INSTRUCTION MANUAL FOR
MICROWAVE LEVEL METER

TYPE
MWLM-PR26

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An operator should read carefully this instruction manual and conduct correct handing.
Safety precautions

- Be sure to thoroughly read the instruction manual before using the products.
- Keep the instruction manual in a safe, convenient location for future reference.
- All or part of the contents described in this manual may be changed without any notice.
- Due to our constant striving for further improvement of products, parts or products that differ from those described in this manual may be substituted.

**WARNING** (Failure to observe this WARNING may cause a fatal or serious injury.)
- Be sure to confirm that any peripheral equipment does not move before installation work. In addition, observe safety requirements for installation work where high-place work is expected.
- Be sure to turn off the power source before wiring, mounting and transportation work. (Failure to observe this WARNING may result in an electric shock/ injury or equipment damage due to short-circuit.)
- Carry out wiring work correctly with reference to a proper drawing.
- Never disassemble the equipment. (Failure to observe this WARNING may result in an electric shock.)
- Do not open the cover under an explosive environmental condition when power is entered. (Failure to observe this WARNING may result in an injury or equipment damage.)
- Do not place or store the equipment in any hostile environmental place where it will be subjected to direct sunlight, rain, water droplet, hazardous gas / water, etc..

**CAUTION** (Failure to observe this CAUTION may cause a moderate injury or equipment damage.)
- Do not use the equipment for any purpose other than the original purpose of use.
- Be sure to confirm the specification of equipment and use the equipment within the range of specification. (Mounting conditions such as temperature, power source, frequency, etc.)
- Make sure a correct wiring before applying power source.
- Do not have a shock or strong impact to the equipment. (Failure to observe this CAUTION may result in equipment damage.)
- Be sure to connect necessary terminals (grounding, etc.).
- Remove all wiring to the equipment before doing electrical welding work near the equipment.
- Do not forcibly bend or pull the lead wire also do not use unnecessarily long wire.
- Tighten the cover, lead outlet, etc. properly so that dust, rainwater, etc. do not enter inside the equipment.
- Do not use the equipment under a corrosive condition (NH₃, SO₂, Cl₂, etc.).
- Be sure to tighten the cable grand so that outer air does not enter inside the equipment.
- When applying piping connection such as conduit, etc. instead of cable gland, apply putty or equivalents On the cable entry so that outer air does not enter inside the equipment.

**IMPORTANT** (indicates notes or information to help customers.)

**Limitations of Warranty:**
- Warranty period shall be one year from the date of delivery (ex-factory).
- Any damage of any other products that have occurred for use of the equipment is not covered by this warranty. Also any loss induced by failure or malfunction of the equipment is not covered by this warranty.
- Failure or malfunction caused by following are not covered by this warranty:
  a. Modification or repair by a party other than MATSUSHIMA's authorized personnel, or replacement of parts not recommended by MATSUSHIMA.
  b. Inadequate storage, installation, use, inspection or maintenance that does not comply with specifications.
  c. Cause for any peripheral equipment or device.
  d. Accident beyond control and force majeure (fire, earthquake, flood, riots, etc.).
- Lack of instructions to MATSUSHIMA for information or safety requirements that can be predicted only by customers' side.

This warranty conditions do not limit customers' legal right.

Price for the equipment does not include any charge for services such as commissioning, supervising, etc.
1. Overview
Microwave level meter measures level of bulk solids and liquids in the storage vessels without physical contact to measuring material. This model of level meter doesn't need separate output unit, which 4-20mA current output signal is carried by same two wires for power supply.

2. Measurement principle
The level meter transmits microwaves at constant intervals, and receives echoes (reflection of transmitted waves) from the surface of material under measurement. The time difference between transmission and reception of microwave is processed by microcomputer to accurately determine level of stored materials.

3. Specifications
3-1. General Specifications

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<td><strong>Antenna</strong></td>
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</table>
1) Power supply ripple voltage must be less than 0.2Vp-p. Noise and surges should not be interfered.

2) When mount on a short stand pipe, install the level meter so that the end of the antenna protrude from the short stand pipe.

3) The measurement range and accuracy are guaranteed only when, antenna is pointed at an angle perpendicular to the material surface, temperature is normal (15°C), permittivity is more than two at high pressure, and no any presence of airborne dust, vapor, and agitated foam.

   If these conditions are not satisfied, the measurement range and accuracy may differ according to the measurement conditions.

4) Ensure that freezing and/or condensing will not occur inside the electronic unit.

5) Take care that water may enter and damage the equipment, if lead outlet not tighten firmly or loosen.

   When the equipment operated in the presence of process gases and/or fluids, those materials may penetrate through resin of cone antenna and damage the equipment, specially corrosive gases such as H2S, HCl and HF.

3-2. Authentication

FCC and IC conformity (only for USA/Canada)

   - This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

   - Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment

   - This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le present appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisee aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioelectrique subi, meme si le brouillage est susceptible d'en compromettre le fonctionnement.

   FCC ID : PVK-MWLM-PR26
   IC   : 10700A-MWLMSPR26
- RF Exposure: A distance of 20 cm shall be maintained between the antenna, and the transmitter may not be co-located with any other transmitter or antenna.

Exposition de RF : Une distance de 20 cm sera maintenue entre l'antenne, et l'émetteur ne peut être coimplante avec aucun autre émetteur ou antenne.

- This device shall be installed and operated in a completely enclosed container to prevent RF emissions, which otherwise can interference with aeronaughtical navigation. Installation shall be done by trained installers, in strict compliance with the manufacture's instructions.

From French Version of RSS-210:

(i) Ce dispositif doit être installé et exploité dans une enceinte entièrement fermée afin de prévenir les rayonnements RF qui pourraient autrement perturber la navigation aéronautique. L'installation doit être effectuée par des installateurs qualifiés, en pleine conformité avec les instructions du fabricant.

- The use of this device is on a "no-interference, no protection" basis. That is, the user shall accept operations of high-powered radar in the same frequency band which may interfere with or damage this device. However, level probing devices found to interference with primary licensing operations will be required to be removed at the user's expense.

(ii) Ce dispositif ne peut être exploité qu'en régime de non-brouillage et de non-protection, c'est-à-dire que l'utilisateur doit accepter que des radars de haute puissance de la même bande de fréquences puissent brouiller ce dispositif ou même l'endommager. D'autre part, les capteurs de niveau à propos desquels il est démontré qu'ils perturbent une exploitation autorisée par licence de fonctionnement principal doivent être enlevés aux frais de leur utilisateur.

- This device shall be installed only by professionally training individuals inside closed containers at permanent fixed positions, pointing in a downward direction.

Ce dispositif sera installé seulement par professionnellement les recipients fermes par interieur de personnes de formation aux positions fixes permanentes, se dirigeant dans une direction de haut en bas.
4. System configuration

This device is two wired which 4..20mA current output signal and power supply are carried on the same two wire cable.

- Power supply : Nominal DC 24V
- Output current signal : DC 4 to 20mA
- Load resistance : Max. 499 Ohm for 24V (total of load resistor 250 Ohm plus cable resistance).

For other configurations, please refer to graph shown in Fig.1.

- Cable size : 0.3mm² to 1.25 mm² (0.01 to 0.49in)
- The size of a grounding wire must be used larger than 1.25mm mm² (0.49 in).

□ When communicating to HART network, loop resistor of 250 Ohm must be connected at power supply side

Optional products for adjustment of level meter
- LCD adjustment unit
- HART modem
- Software for the PC adjustment

Fig. 2. System configuration example
5. Dimensions (Units : mm(in))

- Liquid

Fig. 3. External dimensions for liquid type

- Refer to external dimensions for measurement reference point.
- Basically upper part of mounting compartment is measurement reference point.
Refer to external dimensions for measurement reference point.

Basically upper part of mounting compartment is measurement reference point.
Solid-2

Refer to external dimensions for measurement reference point.
Basically upper part of mounting compartment is measurement reference point.

Fig. 4-2. External dimensions for solid type
6. Installation

6-1. Installation

- If material surface enter to the blind sector, a stand pipe shall be used to ensure that material surface can not reach the blind sector of the level meter. But if the material surface will not enter the blind sector, then stand pipe should not be used.
- If length of stand pipe is longer than required, such that antenna end is not protruded from stand pipe, then it causes malfunction of instrument.
- When required stand pipe length is longer than antenna, please use cone shape stand and ensure radiation angle including the side beam.
  Keep radiation free of interference from the stand pipe.

[Recommended height of stand pipe]
Solid: The end of the horn antenna must be protruded a minimum of 10mm(0.39) from the stand pipe.
Liquid: The end of the antenna must be protruded a minimum of 25mm(0.98) from the stand pipe.

[Calculation of radiation angle expansion]
Solid : Distance from meas. reference point × tan16° + φ98(3.85) (Antenna diameter)
Solid : Distance from meas. reference point × tan28° + φ56(2.2) (Antenna diameter)
Liquid : Distance from meas. reference point × tan48° + φ45(1.77) (Antenna diameter)
6-2. Mounting direction

The spread of the transmitted microwave is different depending on direction of the dot on the antenna. When silo is empty, turn around the dot direction to find out the best point where the greatest reflection echo can be received without any noise.

6-3. Installation precautions

- Set the value of 100%(20mA) level so that the blind sector is secured. Setting the 100%(20mA) level within the blind sector will cause a malfunction of the instrument.
- Avoid too long stand pipe to prevent malfunction of the instrument.
- Do not install instrument close to inlet of material under measurement.
- Do not install any interfering instruments within the side beam, because reflections from beams, pipes, and other supports within the tank will cause false echoes.
• Provide shielding to minimize noise or unwanted reflections, when crossbeams, and other supports are installed within the tank.

![Fig. 10. Installation precaution (3)](image)

**False reflections**

In environments where interfering signals are generated, level meter may indicate incorrect measurements results. False reflections up to a certain level of strength can be suppressed by executing the echo learning function. However, the level meter's installed position must be changed if true echoes cannot be received or if the reflection level (measured in dB) is extremely low. When there are obstructions such as crossbeams, pipes, or level switches in the tank, install the level meter in a position where there is no obstruction within its radiation angle.

⚠️ **Important**: It is not possible to specify the range of false reflections in dB that can be suppressed by the learning function because the level of true echo from the surface of material differs depending on the level meter installation conditions and measuring material type. The general guideline for the level of false reflections that can be suppressed by the learning function is one third (1/3) of true echo level.

• Install protection such as a simple roof above the Level Meter to avoid exposure to direct sunlight.

![Fig. 11. Installation precaution (4)](image)
7. Wiring

7-1. Unscrew the cover. (Rotate counterclockwise)
7-2. If an optional LCD adj. unit is attached, remove it. (Rotate counterclockwise or to direction "OPEN").
7-3. Open the wire entry of terminal block by pushing on the actuating lever with flat screwdriver.
   (Recommended flat screwdriver: Axis diameter 3mm(0.11) and blade tip size 2.6mm(0.1))
7-4. Insert wires as shown on the panel, positive (+) to terminal entry No.1 and negative (-) to terminal No.2. Please wire so that there is no mistake.
   Release actuating lever of the terminal.
7-5. Connect the ground wire to internal earth ground terminal.
7-6. Attach the LCD adj. unit if it had been installed.
7-7. Screw the cover on tightly.

⚠️ Important:
The size of the acceptable cable is max. 1.25mm² (0.3mm² to 1.25 mm²).
(0.01 to 0.49in)

⚠️ Warning:
Do wiring when the instrument is powered OFF. Avoid short circuit and reverse polarity.

The instrument must be supplied with DC power supply, do not apply different voltage.

Tighten the cover and lead outlet firmly after wiring completed.

Fig. 12. Cover detaching
Fig. 13. Wiring technique
Fig. 14. Connection example

8. LCD adjustment unit (GRAPHIC COM II) Optional

- The size of a grounding wire must be used larger than 1.25mm mm² (0.49 in)

□ Left figure shows that LCD Adj. unit removed.
□ Do not touch to the LCD Adj. unit connection terminal, while instrument is powered on.
Table 2. Key functions

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<thead>
<tr>
<th>No.</th>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
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<td>1.</td>
<td>Esc</td>
<td>- Interrupt entry (cancel)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Returns to previous screen</td>
</tr>
<tr>
<td>2.</td>
<td>+</td>
<td>- Moves cursor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Change value</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Change Y axis (reflection) of waveform</td>
</tr>
<tr>
<td>3.</td>
<td>→</td>
<td>- Moves cursor to the left</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Change X axis (distance) of waveform</td>
</tr>
<tr>
<td>4.</td>
<td>Ent</td>
<td>- Enters to menu</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Accepts value</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Shifts to next screen</td>
</tr>
<tr>
<td>5.</td>
<td>Display</td>
<td>Displays parameters and waveforms</td>
</tr>
</tbody>
</table>

9. Start-up

Fig. 15. LCD adjustment unit

Fig. 16. Start-up

- Level meter installation
- Wiring
- Wiring confirmation
- OK?
- Power supply turning on
- Power supply confirmation
- Error code output
- Distance display confirmation
- OK?
- Adjustmen with LCD Adj. unit or PC
- OK?
- Ready to start level measurement

Fig. 17. Measurement range

- "LCD adj. unit","Software for PC adjustment" and "HART modem" are optional products.
- For the error code details, please refer to “Instruction manual for LCD adjustment unit” and “Operating manual for adjustment software Matsushima DTM”.

‡" LCD adj. unit", "Software for PC adjustment" and "HART modem" are optional products.
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‡ For the error code details, please refer to “Instruction manual for LCD adjustment unit” and “Operating manual for adjustment software Matsushima DTM”.
10. Parameter setting
10.1 Measurement span
Sets measurement span corresponding to the process level of 100% and 0%.
Distance: Distance from level meter measuring reference point to material surface

| Ent ×1 |
| Ent ×1 |
| + ×1 |
| + ×1 |
| + ×1 |
| Ent ×1 |
| + ×2 |
| Ent ×1 |

1.000m is changed to 2.000m as an example.

70.000m is changed to 6.000m as an example.

Setting of the measuring span has been completed. Please return to the measurement screen.

Measurement screen (Omitted)
10-2. Damping
Sets time constant for the damping filter. The damping filter smooth the response to a sudden change in process level. This time can be set between 0 and 999 seconds. Keep in mind that the reaction time of the entire measurement will be longer and the sensor will react to measured value changes with a delay.

【Measurement screen】

12345m

Ent ×1

+ ×1

Ent ×1

+ ×2

Ent ×1

Ent ×1

30sec is changed to 0sec as an example.

+ and → × Several time

Ent ×1

Setting of the damping has been completed. Please return to the measurement screen.

Esc ×>3

Measurement screen (Omitted)
10-3. Current output
Selects the 4-20mA current output mode corresponding to the process level 0-100% and alarm current value.

**Measurement screen**

![Measurement screen diagram]

20-4mA is changed to '4-20mA' as an example.

**Current output set other settings**

- "2.Alarm output sel". Selects alarm current value to output whenever measured value is not correct due to loss echo or other erroneous condition.
  Possible selection: Hold / Sel.val / Max. / Min.
  Hold → Output remains at previous measured result.
  Sel.val → Value set by "5.Sel.alarm current val" is output.
  Max. → Value set by "3.Max.current sel" is output.
  Min. → Value set by "4.Min.current sel" is output.

- "3.Max.current sel". Selects current value to output when "Max." is selected by "2.Alarm output sel".
  Possible selection: 20mA / 20.5mA / 22mA

- "4.Min.current sel". Selects current value to output when "Min." is selected by "2.Alarm output sel".
  Possible selection: 4mA / 3.6mA / 3.8mA

- "5.Sel.alarm current val". Sets current value to output when "Sel.val" is selected by "2.Alarm output sel".
  Setting range: 3.6mA to 22.0mA

**Meaning of "Current output sel" item**

- $4\cdot20mA = 100\%$ Level(Upper level) : 20mA
  0% Level(Lower level) : 4mA
- $20\cdot4mA = 100\%$ Level(Upper level) : 4mA
  0% Level(Lower level) : 20mA
10-4. Echo learning of false echo
Sets mask to unwanted reflections (false echoes or noise echoes) being received from obstructions within a tank.

⚠️ Important: In most cases sets distance from level meter to unwanted reflections as echo learning distance. If there is true echo between the level meter and the masking distance, then echo learning distance shall be set as distance to true echo. Actual distance to mask will be around 1m less than the entered value.

---

**Measurement screen**

1. 3 4 5 m

```
   Ent ×1
```

```
   + ×2
```

```
   Ent ×1
```

```
   + ×1
```

```
   Ent ×1
```

```
   + and  □ × Several time
```

```
   + ×1
```

Continue on next page.
Continued from previous page.

It changes from the display of " - " to the display of "Update".

'Ent' The button is pushed, and "Update" is selected.

When echo learning ends, the message "Echo learning" at lower screen will be cleared.

Setting of the echo learning was completed. Please return to the measurement screen.

- "Selectable execution
  [Clear / Update / Addition]

Clear : Deletes all echo learning data.
Update : Deletes current echo learning data and writes new data.
Addition : Addition of echo learning data
  The data that had been input in the past is not deleted and new data is added.
10-5. Reset
There are two reset options. Use "Measuring reset" to restart measurement without affecting parameters. Use "Parameter reset" to reset parameters to the default settings.

Important: "Parameter reset"
- Parameter reset returns various parameters to instrument default. Please take note of current settings before execute parameter reset.
- It is possible to clear echo learning range and strength by using the optional PC software, but echo learning setting described in article 10-4 does not clear even when reset is executed.
- There are two reset types described above, but there is menu item "Factory reset" might be displayed. This reset type used at factory setting and user can not apply this reset.

[Measurement screen]

1 2 . 3 4 5 m

Ent ×1

+ ×5

Ent ×1

Ent ×1

Ent ×1

+ ×2

_measurement screen (Omitted)

'Parameter reset' is changed to '·' as an example.

When reset completed, "Communication" display will be cleared.

Click Esc three times to return to measurement screen.

Measurement screen (Omitted)
10-6. Current output test
Allows you to input simulation value in order to test the functioning of the current output.

⚠️ Important: When you are ready to end the simulation, click on 'Esc' to return the instrument to the actual level measurement.

![Measurement screen]

The message “Testing” blinks during simulation. Click “Esc” to interrupt simulation.

50% is output as an example.

In this manual, only setup steps of the typical parameters have been described. Please refer to “Instruction manual for LCD adjustment unit” and “Operating manual for adjustment software Matsushima DTM” for other settings.
11. Troubleshooting

If you encounter any problems, first check if they are described in this section, then execute suggested corrective actions.

### Table 3. Troubleshooting

<table>
<thead>
<tr>
<th>No.</th>
<th>Problem</th>
<th>Check the following</th>
<th>Corrective actions</th>
</tr>
</thead>
</table>
| 1   | Powered ON the device, but screen is blank   | • Are wiring connections correct?  
     |                                              | • Check whether the power is supplied to the device?  
     |                                              | • Correct the wiring  
     |                                              | • Supply power to the device                                                          |
| 2   | Measured level reading higher than material  | • Are there any obstructions between antenna and material surface to be measured?  
     | level                                       | • Are there any inlet streams of material under measurement within the radiation angle |
     | level                                       | • Execute echo learning to mask false echo from the obstacle  
     | level                                       | • Change the level meter position                                                   |
| 3   | Measured level reading lower than material   | • Check whether the material surface entered to the blind sector?                   |
     | level                                       |                                                                                     | • Change level meter installation                                                  |

### Table 4. Error codes

<table>
<thead>
<tr>
<th>No.</th>
<th>Error code</th>
<th>Error type</th>
<th>Description</th>
<th>Corrective actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>E8000</td>
<td>SRAM Error</td>
<td>SRAM failure</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>E4000</td>
<td>EEPROM Error</td>
<td>EEPROM failure</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>E2000</td>
<td>MIC Error</td>
<td>MIC unit failure</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>E1000</td>
<td>Trig Error</td>
<td>Trigger signal lost</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>E0800</td>
<td>LCD Error</td>
<td>LCD adj. unit failure</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>E0400</td>
<td>Charge Error</td>
<td>Charge circuit failure</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>E0200</td>
<td>I2C Checksum error</td>
<td>Communication between level meter and LCD adj. unit failed</td>
<td>Turn off device power and turn on again</td>
</tr>
<tr>
<td>8</td>
<td>S.CPU</td>
<td>Level meter not responding</td>
<td>No response from level meter</td>
<td>Turn off device power and turn on again</td>
</tr>
<tr>
<td>9</td>
<td>S.I2C</td>
<td>I2C Checksum error</td>
<td>Communication between level meter and LCD adj. unit failed</td>
<td>Ensure LCD adj. unit attached properly</td>
</tr>
</tbody>
</table>
| 10  | E0080      | Lost echo  | • Reflection echo is currently being detected  
     |                                              | • There is no reflection echo  
     |                                              | • There is no reflection echo in the measurement span  
     |                                              | • Check whether there are adhesives in the horn antenna. If there is adhesives, clean the horn antenna  
     |                                              | • Optimize measurement span  
| 11  | E0008      | Min. meas. limit over             | Measured distance is lower than "Min. meas. limit"  
     |                                              |                                                                                   | Check setting for Min. and Max.meas. limit over, and Upper and Lower range limit over. If you set invalid then error message must be clear. Please note that those settings can be altered by optional PC software only. You can not change by LCD adj. unit |
| 12  | E0004      | Max. meas. limit over             | Measured distance is higher than "Max. meas. limit"  
| 13  | E0002      | Upper range limit over            | Measured distance exceeds "Upper range limit over (100% over)".  
     | (100% over)                              |                                                                                   |                                                                                   |
| 14  | E0001      | Lower range limit over            | Measured distance undergoes "Lower range limit over (0% over)".  
     | (0% over)                                |                                                                                   |                                                                                   |

Error message No.11 to 14 will be displayed, only when appropriate settings are set to "Valid" by PC adjustment software Matsushima DTM. The default settings are "Invalid".

If problem persists, please contact your local Matsushima sales office.

### Table 5. Periodic inspection

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Descriptions</th>
<th>Interval (standard)</th>
</tr>
</thead>
</table>
| 1   | Check of appearance  | Confirm whether there is damage on housing etc.  
     |                    | Tighten the cover and lead outlet  
     |                    | Tighten the bolt for installation fixture        | Every 12 months |
| 2   | Check of antenna    | Clean the antenna (Solid: Inside, Liquid: Outside)| Every 6 to 12 months |

⚠️ Important: Standard periodic inspection interval differs depending on measurement condition and measuring material.
12. Menu structure

All values shown here are parameter defaults.

### Main menu

- **Identification setting**
  - 1. Tag = SENSOR
  - 2. Description = PULSE-RADAR
  - 3. Message = LEVEL METER
  - 4. Installation Day = 2011/01/01

- **Basic setting**
  - 1. Application
    - Meas. unit = m
    - Measuring object = Liquid
    - Level change rate = Normal < 1m/min
  - 2. Meas. range span
    - Full setting: Distance = 0m, Percent = 100%
    - Empty setting: Distance = 70m, Percent = 0%
  - 3. Damping = 0s

- **Sensor adjustment**
  - 1. Current output set
    - Current output sel. = 4-20mA
    - Alarm current sel. = Hold
    - Max. Current sel. = 20mA
    - Min. Current sel. = 4mA
    - Sel. Alarm current = 22mA

- **Graph display**

- **Self test**

- **Reset**

- **Current output test**

- **HART communication**

- **Sensor information**

- **Display**

- **Service**

---

**Input range**

@ABCDEFGHIJKLMNOPQRSTUVWXYZ
POQRSTUVWXYZ[¥]_‘SP!"#$%’()<,.;/0123456789:;<=?`

**Setting range**

- Meas. Unit = m / f t
- Measuring object = Liquid / Solid
- Level change rate
  - Normal < 1m/min
  - Fast > 1m/min

- Full setting
  - Distance = 0~70.000m
  - Percent = 0~100.00%
- Empty setting
  - Distance = 0~70.000m
  - Percent = 0~100.00%

**Setting range**

0~999 s

- Current output sel.
  - = 4.20mA / 20.4mA
- Alarm current sel.
  - = Hold / Sel..val / Max / Min
- Max. current sel.
  - = 20mA, 20.5mA, 22mA
- Min. current sel.
  - = 4mA, 3.6mA, 3.8mA
- Sel. Alarm current val.
  - = 3.6mA~22.0mA
3.2 Meas. adj.

- **Echo learning**
  - Distance = 0.000 m

- **TW adjustment**
  - Distance = 0.000 m

- **Setting range**
  - Distance

- **Graph display**
  - 4
  - 1. Echo curve (EC)
  - 2. Echo detection curve + EC + TW

- **Screen of echo curve**

- **Screen of EDC + EC + TW**

- **Self test**
  - OK
  - Diagnosis result

- **Reset**
  - Measuring reset
  - Parameter reset
  - Factory reset

- **Current output test**
  - 1. Percent = 100%
  - 2. Current = 20.000 mA

- **HART communication**
  - 1. Polling address = 0
  - 2. Preamble number = 5

- **Sensor information**
  - Manufacturer = Matsushima
  - Device type = MWLM-PR26
  - Serial number = 0
  - Firmware version = 1.00
  - Order number = 0
  - Factory adj.date = 2010/5/26

- **Display**
  - 1. Display setting = Distance
  - 2. Language = English

- **Level distance**
  - Level
  - Current

- **Language**
  - English / Japanese