



General Information

General Information

ST,SB 300 Series SI,SS,SM 300 Series Ultrasonic Level Meters

COMPACT TRANSMITTERS



TWO-PART MEASURING SYSTEM



HITROL CO., LTD.

Fields of Application

Ultrasonic Level Meters offer you excellent tools for liquid level and volume measurements in tanks or reservoirs and for open channel flow measurement.

Level measurement technology based on the non-contacting ultrasonic principle is especially suited for applications where, for any reason, no physical contact can be established with the surface of the material to be measured.

Such reasons may include corrosive attack by the process medium of the measuring device material(acids), possible contamination(sewage) or particles of the process medium adhering to the measuring device(adhesive materials).

Principle of Operation

The ultrasonic level metering is based on the principle of measuring the time required for the ultrasound pulses to make a round trip from the sensor to the surface of the liquid and back. An ultrasonic sensor installed above the liquid to be measured emits an ultrasonic pulse train and receives the echoes reflected from the liquid surface. Intelligent electronics processes the received signal by selecting the echo reflected by the liquid surface and calculate from the time of flight, the distance of liquid surface.

The Measuring System

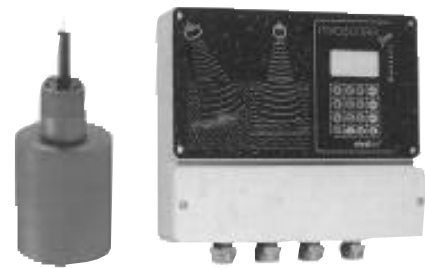
Compact Transmitters

Standalone devices with sensor and transmitter in one unit.



Two-part System

Separate sensor and transmitter control unit



Measuring Range

The measuring range or more exactly the distance the ultrasonic unit can measure depends on the ambient conditions(e.g. closed tank or open vessel). Proper care has to be taken intensive air movements in open-air applications, since wind or storm may "blow away" the ultrasound at high distances, thereby reducing effective range.

There are a few other phenomenon such as foam, waves and vapour can also reduce the max. distance which can be measured.

Therefore in such applications higher power transducers with a lower frequency (greater penetration) have to be selected for optimum results.

Transducer Material

Offers a wide range of transducer materials for its ultrasonic units to suit the varied requirements of liquid level metering applications:

Polypropylene (PP)-Resists to most caustics, acids and bases

Solef (PVDF)-Resists to acids and most solvents

Teflon (PTFE)-Resists to acids and most solvents

Accepted in hygienic application.

Stainless steel (DIN1. 4571. aisi SS316Ti)-Ultimate resistance against solvents

Accepted in most hygienic applications, withstands CIP cleaning up to 120

Temperature

All ultrasonic devices have built in temperature compensation over the entire measuring range.

For outdoor applications the use of a weather protection unit is recommended.

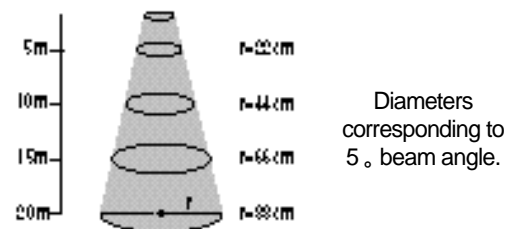
Pressure

Because of the physical characteristics of ultrasound, ultrasonic measurement is limited in vacuum and high pressures.

The operating pressure range is between 0.3 bar and 6 bar (Abs.).

Sonic Cone

Most of the transducers have a 5 °-7 total beam angle at-3 dB, ensuring a reliable measurement in narrow silos with uneven side walls as well as in process tanks with various protruding objects Furthermore, as a result of the narrow beam angle the emitted ultrasonic signals have an outstanding focusing and good penetration through gases, vapour and foam is ensured.



Selection

We offer the widest range of ultrasonic level measurement solutions involving standalone devices and two-part systems, sensors of different materials and with many different working frequencies.

Since the main selection aspects mentioned above (see "Measuring Range") from only part of the application know-how, please contact us to assist you in selecting your optimal ultrasonic system.

Compact Transmitters

Standalone devices with transducer and transmitter in one unit.

EchoTREK - THE NEXT GENERATION

The flexibility of its programming makes the Echo TREK the ideal level metering tool for basic applications requiring only a level proportional output(excl. : open reservoirs) as well as for complex applications requiring linearisation, relay action, fixed target suppression(excl. : agitated process tanks containing heavily fuming chemicals).

Echo TREK is offered with Polypropylene or PVDF transducers as well as (PTFE) and stainless steel flush flange mounting versions.

Programming options for Echo TREK

Touch-Magnet programming (magnetic key supplied) : A cost effective solution for simple and easy applications.

The plug-in programming module : To access and program all features provided by this smart device

Remote : For remote programming and data acquisition, Echo TREK transmitters support MODBUS and HART protocol options

LEVEL-VOLUME-FLOW measurement

Echo TREK in standard form incorporates a current output and a fully programmable power relay that can be used for various alarm and control functions. Over 10 pre-programmed tank shapes for volume calculation as well as 32-point linearisation are also provided.

FLOW metering : The Echo TREK can also be used as a smart flow transmitter on open channel applications with more than 20 pre-programmed flume and weir flow formulas. It also has two independent volume flow totalizers and a relay that can be used as a volume flow counter.

EchoTREK S-300



Type	ST/SB-39	ST/SB-38	ST/SB-37	ST/SB-36	ST/SB-34	ST/SB-32
Main application field	Small tanks, where dead band is critical	Small process tanks with 2" process connection	Small process tanks with flanges	Small process tanks with flanges	Medium process tanks	Medium to large process tanks
Mounting	1 1/2" BSP or NPT	2" BSP or NPT	DN80	DN80	DN125	DN150
Frequency	80 kHz		60 kHz		40 kHz	20 kHz
Penetration through fume/vapour, foam	x		xx		xxx	xxxx

x = weak; xxxx = excellent

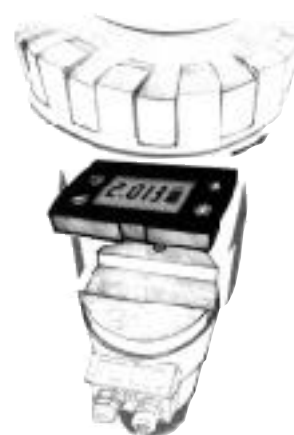
The SAP-100 Programming Module / Field Indicator

The SAP-100 module is used for programming and/or displaying measurement values.

Using the SAP-100 for programming, operators can choose between menu driven "QUICKSET" or full parameter programming to access all features of this smart device, matching performance levels of Two-Part systems.

In case of multi-vessel installations, using a single SAP-100 programming module, any number of Echo TREK devices can be set up.

Acting as a field indicator permanently plugged into the Echo TREK, measurement values are displayed in 6-digits of selected metric or US engineering units as well as on a bargraph.



Top view without SAP-100
with symbols and short
description for touch magnet
programming



Top view with plugged-in
SAP-100



Top view with
plugged-in SAP-100
screwed-on device
cover



SAP-100 module

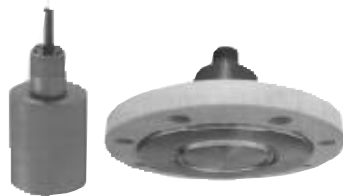

Two-Part Measurement Systems

The Two-Part Measurement System consist of SenSonar Sensors and a NIVOSONAR Control Unit for remote signal provided by the sensor, indication and output of measurement values.

SenSonar Sensors

Incorporating our latest SenSonic™ transducer technology, providing an excellent narrow beam angle and high efficiency for superb signal reproduction.

SenSonar Sensors are also offered in Ex versions : “Eex ia”-Intrinsically safe(IS) versions requiring[EEx ia] certified Control Units supplied with barriers or “Eex m” certified sensors requiring standard Control Units.

Versions	STANDARD Sensors(SI-300 series)	FULL FEATURE Sensors(SS-300 series)
		
Mechanical Prot.	IP68	IP65
Transducer material	PP, PVDF, PTFE(Teflone), Stainless steel	PP, PVDF
Electric connection	Direct cable outlet	Plastic or Aluminum housing with Pg16 cable glands or 1/2" NPT conduit
Heating	Optional	NA

Sensorar SI/SS-300



Type	SI-38	SS-38	SI-36	SS-36	SI-34	SS-34	SI-32	SS-32
Main application field	Open channel flow metering, water treatment	Small tanks where the minimum measuring range is critical	Open channel flow metering, water treatment	Non-fuming, non-foaming liquids. Small sized tanks	Water/wasewater applications with foam	Fuming and/or foaming liquids. Medium sized tanks	Water/waste-water applications with heavy foam	Heavy fuming and/or foaming liquids. Medium to tall tanks
Mounting	1" or 2"	2"	1", DN80	DN80	1", DN100	DN125	1", DN150	DN 150
Frequency	80 kHz		60 kHz		40 kHz		20 kHz	
Penetration through fume/vapour, foam	x		xx		xxx		xxxx	

x = weak; xxxx = excellent

NIVOSONAR Control Units

These control units feature Nivelco's QUEST+™ software using advanced, process adaptive digital signal processing.

With the control unit located remotely from the sensor(s), measurement indication and programming via display and full keypad is provided at hand, at the convenience of the user/operator. Control Units are offered with various features and mechanical designs:

NIVOSONAR SM-300

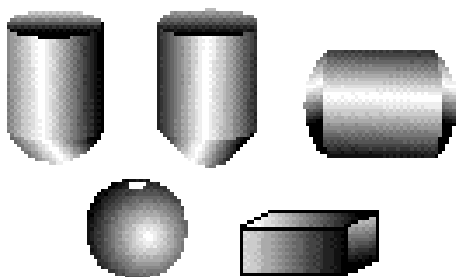


Type	SMM / SMZ-300	SMW / SMC / SMD / SMH-300
Mounting	Panel mounting	Wall mounting
Mechanical protection	IP40	IP54 or IP65
Measuring channel(s)	1	Up to 2
Current output	1	Up to 2
Relays	Up to 3	Up to 8
RS485	Optional	Optional
Heating	NA	Optional
Differential level meas.	NA	Standard

Features (common to both Compact and Two-part systems)

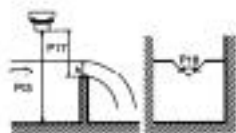
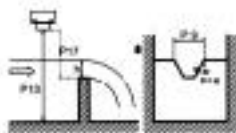
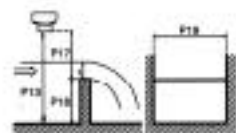
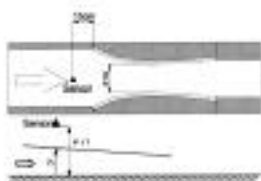
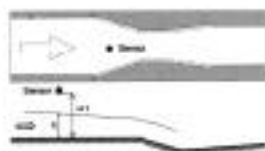
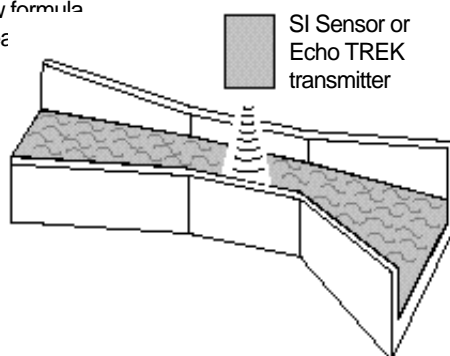
Level / Volume measurement

- * Using over 10 pre-programmed tank shapes or 32-point linearisation



Open Channel Flow metering package

- * Standard in all ultrasonic devices
- * Flow calculation based on:
 - 9 preset Parshall Flumes
 - General Parshall flume
 - Venturi flume
 - Weirs
 - General flow formula
 - 32-point linear



- * Two independent (one resettable) volume flow totalisers
- * Relay output as volume flow counter

Other calculation / Features

- * Differential level metering (rake/screen control)
- * Trend monitoring and level changing rate calculation
- * Temperature monitoring

Analogue output

- * Can be assigned to all measured or calculated values
- * Other programmable features :
 - 0 to 20 mA or 4 to 20 mA
 - Normal or inverted mode
 - Failure indication modes : Hold, below 4 mA, above 20 mA

Relay outputs

- * The relays can be assigned to over 30 different functions.
- * Some of the relay functions
 - HIGH/LOW FAIL SAFE ALARM
 - DIFFERENTIAL LEVEL SWITCHING (Hysteresis control)
 - WINDOW SWITCHING
 - ALTERNATING PUMP CONTROL
 - VOLUME FLOW COUNTER
 - FAILURE INDICATION (Errors of Self Diagnostic System)
 - VOLUME/FLOW TOTALISER
 - LEVEL CHANGING RATE ALARM
 - TEMPERATURE ALARM
 - etc.
- * Other user selectable features :
 - energised or de-energised relay action
 - adjustable time delay for relay action.

32-point linearisation curve

- * Level to level, level to volume and level to flow calibration.

Fixed target suppression

- * Up to two disturbing objects can be blocked out at fix levels. (with Echo TREK only)

Automatic signal processing feature(QUEST™)

- * Agitator/stirrer filtering
- * Automatic floating average curve
- * Automatic dead band control

Access lock by secret code

- * To prevent unauthorised access by a 4-digit secret code.

Fully Self Diagnostic System with individual error messages

- * Errors, depending on their nature are assigned to different codes for customer information and further processing.

Device history

- * User can read out data relating to the device history, such as total operating hours, operation after last switch-on, number of switching actions for each relay, min. and max. registered temperatures etc.

Service & test parameters

- * Read-out data, reporting on operating conditions such as sensor gain, echo amplitude, noise level etc. to facilitate the commissioning or troubleshooting of the system.

RS485 interface (option)

- * RS485 interface provides for remote control and data acquisition possibility.

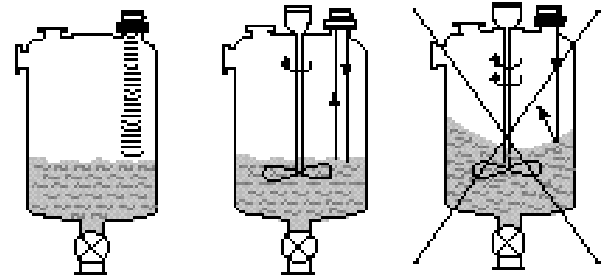
Digital Signal Input (For SM-300 control units only)

- * This input can be used for various synchronising functions such as remote calibration by the output signal of a level switch.

Installation

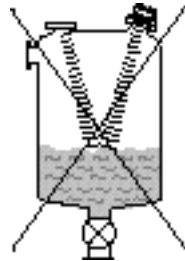
POSITION

The optimal position of the Echo TREK is between 1/2 radius and 2/3 diameter of the (cylindrical) tank / silo. (Take also sonic cone on page 2 into consideration.)



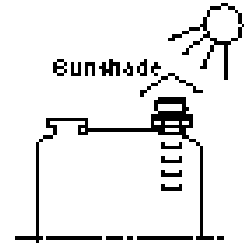
SENSOR ALIGNMENT

The sensor face has to be parallel to the surface of the liquid within $\pm 2-3^\circ$.



TEMPERATURE

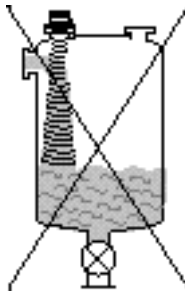
Make sure that the transmitter will be protected against overheating by direct sunshine.



OBSTACLES

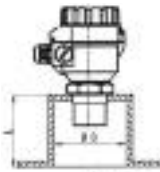
Make sure that no in-flow path or objects (e.g. cooling pipes, ladders, bracing strut, thermometers, etc) or no uneven tank wall surfaces (welding seam) protrude into the sensing cone of the ultrasonic beam.

Up to two fix objects in the tank / silo that disturb the measurement can be blocked out by the appropriate programming of the Echo TREK



STAND-OFF PIPE FOR THE ECHOTREK

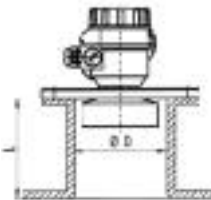
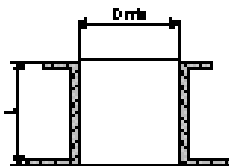
The structure of the stand off pipe should be rigid, the inner rim where the ultrasonic beam leaves the pipe should be rounded.



L	D _{min}		
	S__-39_	S__-38_	S__-37_
150	50	60	60
200	50	60	75
250	65	65	90
300	80	75	105
350	95	85	120

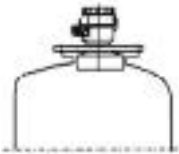
STAND-OFF PIPE FOR SENSOR (Two-part system)

The structure of the stand off pipe should be rigid, the inner rim where the ultrasonic beam leaves the pipe should be rounded.



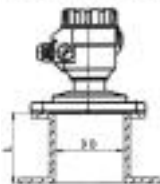
	D _{min}	
	S__-36_	S__-34_
90	80	-
200	80	-
350	85	-
500	90	-

* For values consult your distributor



S-32 models with plastic transducer must not be installed in stand-off pipes since the transducer face has to protrude into the tank.

L[mm]	D _{minimum} [mm]				
	S-39	S-38 / 37	S-36	S-34	S-32
500	100	125	150	200	300
300	85	100	125	175	200
200	60	85	100	150	175



	D _{min}		
	S_S-36_	S_S-34_	S_S-32_
320	80	-	-
440	-	125	-
800	-	-	150

FOAM

In case of foam above the liquid, exceeding 1-2 cm, ultrasonic devices with lower measuring frequency (40, 20 kHz) are recommended. Ideally a location should be found, where only minimal foaming occurs.

Locate unit as far as possible from liquid inflow or install in a stilling pipe.

Fume / Vapour

In case of closed tanks containing chemicals or other liquids creating fume/gases above the liquid surface especially outdoor tanks exposed to the sun, a strong reduction of the nominal measuring range of the unit must be taken into consideration.

Units with lower measuring frequency (40, 20 kHz) are recommended depending on the range.

WIND / STORM

An intensive movement of air(gas) in the vicinity of the ultrasonic cone is to be avoided. A strong or storm may "blow away" the ultrasound.

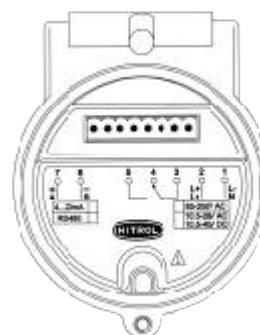
Units with lower measuring frequency (40, 20 kHz) are recommended.

Electrical Connections for the Echo TREK Compact Transmitters

Echo TREK ST/SB-300

* For proper earthing of the unit, either use the earth (ground) screw terminal on the outside of the housing; or, use a three-wire mains cable, connecting the third wire to the internal earth screw terminal.

* Three-wire installation is also possible for the 24 V DC versions by linking the terminals 1 and 6. In this case the galvanic isolation is not provided.



Electrical Connections of Two-Part Measurement Systems

SenSonar SI/SS-300 Sensors SM-300 Control Units

* For connecting sensors to control units, use type of cable described in the "Technical Data Table".

* Signal cables must not be run in common with high voltage cables.

* If signal cables of more than one sensor are run in common duct, ensure that they are individually shielded/screened.

* For safe earthing of the metal housing of SS-300 sensors, use earth/ground screw terminal in housing.

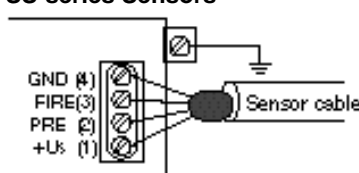
* The SYNC input of the Control Units are TTL compatible. The SYNC input is not available for Ex certified Control Units.

Active state : when the SYNC input is connected to earth/ground or the voltage on it is lower than 0.4V.

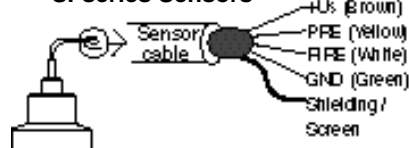
Inactive state : when the SYNC input is left open/free or voltage on it is higher than 2.4V ($U_{MAX}=12V$).

Wiring between Sensor and Control Unit

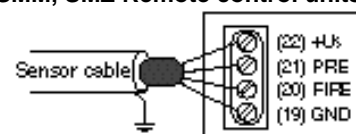
SS-series Sensors



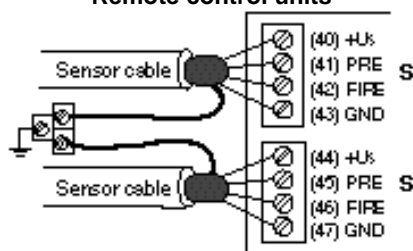
SI-series Sensors



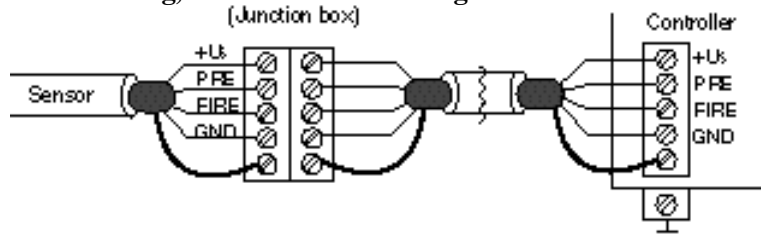
SMM, SMZ Remote control units



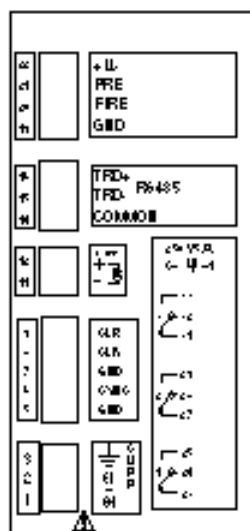
SMW, SMC, SMD, SMH Remote control units



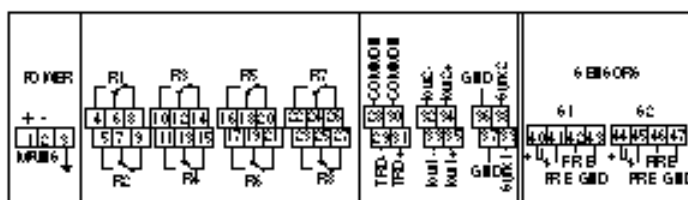
Wiring, with extended sensor signal cable (Junction box)



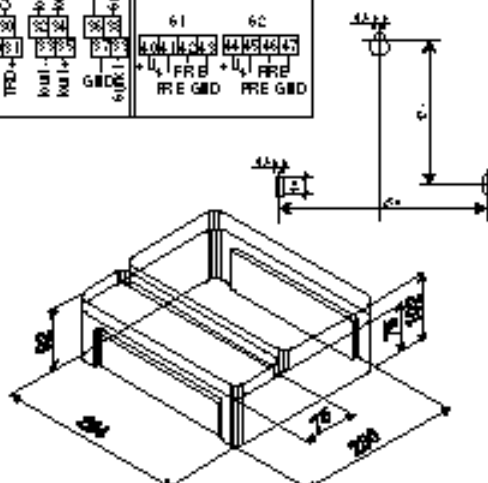
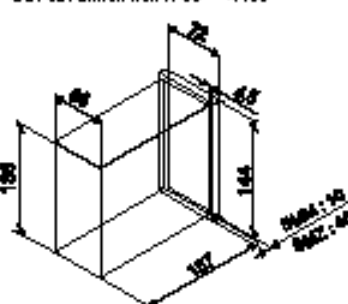
SMM, SMZ Panel Mounting Control Units



SMW, SMC, SMH AND SW-300 Wall Mounting Control Units



Cut-out dimension: 68 ± 2 x 138 ± 2



Technical Data, standalone devices

Echo TREK Compact Transmitters

General Specifications

Product name	Echo TREK ST/SB-300 series
Product description	Compact type ultrasonic level transmitter
Transducer materials	Polypropylene(PP) Kynar(PVDF) Teflon(PTFE) Stainless Steel(DIN 1.4571, ANSI SS316Ti)
Housing material	Plastic : PBT fibre-glass reinforced, flame-retardant(DuPont) Aluminium : Powder paint coated
Process temperature	PP, PVDF versions : -30 ... +90 Stainless Steel versions : -30 ... +100 (CIP 120, for max. 2 hours)
Ambient temperature	-30 ... +60 with SAP-100 progr. module -25 ...+60 (if necessary protect the device from over heating by direct sunshine!)
Pressure(Absolute.)	0.3 ... 3 bar (0.03... 0.3MPa) Stainless steel versions 0.9... 1.1 bar (0.090 ... 0.11 MPa)
Seals	PP transducer : EPDM, All other transducer versions : FKM(Viton)
Mechanical protection	Sensor : IP68(submersible), Housing : IP67(NEMA 6)
Power supply/Consumption	High voltage version : 85 ... 255 V AC / 6 VA Low voltage version : 10.5 ... 40 VDC / 3.6W, 10.5 to 28 V AC / 4 VA
Accuracy*	±(0.2 % of measured distance 0.05 % of range
Resolution	Depending on distance to be measured 2 m : 1 mm, 2 ... 5 m : 2 mm, 5 ...10 m : 5 mm, 10 m : 10 mm
Outputs	Analogue : 4/20 mA, 600 Ohm, galvanically isolated, secondary lightning protection Contact : SPDT (NO/NC) ; 250 V AC, 3A Interface : RS 485 (optional), HART (optional) Display (SAP-100) : 6 digits, icons and bargraph, Custom LCD
Electrical connections	2 x Pg16 or 2 x 1/2" NPT Wire cross section : 0.5 ... 2.5 mm²
Electrical protection	Class I. with aluminium housing and Class II with plastic housing

* Under optimal conditions of reflection and stabilised transducer temperature.

Special data of Echo TREK for liquids with PP and PVDF transducers

Type	ST -39 - SB -39 -	ST -38 - SB -38 -	ST -37 - SB -37 -	ST -36 - SB -36 -	ST -34 - SB -34 -	ST -32 - SB -32 -
Transducer material	PP or PVDF	PP or PVDF	PP or PVDF	PP or PVDF	PP or PVDF	PP or PVDF
Maximum measuring distance [m / ft]	4 / 13	6 / 20	8 / 26	10 / 33	15 / 49	25 / 80
Min. measuring distance (Dead band) [m / ft]	0.2 / 0.65	0.25 / 0.82	0.35 / 1.2	0.35 / 1.2	0.45 / 1.5	0.6 / 2
Total beam angle (-3 dB)	6 °	5 °	7 °	5 °	5 °	7 °
Measuring frequency	80 KHz	80 KHz	50 KHz	60 KHz	40 KHz	20 KHz
Process connection	1 1/2" thread	2" thread	2" thread	Flange	Flange	Flange

(from transducer face)

Special data Echo TREK for liquids with PTFE and Stainless Steel transducers

Type	STT-39 - SBT-39 -	STT-38 - SBT-38 -	STT-37 - SBT-37 -	STS-36 - SBS-36 -	STS-34 - SBS-34 -	STS-32 - SBS-32 -
Transducer material	PTFE	PTFE	PTFE	St. St.	St. St.	St. St.
Maximum measuring distance [m / ft]	3 / 10	5 / 16	6 / 20	7 / 23	12 / 39	15 / 49
Min. measuring distance (Dead band) [m / ft]	0.2 / 0.65	0.25 / 0.82	0.35 / 1.2	0.4 / 1.3	0.55 / 1.8	0.65 / 2.2
Total beam angle (-3 dB)	6 °	5 °	7 °	5 °	5 °	7 °
Measuring frequency	80 KHz	80 KHz	50 KHz	60 KHz	40 KHz	20 KHz
Process connection	1 1/2" thread	2" thread	2" thread	Flush flange	Flush flange	Flush flange

(from transducer face)

SAP-100 Programming Module

Field indication	6 digits, icons and bargraph, Custom LCD
Ambient temperature	-25 ... +60
Housing material	PBT fibre-glass reinforced plastic, flame-retardant (DuPont)

Technical Data, two-part systems

SenSonar Sensor

General Specifications

Product name	SenSonar SI/SS-300 series	
Product description	Sensor for Two-Part Ultrasonic Level Metering System	
Transducer materials	SIA/SSA : Polypropylene(PP), SIB/SSB : Kynar(PVDF) SIT : Teflon(PTFE), SIS : Stainless Steel(DIN 1.4571, ANSI SS316Ti)	
Housing material	SI : Same as transducer material ; SS : Paint coated Aluminium	
Process temperature	SIA/SIB/SSA : -30 ... +80 , SSB : -30 ... +90 SIS/SIT : -30 ... +100 (CIP 120 ° for max. 2 hours)	Ex version : SSA, SIA : -20 ...+70 SSB : -20 ...+80 , SIB : -20 ...+75
Ambient temperature	SSA, SSB, SIT, SIS -30 ... +60 SIA, SIB : -30 ... +80	Ex version : SSA, SSB : -20 ...+60 SIA, SIB : -20 ...+70
Pressure(Absolute.)	0.3 ... 6 bar (0.03 ... 0.6MPa), with or without suitable flange. Ex versions at atmospheric pressure only!	
Seals	PP Version : EPDM, All other versions : FKM(Viton)	
Mechanical protection	SI : IP68 (NEMA 6X), submersible ; SS : Sensor : IP68 (NEMA 6X), submersible, Housing : IP65(NEMA 4)	
Electrical connections	SI : Direct cable outlet ; SS : screw terminals in housing with 2 x Pg16	
Signal cable	4-Wire shielded cable ; wire cross section : 0.5 ... 2.5 mm ² ; max. 50 nF, max. 20 Ohm	
Length of signal cable	Recommended max. cable length : 300 m ; recommended type : LIYCY 4 X 0.75 mm ²	
Electrical protection	Class III. with surge protection	

PP and PVDF SenSonar sensors

Type	SI -38 / SS -38	SI -36 / SS -36	SI -34 / SS -34	SI -32 / SS -32
Transducer material	PP or PVDF	PP or PVDF	PP or PVDF	PP or PVDF
Maximum measuring distance [m / ft]	6 / 20 EEx ia : 4 / 13	10 / 33 EEx ia : 7 / 23	15 / 45 EEx ia : 10 / 33	25 / 80 EEx ia : 20 / 65
Min. meas. dist. [m / ft]	0.25 / 0.65	0.35 / 1.2	0.45 / 1.5	0.6 / 2
Total beam angle	5 °	5 °	5 °	6 °
Measuring frequency	80 KHz	60 KHz	40 KHz	20 KHz
Process connection	2" thread	Flange	Flange	Flange

PTFE and Stainless Steel

Type	SIT-38	SIS-36	SIS-34	SIS-32
Transducer material	PTFE	St. St.	St. St.	St. St.
Max. meas. dist. [m / ft]	4 / 13	7 / 23	12 / 39	25 / 80
Min. meas. dist. [m / ft]	0.3 / 1	0.35 / 1.2	0.55 / 1.8	0.65 / 2.2
Total beam angle	5 °	5 °	5 °	7 °
Measuring frequency	80 KHz	60 KHz	40 KHz	20 KHz
Process connection	2" thread	Flush flange	Flush flange	Flush flange

NIVOSONAR Control Units

Product name	Nivosonar SM-300 series
Product description	Control unit for Two-Part Ultrasonic Level Metering System
Mounting	SMM, SMZ : Panel Mounting, SMW, SMC, SMD, SMH : Wall Mounting
Measuring channel	SMM, SMZ : 1 channel / 1 sensor, SMW, SMC, SMD, SMH : with 1 or 2 channel / sensor (processing the special signals of 2 sensors)
Resolution	Depending on distance to be measured 2 m : 1 mm, 2...5 m : 2 mm, 5...10 m : 5 mm, 10 m : 10 mm
Accuracy	± (0.25 % of measured distance +0.1 % of range)
Ambient temperature	SMM, SMZ : 0 ... +50 , SMW, SMC, SMD : -20 ... +50 , SMH : -30 ... +50
Analogue output	Galvanically isolated ; 0/4 to 20 mA ; max. 500 Ohm with surge protection
Relay output	SPDT(NO/NC) ; 250 V AC, 5 A
Electrical protection	Class II. with surge protection
Mechanical protection	SMM : Front : IP40 ; rear : IP20, SMZ : Front : IP54 ; rear : IP20, SMW : IP54, SMC, SMD, SMH : IP65
Supply voltage	230 or 110 or 24 V AC, 50 ... 60 Hz ; or 24 V DC (specify when ordering)
Power consumption	SMM, SMZ : max. 10 VA, SMW, SMC, SMD : max. 12 VA, SMH : max. 25 VA

* Under optimal conditions of refecton and stabilised transducer temperature.

Approvals

CE All ultrasonic devices are designed and manufactured to conform to the following EC directives:

Directive 89/336 (for Electromagnetic Compatibility)

Directive 73/23 (93/68) (for Low Voltage Equipment)

The device have been tested according to the following standards :

EN50081-1, EN50081-2, EN50082-2, EN5022 : 1987

IEC 801-2, IEC 801-3, IEC 801-4, CEI/IEC 61326-1, CEI/IEC 1000-4-5

Hazardous area approvals of intrinsically safe SenSonar Sensors :

- | | | |
|---|--|---|
| * SI-300 Series | CENELEC certificate : EEx ia IIB T6
ATEX Group II. 1G (ZONE 0) prEN50284 / Entwurf1997) | No. : Ex 98. D. 007X Issued by : TUV, Austria |
| * SS-300 Series | CENELEC certificate : EEx ia IIB T6 | No. : Ex 98. D. 008X Issued by : TUV, Austria |
| * SI/SS-300 Series Class, Div. 2, Gr. A, B, C and D, Class II, Gr. E, F and G | | No. : LR114131-1f Issued by : CSA, Canada |

Hazardous area approvals for NIVOSONAR Control units for use with EEx ia approved SenSonar Sensors :

- | | | |
|----------------------|--------------------------------|---|
| * SMM/SMZ-300 Series | CENELEC certificate : [EEx ia] | No. : Ex 98. D. 006X Issued by : TUV, Austria |
| * SMW/SMD-300 Series | CENELEC certificate : [EEx ia] | No. : Ex 98. D. 004X Issued by : TUV, Austria |
| * SM-300 Series : | Class II, Groups E, F and G | No. : LR114131-1 Issued by : CSA, Canada |

Application Examples



Measurement various chemical ingredients with Compact Transmitter in a pharmaceutical plant



Measurement of paint with EEx ia system in a paint manufacturing plant



Measurement of an outdoor Sulphuric Acid tank with Compact Transmitter in a chemical plant



Open channel flow measurement with Two-Part system



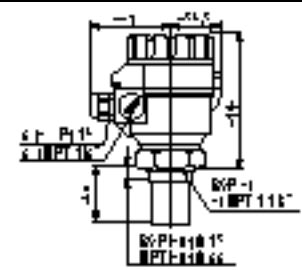
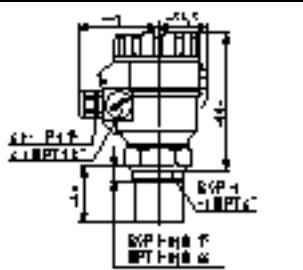
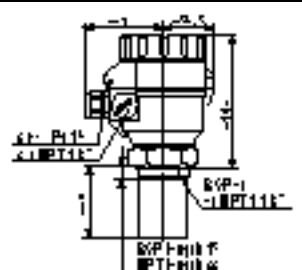
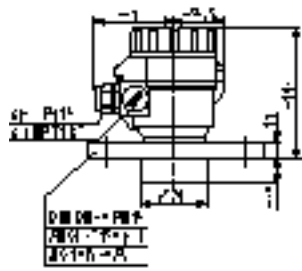
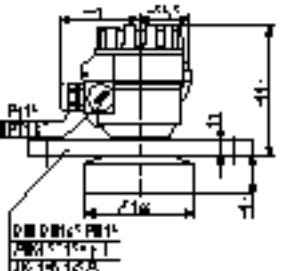
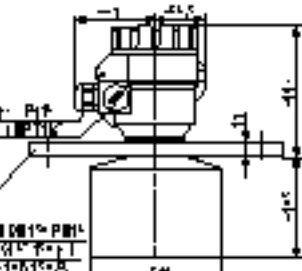
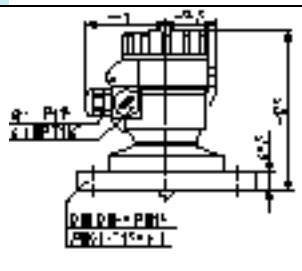
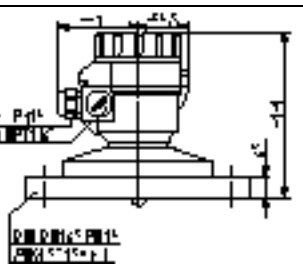
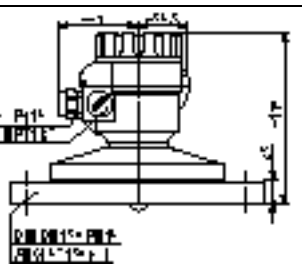
Level measurement in open reservoir with Two-Part System in a sewage treatment plant



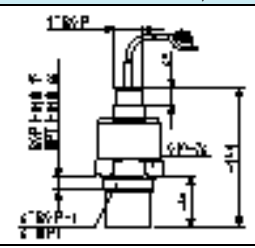
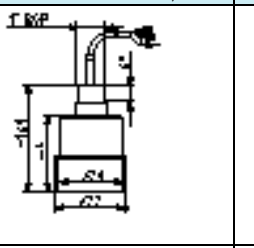
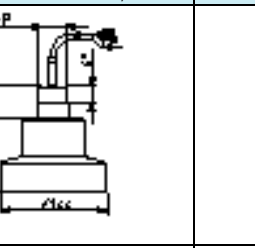
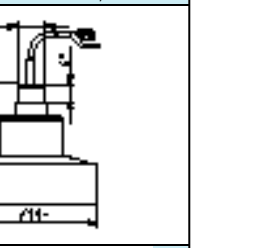
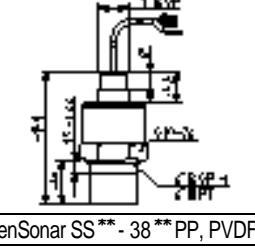
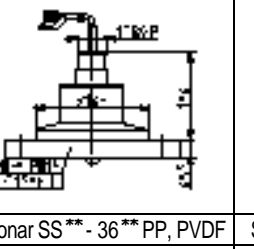
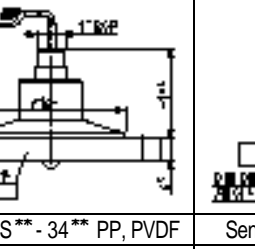
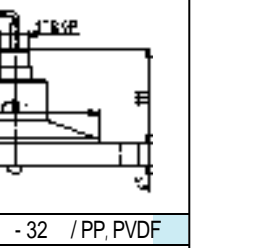
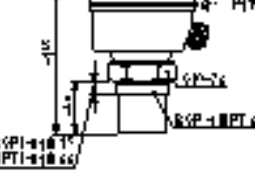
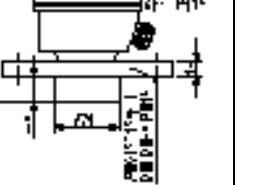

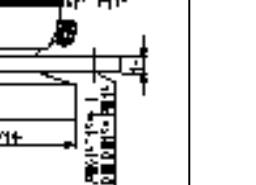
Measurement of 22 m high liquid fertiliser tanks with Compact Transmitters

Dimensions

EchoTREK Compact Transmitters

EchoTREK S *** -39** - ** / PP, PVDF, PTFE	EchoTREK S *** -38** - ** / PP, PVDF, PTFE	EchoTREK S *** -37** - ** / PP, PVDF, PTFE
		
EchoTREK S *** -36** - ** / PP, PVDF	EchoTREK S *** -34** - ** / PP, PVDF	EchoTREK S *** -32** - ** / PP, PVDF
		
EchoTREK S ** S -36** - ** / St. St.	EchoTREK S ** S -34** - ** / St. St.	EchoTREK S ** S -32** - ** / St. St.
		

SenSonar Sensors

SenSonar SI ** - 38** / PP, PVDF	SenSonar SI ** - 36** / PP, PVDF	SenSonar SI ** - 34** / PP, PVDF	SenSonar SI ** - 32** / PP, PVDF
			
SenSonar SI ** - 38** / PTFE	SenSonar SI ** 36** / St.St., PTFE	SenSonar SI ** 34** / St.St., PTFE	SenSonar SI ** 32** / St.St., PTFE
			
SenSonar SS ** - 38** PP, PVDF	SenSonar SS ** - 36** PP, PVDF	SenSonar SS ** - 34** PP, PVDF	SenSonar SS ** - 32** / PP, PVDF
			

Order Codes

Echo TREK Compact Transmitters

Note : not all combinations of order numbers are possible

Echo TREK S** ** - 3** ** - **

Type	CODE	TRANSDUCER / HOUSING	CODE	RANGE	CODE	MOUNTING	CODE	SUPPLY / OUTPUT	CODE
Transmitter	T	PP / Aluminium	A	25 m	2	BSP thread	0	85 to 265 VAC	
Transmitter with local indicator	B	PVDF / Aluminium	B	15 m	4	NPT thread	N	4...20 mA+Relay	1
		PTFE / Aluminium	T	10 m	6	JIS 80A	G	4...20 mA+HART+Relay	3
		St. St. / Aluminium	S	8 m	7	JIS 100A	H	RS485+Relay	5
		PP / Plastic	P	6 m	8	JIS 125A	P	4...20 mA+Relay (limited pr.)	
		PVDF / Plastic	V	4 m	9	JIS 150A	R	10.5 to 40 VDC	
		PTFE / Plastic	F			JIS 200A	S	10.5 to 28 VAC	
		St. St. / Plastic	M			200 mm bracket	K	4...20 mA+Rel	2
						500 mm bracket	L	4...20 mA+HART+Rel	4
						700 mm bracket	M	RS485+Relay	6
								4...20 mA+Relay (limited pr.)	

* For measuring ranges of PTFE and

St.St. (stainless steel) versions, see Technical Data table

** S...39, 38 or 37 with thread, all other models with flange or bracket

Echo TREK S A P - 1 0 0

Plug-in Programming Module

SenSonar Sensors (Two-part System)

S** ** - 3** ** - **

TYPE	CODE	TRANSDUCER	CODE	RANGE	CODE	MOUNTING	CODE	APPROVAL	CODE
Standard (IP68)	I	PP	A	25 m	2	BSP thread	0	None	0
Full feature (IP65)	S	PVDF	B	15 m	4	NPT thread	N	EEx m	M
		PTFE	T	10 m	6	JIS 80A	G	EEx ia IIB T6	9
		Stainless Steel	S	6 m	8	JIS 100A	H		
						JIS 125A	P		
						JIS 150A	R		
						JIS 200A	S		
						200 mm bracket	K		
						500 mm bracket	L		
						700 mm bracket	M		
						Fast connection gland	F		

* SI-300 sensors are delivered with 3 m cable unless otherwise specified (max. cable length : 30 m ; further extension possible).

** For measuring ranges of PTFE, St. St. and Ex versions, see Technical Data table

*** 1" for all SI versions, 2" for SI/SS-38

S M** ** - 3** ** - **

OTHER	CODE	CURRENT OUTPUT / RS 485				POWER SUPPLY/APPROVAL		CODE
Panel mount	M	Single channel version		Dual channel version		230V AC / Standard		1
Panel mount, lockable cover	Z	None	1	None	5	110V AC / Standard		2
Wall mount, IP54	W	1 x 4...20 mA	2	2 x 4...20 mA	6	24V AC / Standard		3
Wall mount, IP65, screw cover	C	RS485	3	RS485	7	24V DC / Standard		4
Wall mount, IP65, lockable cover	D	1 x 4...20 mA + RS485	4	2 x 4...20 mA + RS485	8	230V AC / [EEx ia]		5
Wall mount, IP65, heated	H					110V AC / [EEx ia]		6
						24V AC / [EEx ia]		7
						24V DC / [EEx ia]		8

RELAY OUTPUT	CODE
1 relay	1
...	...
8 relay	8



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