Unpacking

If you are reading this document, you have already opened the box containing your instrument. While following the basic safety instructions provided below, proceed with unpacking the content of this box.

Basic safety

Personnel

WARNING

Only properly certified and authorized personnel should be charged with instrument installation, electrical connection, commissioning, operation and maintenance.

Depressurize the vessel before opening the instrument connection. Any process media released may cause severe injuries.

Carefully plan any installation, modification or repair before actually proceeding.

Electrical

WARNING

Do not make electrical connections unless the electrical code designation stamped on the instrument data plate matches the classification of the area in which you want to install the instrument. Failure to comply with this warning can result in fire or explosion.

Use only tools compliant with national insulation standards, e.g., DIN EN 60900.

Use only non sparking tools when installing the instrument in hazardous areas.

Improper use

It is prohibited to use the instrument for any of the following, including but not limited to:

• A climbing aid, e.g., for mounting purposes.
• A support for external loads, e.g., as a support for pipes.
• By adding material, e.g., by painting over the name plate, or welding/soldering on parts.
• By removing material, e.g., by drilling the housing.
What’s in the box

- LWT series instrument head
- Instrument coupler
- Probe (not shown in Figure 1)
- Quick Start Guide (this document)
- USB key (with user guide, safety guide, datasheet, customer data package [optional])

Should any part of the package be damaged upon reception, contact ABB customer service as indicated on the back cover of your user guide.

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Figure 1  LWT300 series typical installation

1. The instrument head and coupler are delivered already assembled unless the remote head option was ordered.
Basic physical installation

Below is a list of basic steps necessary to properly install LWT series instruments, as recommended by ABB. All installations should be performed by certified and authorized personnel in accordance with all applicable local security codes (electrical, engineering, etc.).

Here are the basic installation steps:

1. Access and properly secure the installation site (vessel depressurization and cool down, mains power down, etc.).
2. Attach the probe to the head/coupler assembly.
3. Slide the probe in the vessel and attach the probe/coupler assembly on the flange.
4. Connect the mains to the head unit.
5. Power up and configure the instrument.

The steps indicated above are explained in more details in the LWT series User Guide.

Simple connection diagram

Here is a simple power connection diagram for LWT series instruments installed in a non-explosive location.

Initial software setup

Initial setup of the instrument is performed via the Easy Setup menu. Below you will find menu items, factory-set values (in bold) and lists of all available values when you click Select from the Easy Setup screen (if you need to configure your instrument for an oil & gas application, see “Configuring instrument for oil & gas applications” on page 6).
<table>
<thead>
<tr>
<th>Submenu</th>
<th>Default value</th>
<th>Available values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Application Category</strong></td>
<td>Water-Based (DC&gt;10)</td>
<td>Water-Based (DC&gt;10)</td>
</tr>
<tr>
<td>(type of measurement performed)</td>
<td></td>
<td>Liquid mix. (3&lt;DC&lt;10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oil Based (DC&lt;3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Solid (organic)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Solid(Others)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interface</td>
</tr>
<tr>
<td><strong>Set PV</strong></td>
<td>Level</td>
<td>Level</td>
</tr>
<tr>
<td>(primary value measured)</td>
<td></td>
<td>Distance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ullage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interface1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thickness¹</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interface Distance¹</td>
</tr>
<tr>
<td><strong>PV Unit</strong></td>
<td>in (inch)</td>
<td>m (meter)</td>
</tr>
<tr>
<td>(measurement unit for the primary value)</td>
<td></td>
<td>cm (centimeter)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mm (millimeter)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ft (feet)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>in (inch)</td>
</tr>
<tr>
<td><strong>Empty/Zero</strong></td>
<td>Factory-set based on full span of probe length</td>
<td>Customizable</td>
</tr>
<tr>
<td>(distance between the process connection and the starting point of the measuring level range)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Full/Span</strong></td>
<td>Factory-set based on full span of probe length</td>
<td>Customizable</td>
</tr>
<tr>
<td>(the distance between the minimum level and the maximum level)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Max Level Rate</strong></td>
<td>Medium</td>
<td>No Filter</td>
</tr>
<tr>
<td>(rate at which the vessel should reach its maximum level)</td>
<td></td>
<td>Very Slow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slow</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Medium</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fast</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Very Fast</td>
</tr>
<tr>
<td><strong>Display Line1 View1</strong></td>
<td>Level</td>
<td>Level</td>
</tr>
<tr>
<td>(first line of text on the first screen displayed, under the measured value)</td>
<td></td>
<td>Ullage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PV Percent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>External Temperature</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Empty</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Distance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Span</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Probe Length</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Media Level</td>
</tr>
</tbody>
</table>

All menus available in your LWT instrument are explained in more details in the accompanying user’s guide.

¹ When Interface application category is selected
Oil & Gas Application-specific Considerations

The oil & gas market is the main user of Modbus guided-wave radar level transmitters. As such, specific considerations are in order.

Mounting

- Avoid mounting the instrument too close to the vessel inlet or to internal objects (15 cm [6 in]).
- For applications where turbulence is often present, the probe can be anchored to the bottom of the vessel (grounded) (in menu Device Setup > Application Setup > End of Probe Mode).
- If you suspect that the probe can come in contact with the nozzle, use a spacer.

Process

- Do not stack bushings to connect the coupler to the vessel (use 3-to-¾–inch NPT metal bushings (order code A3) and 4-to-¾–inch NPT metal bushings (order code A4) on vessels with 3 in and 4 in threaded connections).
- Ensure a good electrical connections between coupler and vessel (if metallic). Rust and corrosion should be avoided.
  - Limit the use of PTFE (Teflon™) tape as much as possible to keep a good electrical connection between coupler, bushing and vessel.
- Avoid long nozzles (>61 cm [24 in]) (You can adjust the nozzle length in the menu Device Setup > Application Setup > Nozzle Length).
- Avoid nozzles equipped with reducers (use of a coaxial probe is preferred in such cases).
- Avoid nozzles with a section extending inside the vessel. If it is impossible to avoid 1) use a blocking distance to account for the internal section of pipe or 2) check the waveform for signal quality and, if still not acceptable, replace by a coaxial probe.
- For non-metallic vessels, mount the coupler on a metallic flange, a metal sheet (>15 cm [6 in]) or a 4-to-¾–inch bushing.

Changing the probe length

After changing the physical length of the probe, you must change the factory-set probe length configured in the instrument (in menu Device Setup > Application Setup > Probe Length). This procedure is explained on page 49 of the LWT300 User Guide. Probe length is the distance between the sensor reference point and the top of the weight (see Figure 4 below).
IMPORTANT: The probe length value entered must be accurate to <2.5 cm (1 in).

End of probe
- To improve performance and minimize the size of the dead zone, we recommend using the puck-shaped weight (height: 2.5 cm [1 in], diameter: 7.3 cm [2 7/8 in]) (ABB order code QP6).
- Use "long" weights ONLY if the diameter of the vessel top opening does not allow you to use of the puck-shaped version.

Configuring instrument for oil & gas applications
The following parameters need to be configured specifically for oil & gas applications. Configuration of these parameters is explained in more details in the LWT300 User Guide:
- Type of application (in menu Easy Setup > Application Category) (see "Application Category" on page 4 of this document).
  – (If the application category selected is Interface (to measure the interface between liquids, e.g., oil on top of water), you must set the dielectric constant (DC) of the first liquid that the pulse will encounter (in this case, oil) in menu: Device Setup > Sensor Setup > Upper Media DC (see LWT300 User Guide on page 47). (Appendix D of the LWT300 User Guide contains a list of dielectric constants for common substances).
- Calibration parameters (Empty/Zero, Full/Span, Level Offset) (in menu Calibrate > Level > Level Calibration) (for details, see Figure 5 below.)

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**Figure 5** Calibration parameters

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6 Oil & Gas Application-specific Considerations
• Dynamic variables (in menu Device Setup > Dynamic Variable > Set PV, Set SV, Set TV, Set QV). The LWT instrument can monitor up to four variables. These variables are identified as primary (PV), secondary (SV), tertiary (TV), and quaternary (QV). If you initially configured your LWT instrument with the help of the Easy Setup menu, you have already defined the primary variable (PV). You can also monitor three more variables.

**NOTICE**

As is commonly accepted practice, the first two variables (PV and SV) relate to variations on distance measurements (Level, Distance, Ullage, Interface, Thickness, Interface Distance) whereas the last two variables (TV and QV) allow for monitoring of additional variables (Amplitude, Electronics Temperature, Interface Amplitude, GPC Dynamic Factor, External Temperature [linked to pt100 external temperature sensors; see “PT100 temperature sensors” on page E99 of LWT300 User Guide]). Available variables depend on configuration choices made elsewhere (application category, linearization status or output type, etc.)

• Parameters of application (tank type, nozzle length) (in menu Device Setup > Application Setup) (see LWT300 User Guide on page 49)
• Maximum level rate (in menu Device Setup > Filtering > Max level rate) (see "Max Level Rate" on page 4 of this document).
• Blocking distance (in menu Device Setup > Safety Settings > Blocking Distance) (see Figure 6 below) (for more information on blocking distance, refer to the LWT300 User Guide).

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**Figure 6** Blocking and safety distances

![Blocking and safety distances](image)

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**Finalizing the instrument setup**

• It is considered good practice to reset echo tracking after modifications have been made to an instrument setup. This is performed in menu Device Setup > Sensor Setup > Reset Tracking where you select OK to perform the echo tracking reset.
• At the end of the installation, it is also considered good practice to confirm proper installation by taking a look at the generated waveform. Go to menu Diagnostics > Waveform > At sensor Ref. Point and check the quality of the waveform (see Figure 7 below; the waveform section close to the reference point should not show ringing and the pulse at the level or interface distance should be identified by the marker) (refer to LWT300 User Guide on page 79).
• If you have emptied the vessel before installing the instrument, you should confirm the probe length status (in menu Diagnostics > Device Status > Probe Length Status) (refer to LWT300 User Guide on page 80) to make sure that the configured probe length is identical to the probe length measured by the sensor.

**NOTICE**

Probe length confirmation can only be performed if the tank in which the probe is installed is completely empty.

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**Figure 7** The waveform display

1. Display of the level (LVL), distance (DIS), ullage (ULL) or interface (INT) value
2. Display of the blocking distance (BLK) or safety distance (SFD)
   **Note:** This is the only highlighted option that is editable (see 4)
3. Level or interface marker
4. Exit (↑) or Edit (▼) indicator
5. Zoom information
6. Reference distance
7. Display value selector
8. Blocking distance (or safety distance, if SFD selected in 2) marker

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8  Oil & Gas Application-specific Considerations