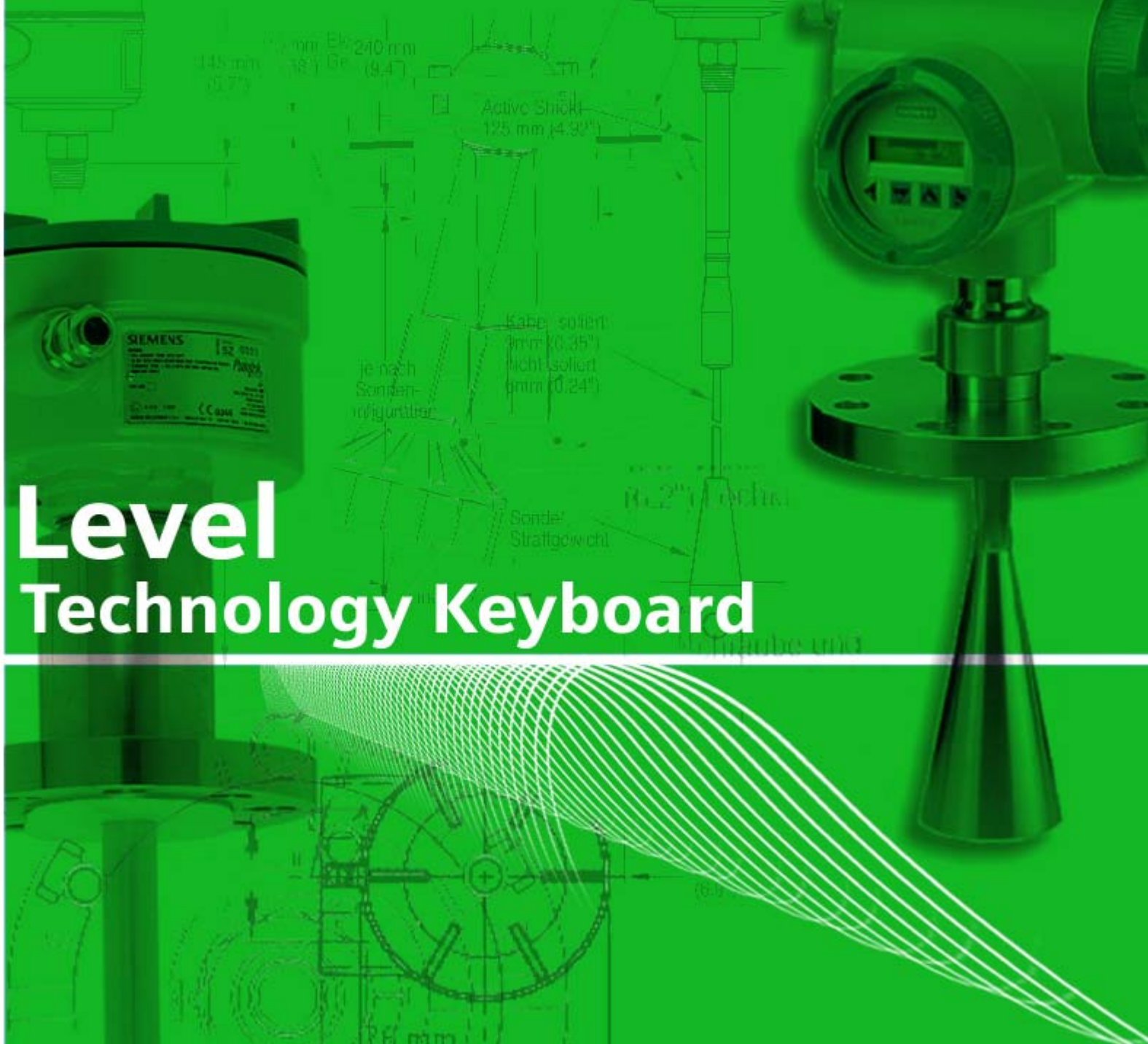


Level
Technology Keyboard

OPEN

SIEMENS

Level Technologies

- **Continous**
  - **Mechanical**
    - Servo Displacer
    - Servo Sense Disc
    - Float
    - Magneto-strictive
  - **Electronic contact**
    - Capacitance
    - TDR
    - Conductive
    - Hydrostatic
      - Delta P
        - Absolute
      - Submersible
        - Bubble System
  - **Electronic Non contact**
    - Ultrasonic
    - Optical Laser
    - Nucleonic
    - Static weighing
    - Radar
      - Chirp
        - Reflectometer
        - Low / High Frequency
      - Puls
        - FMCW
        - CW
  - **Interface**
    - Servo Displacer
    - Capacitance
    - TDR
    - Ultrasonic
    - Radar
    - Hydrostatic
- **Point Level**
  - **Overfill Protection**
    - Oscillating Vibrating
    - Capacitance
    - Conductive
    - Nucleonic
    - Hydrostatic
    - Optical Laser
    - Ultrasonic
    - Radar
    - TDR

COMPARISON

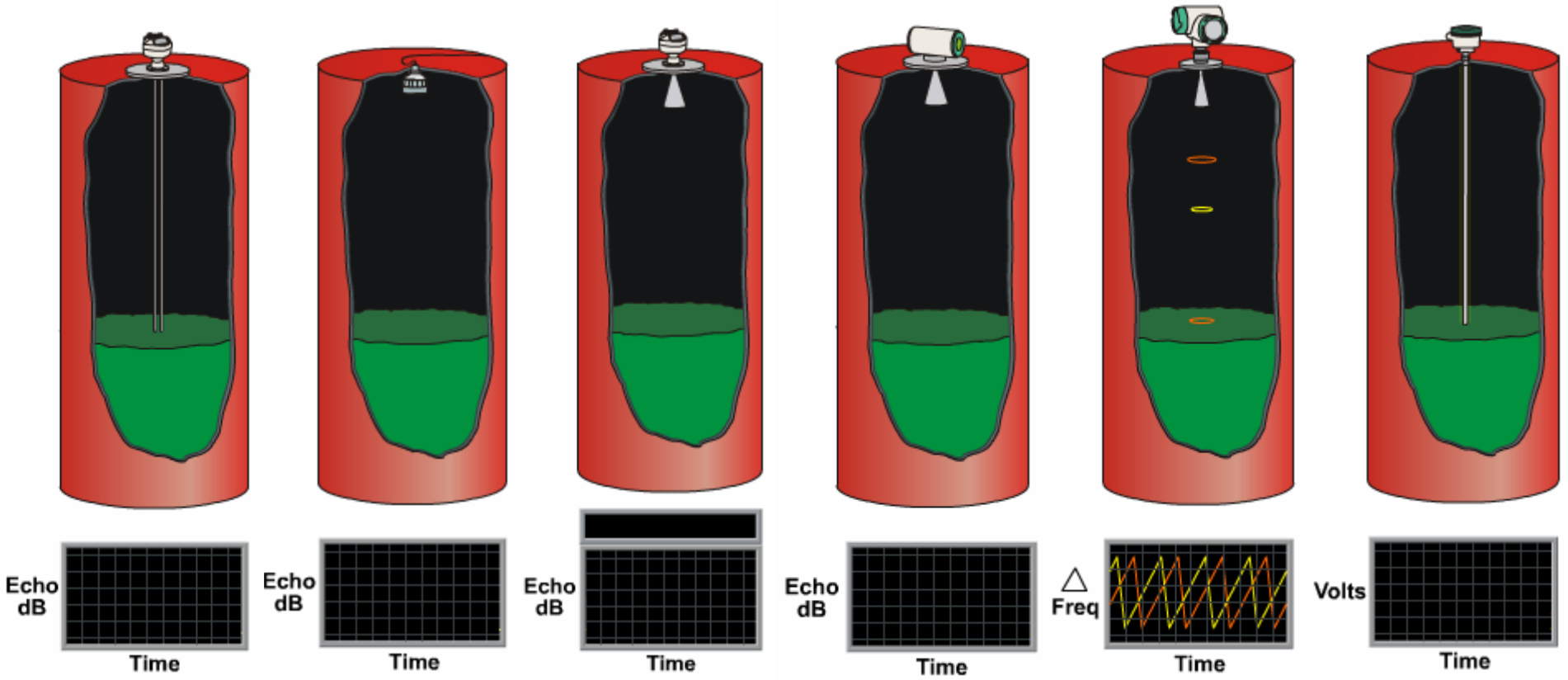
CLOSE

SIEMENS

Level measurement technologies

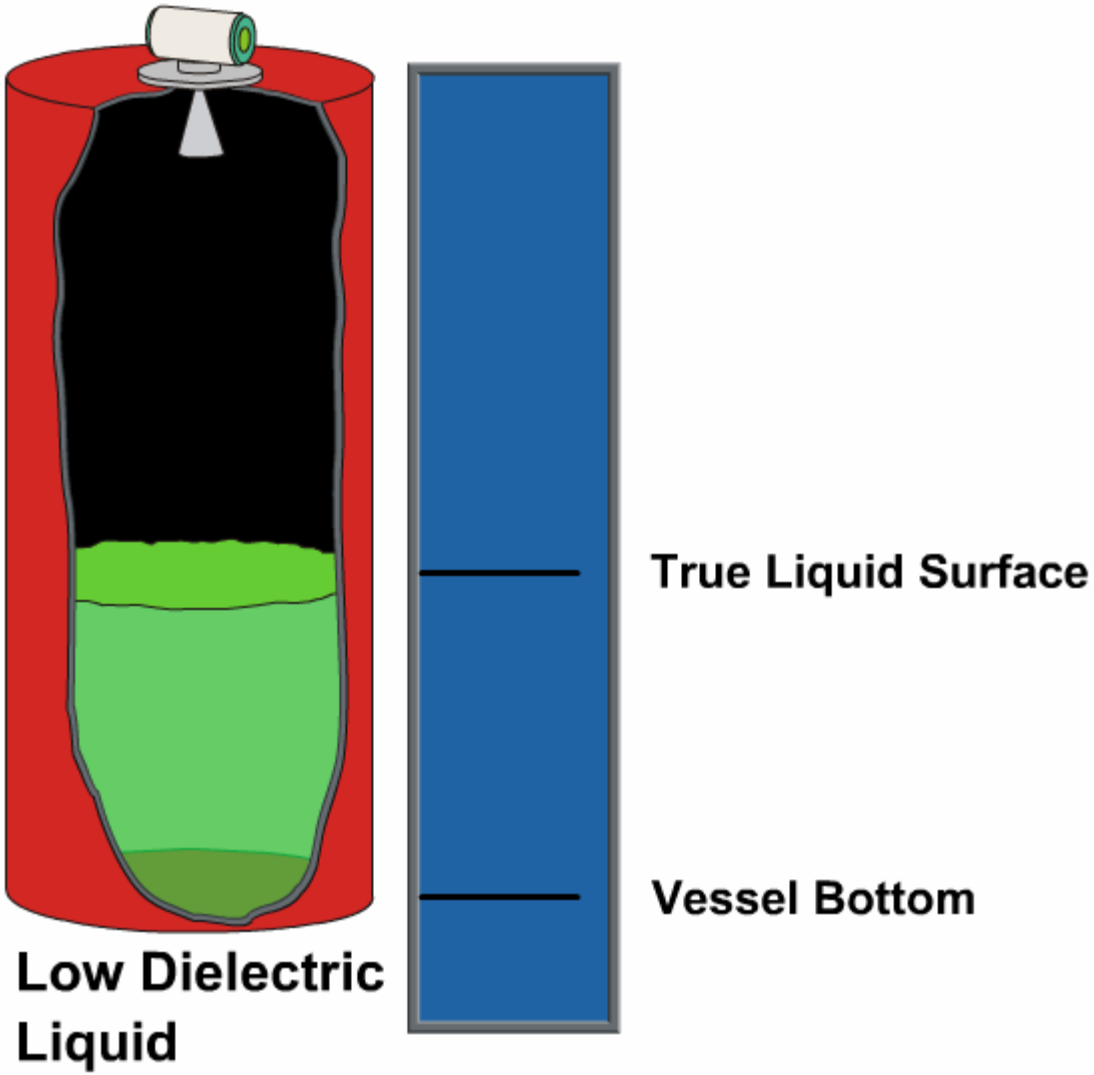
CLOSE

Sitrans LR	Sitrans LU	Sitrans LR 200	Sitrans LR 300	Sitrans LR 400	Sitrans LC 500
Guided Radar / TDR	Ultrasonic	2 wire Pulse Radar	4 wire Pulse Radar	4 wire FMCW Radar	Capacitance



Pulse Radar on Low Dielectric Liquid

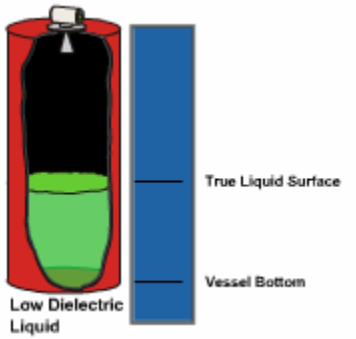
Explanation



Back to overview

SIEMENS

Radar on Low Dielectric Liquid



Introduction:
When watching this animation the audience should be noting the following observations.

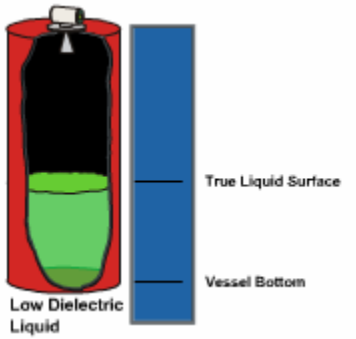
- **U**nlike higher dielectric liquids which strongly reflect echoes on low dielectric liquids the transmit pulse penetrates the liquid surface before the signal is reflected.
- **A**s the liquid level approaches the bottom of the vessel the radar device will detect a small echo from the vessel bottom as well as the liquid surface echo, look for the two echoes on the second pulse transmission
- **W**hen the liquid gets even closer to the bottom of the vessel the echo from the vessel bottom will be stronger and will be the only echo detected

Back to animation

Back to overview

SIEMENS

Radar on Low Dielectric Liquid



Back to animation

The Scene:

A vessel is half full of a low dielectric liquid. A pulse radar device is mounted on the top of the vessel. The pulse radar device will transmit three separate pulses. Between each pulse transmission the liquid level will go down until it is near the bottom of the vessel. After each pulse is reflected an echo will return to the radar device and the resulting echo detection profile will be displayed in a chart window parallel to the vessel.

The Action:

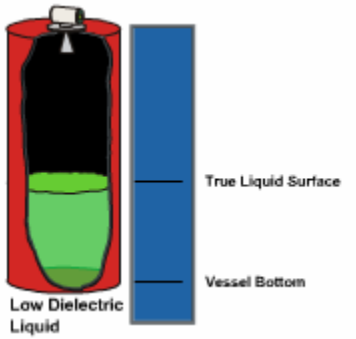
First pulse

The vessel is half full of low dielectric liquid. The pulse radar device transmits a pulse toward the liquid surface. The pulse contacts the liquid surface, as indicated by the “splash rings”, and to penetrate the liquid a small amount. A reflection echo bounces off of this sub-surface boundary layer and returns to the radar device. Once the echo has been received by the radar device the resultant echo profile is displayed in the chart window parallel to the right of the vessel. The echo profile shows a large target echo however the echo is slightly below the actual liquid surface. This produces a measuring error indicating less liquid than what is actually in the vessel.

Back to overview

SIEMENS

Radar on Low Dielectric Liquid



Back to animation

Second pulse

The liquid level drops to approximately one quarter of the vessel height. The radar device transmits a second pulse. Again the pulse penetrates the liquid prior to reflecting an echo. A small bit of the transmit pulse continues through the liquid. This small transmit pulse would normally be absorbed by the liquid but in this case with a low dielectric liquid the pulse continues until it hits the bottom of the vessel. There is enough power in this second echo to reflect back up to the radar device. Therefore we see two echoes returning from this transmission, one from the liquid and one from the vessel bottom. The echo profile shows the strong echo from the liquid surface as well as a small echo from the vessel bottom.

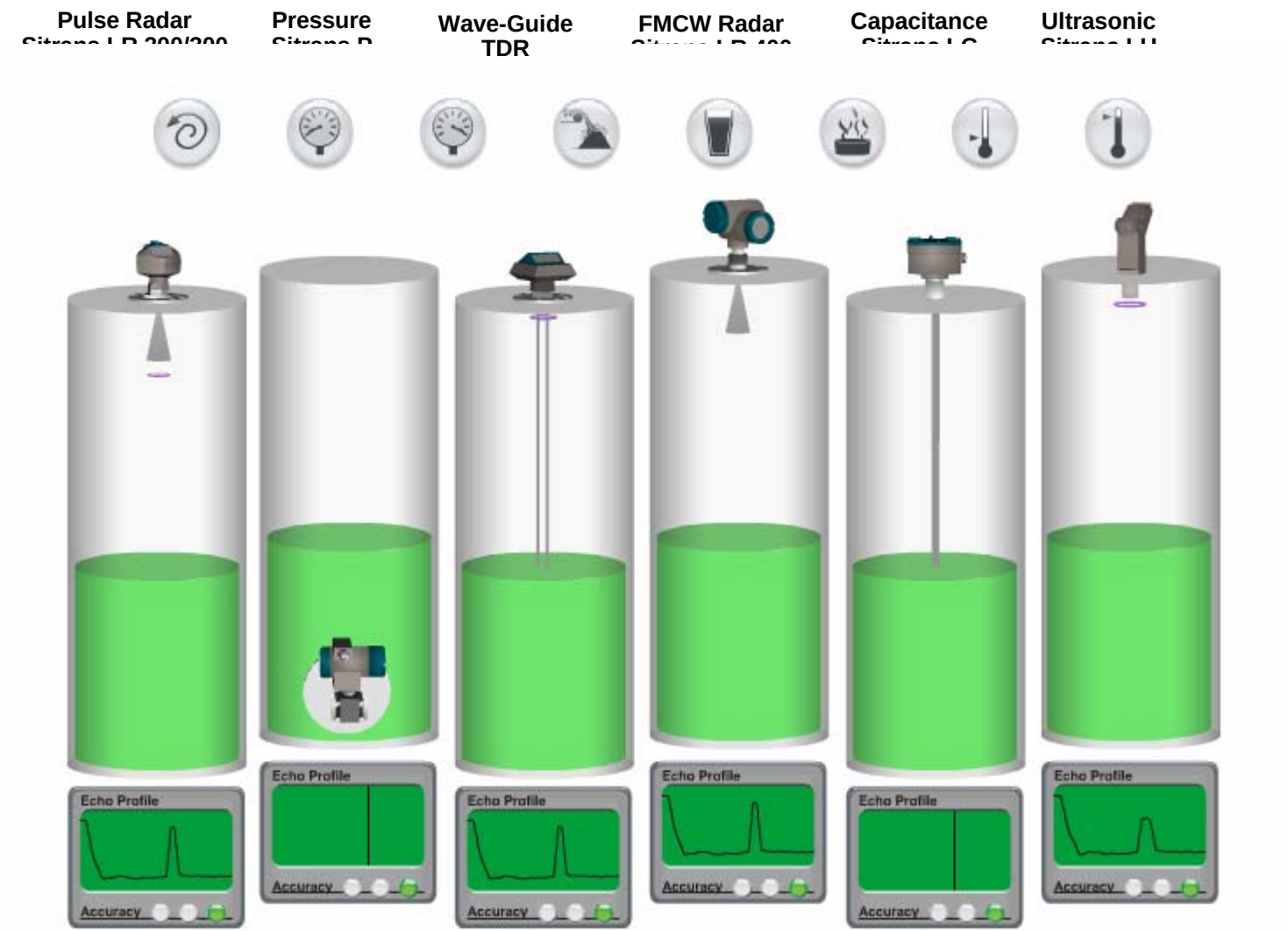
Third pulse

The liquid level drops to within 30cm of the vessel bottom. The transmit pulse is sent by the radar device. The pulse hits the surface and continues into the liquid as above. This time, however, the vessel bottom is within the “boundary zone” where we would normally have detected the liquid level. The transmit pulse reflects strongly from the vessel bottom and returns to the radar device. The echo profile shows only the much stronger tank bottom echo without any echo indicating a liquid surface. At this low liquid level the liquid can be considered to be transparent in respect to the transmitted radar pulse.

Back to overview

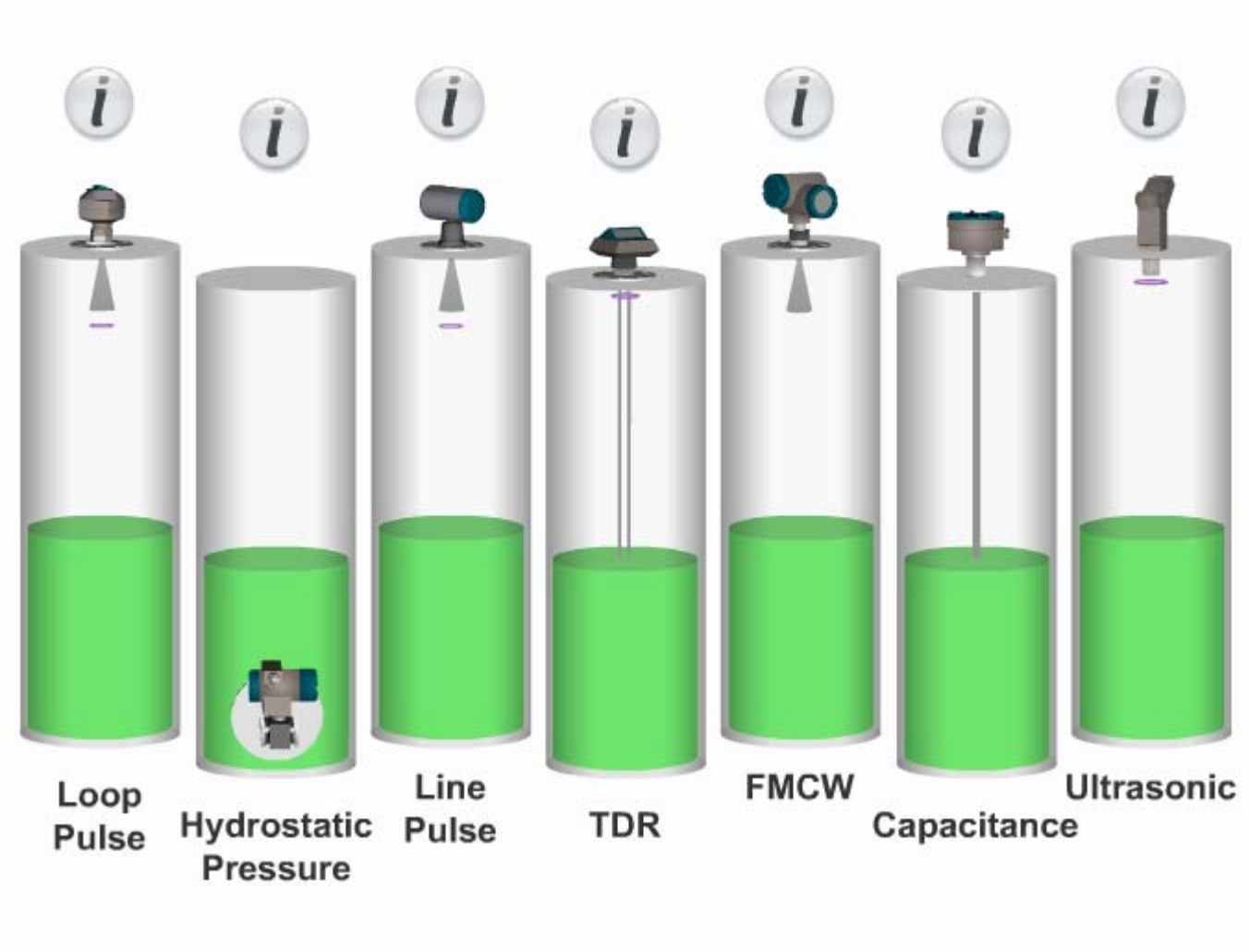
SIEMENS

Simulation of process conditions / applications



Back to overview

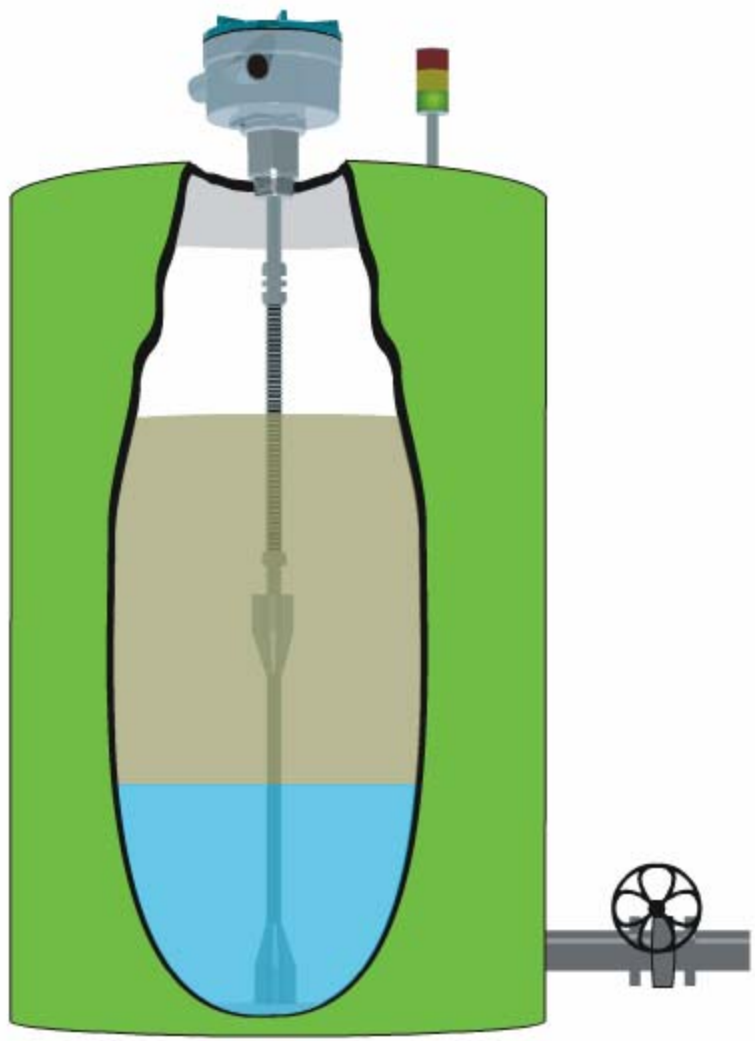
SIEMENS



Back to overview

SIEMENS

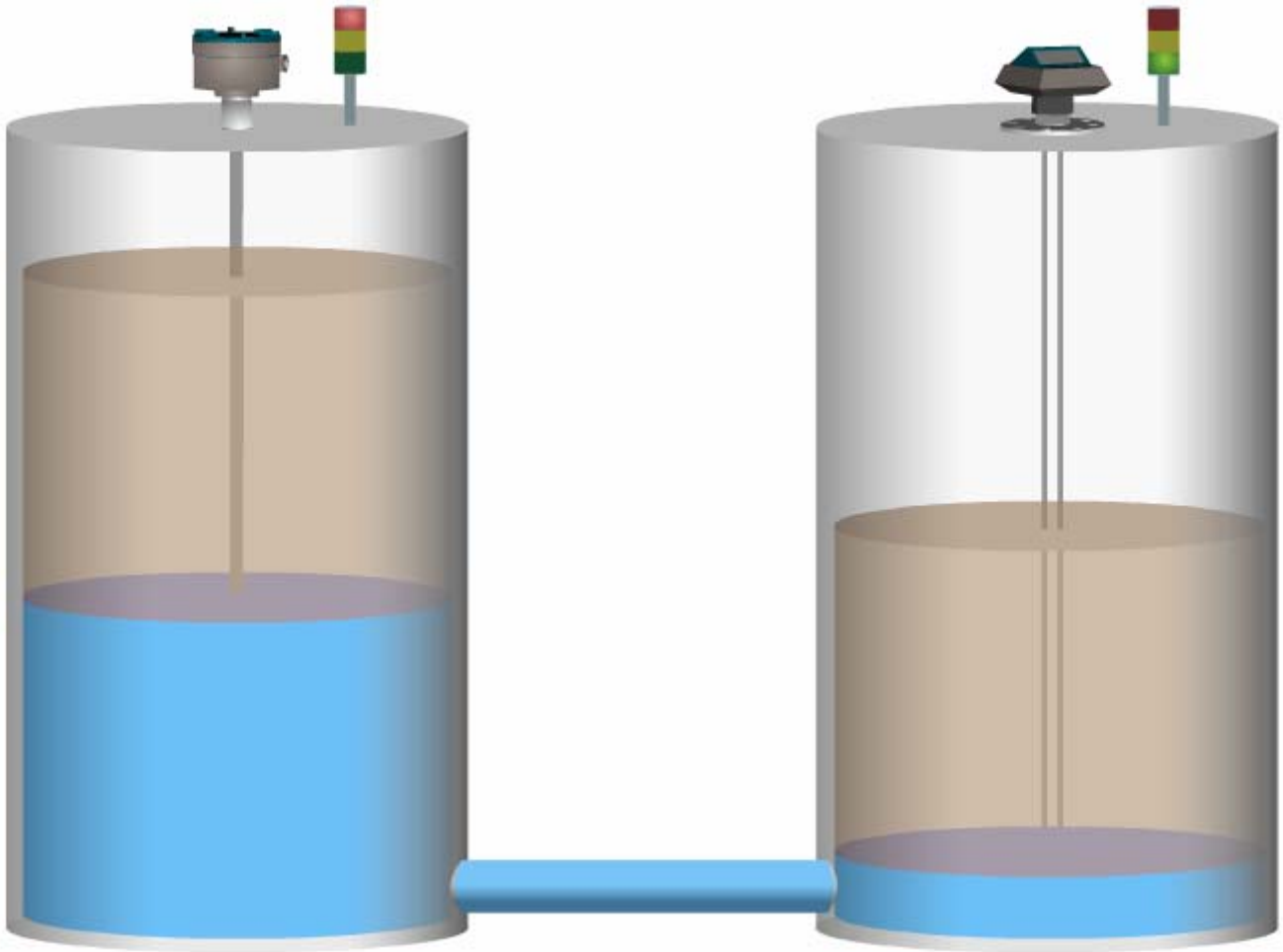
SITRANS LC 500 Interface version



Back to overview

SIEMENS

Capacitance vers TDR Interface Measurement



Back to overview

SIEMENS