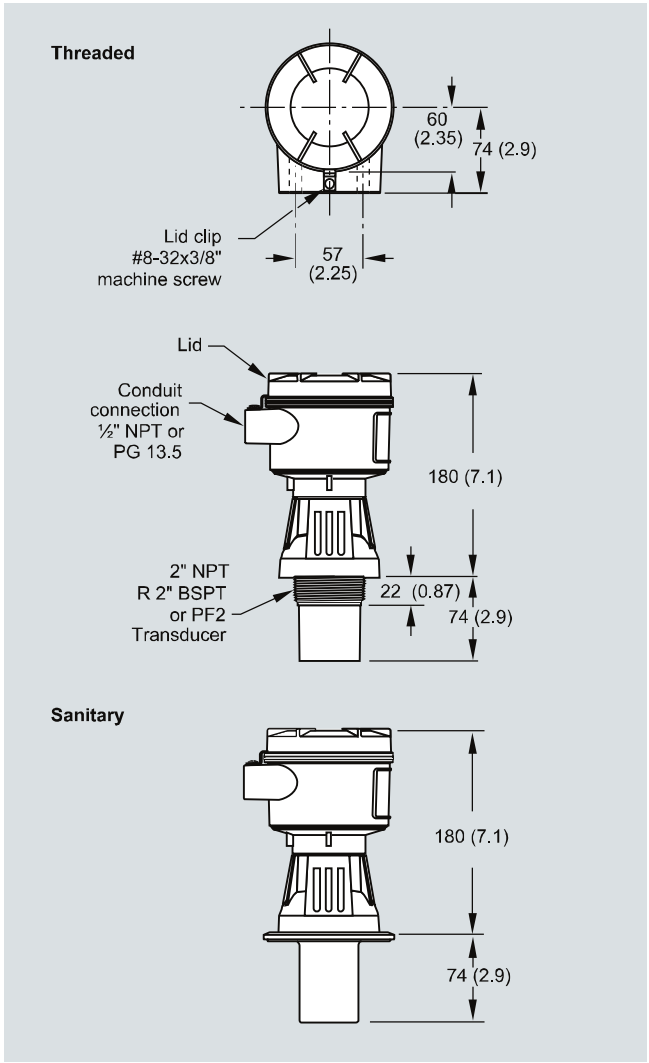
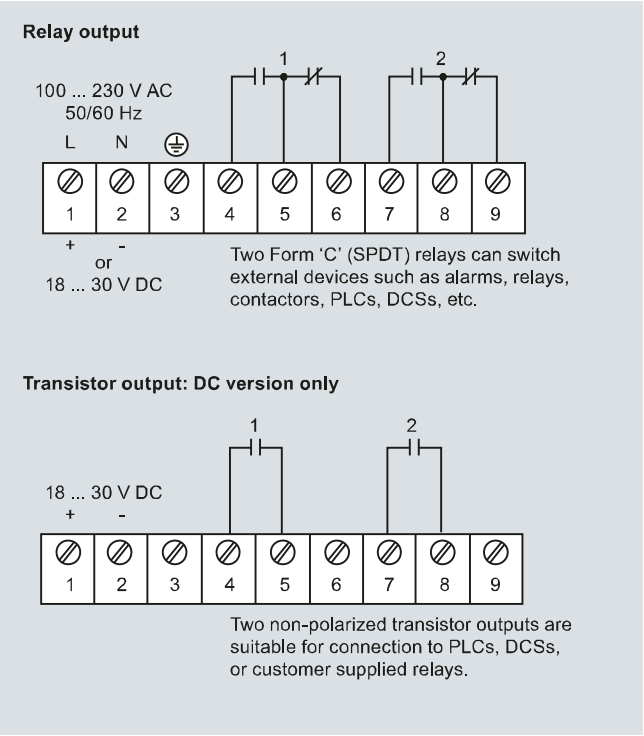
Dimensional drawings



Pointek ULS200, dimensions in mm (inch)

Schematics



Pointek ULS200 connections

4

Ultrasonic

Overview

Introduction

Ultrasonic measurement is based on the speed of sound. Sound can be used as a measurement tool because there is a measurable time lapse between sound generation and the "hearing" of the sound. This time lapse is then converted into usable information. Ultrasonic sensing equipment generates a sound above 20 000 Hz and then interprets the time lapse of the returned echo. The transducer creates the sound and senses the echo and then a transceiver interprets the sound and converts it into information.

Siemens ultrasonic units include Sonic Intelligence, a patented signal processing technology. Using unique algorithms, Sonic Intelligence differentiates between true echoes from the material and false echoes from obstructions or electrical noise, providing intelligent processing of echo profiles.

Typical System

Ultrasonic level measurement requires two components: one to generate the sound and catch the echo (transducer) and one to interpret the data and derive a measurement (transceiver). Even though some ultrasonic instruments combine the components in one unit, the individual functionality remains distinct. The measurement output is communicated to the unit, PLCs or PCs for process control.

Principle of Operation

A piezoelectric crystal inside the transducer converts an electrical signal into sound energy, firing a burst into the air which travels to the target and then is reflected back to the transducer. The transducer then acts as a receiving device and converts the sonic energy back into an electrical signal contained in the transceiver. An electronic signal processor analyzes the return echo and calculates the distance between the transducer and the target. The time lapse between firing the sound burst and receiving the return echo is directly proportional to the distance between the transducer and the material in the vessel. This basic principle lies at the heart of the ultrasonic measurement technology and is illustrated in the equation: Distance = (Velocity of Sound x Time)/2.

Mode of operation

Common Terms

Attenuation

Denotes a decrease in signal magnitude in transmission from one point to another. Attenuation may be expressed as a scalar ratio of the input magnitude to the output magnitude or in decibels.

Beam angle

The diameter of a conical boundary centered around the axis of transmission when the power (radiating perpendicular to the transducer face on the axis of transmission) is reduced by half (- dB).

Blanking distance

Specified zone extending downward from the transducer face in which received echoes are ignored by the transceiver. Blanking distance ignores echoes from ringing.

Echo confidence

The recognition of the validity of the echo as material level. A measure of echo reliability.

Ringing

The inherent nature of the transducer to continue vibrating after the transmit pulse has ceased; the decay of the transmit pulse.

Transducer/Transceiver

A transducer provides the initial ultrasonic pulse and receives its echo. An ultrasonic transducer amplifies the sound wave created by the piezoelectric crystal and transmits that sound wave to the face of the transducer while at the same time dampening the sound wave from the other sides of the crystal.

Transceivers analyze the echo from the transducer to determine the required measurement.

Technical specifications

Ultrasonic Transmitter/Controller Selection Guide

Criteria	SITRANS Probe LU	SITRANS LUT400	HydroRanger 200	MultiRanger 100/200	SITRANS LUC500	SITRANS LU
Range	6 m (20 ft) or 12 m (40 ft)	0.3 ... 60 m (1 ... 196 ft), transducer and application dependent	15 m (50 ft) transducer and application dependent	15 m (50 ft) transducer and application dependent	15 m (50 ft) transducer and application dependent	60 m (200 ft) transducer and application dependent
Typical applications	Chemical storage vessels, filter beds, liquid storage vessels	Wet wells, reservoirs, flumes/weirs, chemical storage, liquid storage, hoppers, crusher bins, dry solids storage	Wet wells, flumes/weirs, bar screen control	Wet wells, flumes/weirs, bar screen control, hoppers, chemical storage, liquid storage, crusher bins, dry solids storage	Wet well/lift station control, weirs/flumes, open channels	Chemical storage, liquid storage, bulk solids storage (sugar, flour bins, grains, cereals), plastic pellets
Output	HART model: 4 ... 20 mA/HART 3 relays PROFIBUS PA model: PROFIBUS	4 ... 20 mA/HART 3 relays	6 relays standard, two 4 ... 20 mA outputs (isolated)	1 relay (option on MultiRanger 100) 3 relays standard 6 relays (option) Two 4 ... 20 mA outputs (isolated)	5 relays, 4 ... 20 mA (option)	4 relays (LU01, LU02) Up to 40 relays (LU10) 4 ... 20 mA isolated
Communications	HART or PROFIBUS PA Options: • SIMATIC PDM for remote configuration and diagnostics	HART 7.0, USB	Built-in Modbus RTU/ASCII via RS 485 Options: • SIMATIC PDM • SmartLinx (PROFIBUS DP, Allen-Bradley Remote I/O, DeviceNet)	Built-in Modbus RTU or ASCII via RS 485 Options: • SIMATIC PDM • SmartLinx (PROFIBUS DP, Allen-Bradley Remote I/O, DeviceNet)	Telemetry capability with Modbus RTU/ASCII via RS 232/RS 485 Options: • SIMATIC PDM • SmartLinx (PROFIBUS DP, Allen-Bradley Remote I/O, DeviceNet) • ECT EnviroRanger Tool software	Dolphin, RS 232/RS 485 (LU01, LU02)) Dolphin via infrared (LU10) Options: • SmartLinx (PROFIBUS DP, Allen-Bradley Remote I/O, DeviceNet)
Power specifications	HART: 4 ... 20 mA, 24 V DC nominal, max. 550 W, 30 V DC max. PROFIBUS PA: 12, 13, 15, or 20 mA, dependent on programming	AC version: 100 ... 230 V AC ± 15 %, 50/60 Hz, 36 VA Fuse: 5 x 20 mm, Slow Blow, 0.25 A, 250 V DC version: 10 ... 32 V DC, 10 W Fuse: 5 x 20 mm, Slow Blow, 1.6 A, 125 V	AC version: 100 to 230 V AC ± 15 %, 50/60 Hz, 36 VA/17 W DC version: 12 ... 30 V DC, 20 W	AC version: 100 to 230 V AC ± 15 %, 50/60 Hz, 36 VA/17 W DC version: 12 ... 30 V DC, 20 W	AC version: 100 to 230 V AC ± 15 %, 50/60 Hz, 30 VA/17 W DC version: 12 ... 30 V DC, 20 W	LU01, LU02: AC version: 100/115/200/230 V AC DC version: 18 ... 30 V DC, 25 W LU10: 100/115/200/230 V AC
Approvals	CE, CSAUS/C, FM, C-TICK, ATEX, ANZEx, IECEx	CE, $CSA_{US/C}$, UL Listed, FM, C-TICK	CE, $CSA_{US/C}$, UL Listed, FM, C-TICK	CE, $CSA_{US/C}$, UL Listed, FM, C-TICK	CE, $CSA_{US/C}$, UL Listed	CE, $CSA_{US/C}$, FM, Lloyd's Register

Ultrasonic

7ML1830-2AN

SITRANS Probe LU HART*
SITRANS LU

7ML5830-2AJ

SITRANS Probe LU PROFIBUS

7ML1830-2AK

MultiRanger 100/200
HydroRanger 200
HydroRanger Plus
SITRANS LUC500

* **Note:** To order the IS version of this hand programmer, order 7ML5830-2AH.

Handheld programmer selection guide

SIEMENS

Ultrasonic Level Application Questionnaire

Customer information

Contact: _____ Prepared By: _____

Company: _____ Date: _____

Address: _____ Notes on the Application: _____

City: _____ Country: _____

Zip/Postal Code: _____ Phone: ( ) _____

Fax: ( ) _____ E-mail: _____

Tanks/Vessel information (Suppy sketch where possible) Sketch attached ☐

Type:
☐ Storage
☐ Process
☐ Pump station
☐ Open channel

Dimensions:
Height: _____ m/ft
Width/Diameter: _____ m/ft

Critical Information
Nozzle Length: _____ cm/inch
Nozzle Diameter: _____ cm/inch

Tank top: ☐ Open ☐ Flat ☐ Conical ☐ Parabolic

Tank bottom: ☐ Sloped ☐ Flat ☐ Conical ☐ Parabolic

Internal equipment and/or obstructions: (Eg. Agitator, heating coils, supports, other)
☐ No
☐ Yes Please list _____

Measurement type: ☐ Point Level ☐ Continuous Level ☐ Volume ☐ Flow

Area safety classification: (Specify code required) _____

Material

Material being measured: _____ ☐ Slurry ☐ Liquid ☐ Solid

Material temperature: Norm: _____ °C/°F Max: _____ °C/°F

Atmosphere: ☐ Air ☐ Other _____ **Homogenous:** ☐ Yes ☐ No

Dust: ☐ None ☐ Light ☐ Heavy

Installation (indicate all that apply)

Power available: _____

Inputs required:
☐ 4 ... 20 mA
☐ Pump Interlocks (#): _____

Outputs required:
☐ 4 ... 20 mA
☐ Relays (#): _____

Communications:
☐ HART/4 ... 20 mA
☐ PROFIBUS DP
☐ PROFIBUS PA
☐ Modbus RTU/ASCII
☐ AB Remote I/O
☐ AB DeviceNet
☐ Other
☐ None

Products recommended: