

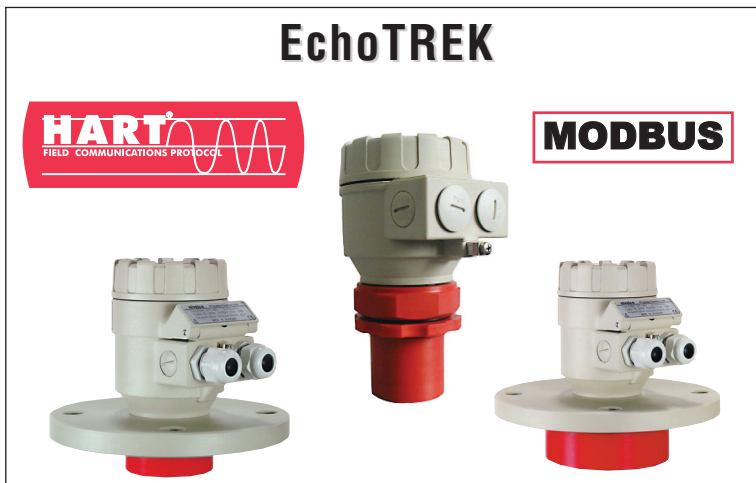


ULTRASONIC LEVEL METERS

Compact Transmitters: SE, SG, ST, and SB 300 series
Two-Part Systems: SI and SM 300 series

FOR
LIQUIDS

COMPACT TRANSMITTERS



TWO-PART MEASURING SYSTEM



- Excellent sensor focusing:
5° total beam angle
- Built-in temperature compensation on full scale
- Built-in secondary lightning protection
- IP 68 versions
- Built-in data logger (2-wire only)
- Wide range of transducer materials
- Two decades of experience with ultrasonics
- Over 30.000 units sold world wide

KNOW-HOW IN ULTRASONICS

Nivelco's two decades of experience with ultrasonic level metering is an asset we gladly share with our customers. A specialised team of experts is working day by day to convert this experience obtained by tens of thousands of applications world-wide. The state-of-the-art, narrow-beam angle sensor and the QUEST+™ (Qualified Echo Suppressing Technique) featuring advanced, process adaptive digital signal processing provide the basis for the solution of the most demanding applications in the process control world.

FIELDS OF APPLICATION

Ultrasonic Level Meters offer 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

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. Ultrasonic sensor installed above the liquid emits ultrasonic pulse train and receives the echoes reflected from the liquid surface. Smart electronics selects the valid echo reflected by the surface and provides distance to the liquid surface. This value of distance represents the basic for the calculation of further process values.

The Measuring System

Compact Transmitters

Stand-alone 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 must be taken for 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 phenomena such as foam, waves and vapour that can also reduce the maximum distance (given in the tables) which can be measured under ideal conditions. For proper selection you may consult Nivelco.

Transducer Material

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

- Polypropylene (PP) - Resists most caustics, acids and bases
- Solef (PVDF) - Resists acids and most solvents
- Teflon (PTFE) - Resists acids and most solvents
Accepted in hygienic application.
- Stainless steel (DIN1.4571, AISI SS316Ti) - Ultimate resistance against solvents
Accepted in hygienic applications, withstands CIP cleaning up to 120°C

Temperature

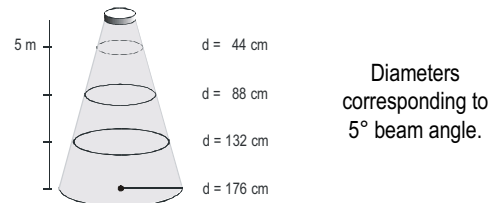
All Nivelco ultrasonic devices have built in temperature compensation over the entire measuring range.

Pressure

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

Sonic Cone

Most of Nivelco's 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 ensures outstanding focus and good penetration through gases, vapour and foam.



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“) form only part of the application know-how, please **contact your local Nivelco distributor** to assist you in selecting the optimal ultrasonic system for your needs.

COMPACT TRANSMITTERS

Stand-alone devices with a transducer and a transmitter in one unit

EchoTREK - THE NEXT GENERATION

Nivelco's next generation of SMART compact ultrasonic level transmitters, make use of SenSonic™ transducer technology and Nivelco's latest QUEST+™ software with advanced, process adaptive digital signal processing.

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

EchoTREK is offered with Polypropylene or PVDF transducers as well as with Teflon (PTFE) and stainless steel flush flange mounting.

Available models are listed on page 10.

LEVEL - VOLUME - FLOW MEASUREMENT

EchoTREK in standard form incorporates a current output that can be used for **level measurement** and control as well as a fully programmable power relay for various alarm functions with the 4-wire version. Over 10 pre-programmed tank shapes for **volume and weight** measurement as well as 32-point linearisation are also provided.

As a special application of the level measurement the EchoTREK can also be used for flow metering in open channel applications with more than 20 pre-programmed flume and weir flow formulas. It also has two independent volume flow totalizers and the relay of the 4-wire version can be used to drive a remote, mechanical volume flow counter.

LINEARISATION

EchoTREK offers the 32 point linearisation function representing assignment of (calibrated or calculated) level, volume or flow to level values measured by the unit. It can be used for instance if the sound velocity is not known (Level to Level) or in the case of unusual tank shape (Level to Volume), with unknown level/flow relation (Level to Flow).

EchoTREK transmitters Two-wire		EchoTREK transmitters Four-wire				
Type	SE/SG-39	SE/SG/ST/SB-38	SE/SG-37	SE/SG-36	SE/SG-34	
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	Medium process tanks	Medium to large process tanks
Mounting	1 1/2" BSP or NPT	2" BSP or NPT		DN80	DN125	DN150
Frequency	80 kHz		50 kHz	60 kHz	40 kHz	20 kHz
Penetration through fumes/vapour, foam	X	X	XX		XXX	XXXX

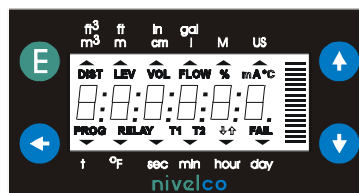
x= weak; xxxx= excellent

PROGRAMMING

EchoTREK compact transmitters can be programmed on site or remotely.

On-site programming

On-site programming of the four-wire EchoTREK (ST/SB-300) can be done with the magnetic screw driver (Touch Magnet Programming) or through the plug-in SAP-100 programming/display module.



SAP-100 programming/display module



SAP-200 display module

The two-wire EchoTREK (SE/SG-300) can be programmed with the plug-in SAP-200 display module and without it (LED aided QUICKSET).

SAP-100 programming and display module (optional for ST and part of SB series) incorporates programming keys, 6 digit LCD display and a bargraph which provides quick visual information on Echo strength or magnitude of the process value. The SAP-100 supports three programming modes: Current Output Scaling, Menu aided QUICKSET and Full Parameter Access.

SAP-200 display module (optional for SE and part of SG series) incorporates, 6 digit LCD display and a bargraph (Programming keys are on the unit). The SAP-200 can be used to display the menu during (Menu aided QUICKSET and Full Parameter Access) programming and process values during measurement.

Remote Programming/Digital Communication

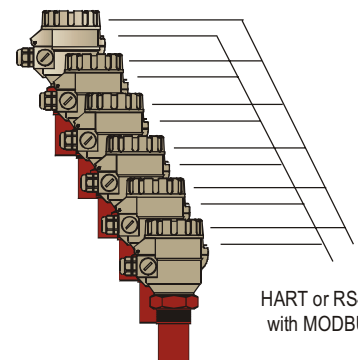
Digital communication makes possible remote programming of and acquiring information from the field devices.

HART

EchoTREK with HART and the configuration software Eview (running under Windows) enables remote programming of up to 15 field devices and viewing of the primary measurement values on the PC.

RS485 with MODBUS protocol (under development)

This is for remote programming and monitoring of up to 30 field devices and data acquisition.





HART or RS485 with MODBUS

Two-Part Measurement Systems

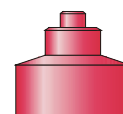
The **Two-Part Measurement System** consists of **SenSonar Sensor(s)** and a **NIVOSONAR Control Unit** for processing of the special signal provided by the sensor, indication and the output of measurement values.

SenSonar Sensors

- ◆ Incorporating Nivelco's 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.
See certificates on page 5

Versions	STANDARD Sensors (SI-300 series)	
See all available versions on page 10.		
Ingress protection	IP68	
Transducer material	PP, PVDF, PTFE (Teflon), Stainless steel	
Electrical connection	Direct cable outlet	
Heating	Optional	

SenSonar SI/SS-300



Type	SI-38	SI-36	SI-34	SI-32
Main application field	Open channel flow metering, water treatment	Open channel flow metering, water treatment	Water/ waste-water applications with foam	Water/ waste-water applications with heavy foam
Mounting	1" or 2"	1", DN80	1", DN100	1", DN150
Frequency	80 kHz	60 kHz	40 kHz	20 kHz
Penetration through fumes/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 for the convenience of the user/operator. Control Units are offered with various features and mechanical designs:

NIVOSONAR SM-300

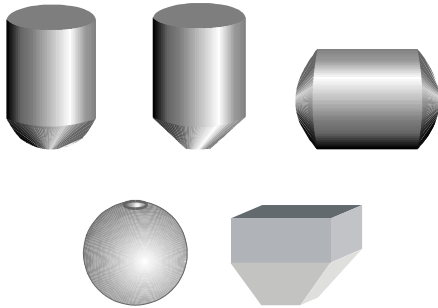


Type	SMM/SMZ-300	SMW/SMC/SMD/SMH-300
Mounting	Panel mounting	Wall mounting
Mechanical protection	IP40	IP54 or IP65
Measuring channel(s)	1	Up to 2
Current output	1	Up to 2
Relays	Up to 3	Up to 8
RS485	Optional	Optional
Heating	NA	Optional
Differential level meas.	NA	Standard

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

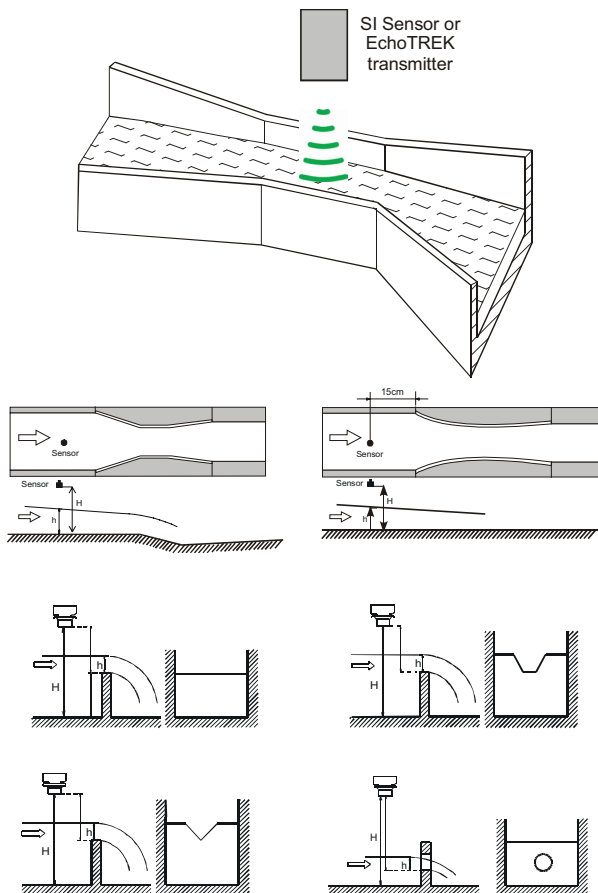
Level / Volume measurement

- Level related output and display
- Volume related output and display by measuring the level and using over 10 pre-programmed tank shapes formula



OPEN Channel Flow metering package

- Standard in all Nivelco ultrasonic devices
- Flow calculation based on:
 - 9 preset Parshall Flumes (Flumes supplied by NIVELCO)
 - General Parshall flume
 - Venturi flume
 - Weirs
 - 32 point linearisation



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

Other calculations / Features

- Differential level metering (rake/screen control) with the Two-Part System only
- 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 20mA or 4 to 20 mA
- Normal or inverted mode
- Failure indication modes: Hold, below 4 mA, above 20 mA

Relay outputs (features for the two-part systems)

- The relays can be assigned to over 30 different functions.
- Some of the relay functions
 - HIGH/LOW FAILSAFE 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

- Assignment of (calibrated or calculated) level, volume or flow to level values measured by the unit.

Fixed target suppression

- One disturbing fixed object can be blocked out. (With compact transmitter series only)

Automatic signal processing features (QUEST™)

- Automatic floating average curve
- Automatic dead band control

Access lock by secret code

- A 4-digit secret code to prevent unauthorised access

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.

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

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

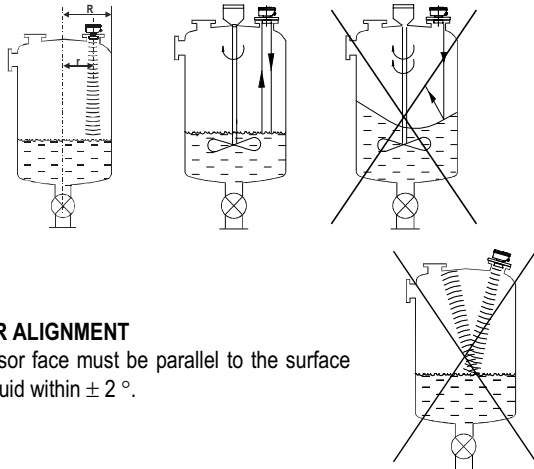
Digital Communication

- RS485 (Special Nivelco protocol) with the Two-Part system
- RS485 (MODBUS protocol) and HART (Eview configuration software) with the Compact transmitter.

INSTALLATION

POSITION

The optimal position of the EchoTREK transmitter and the SenSonar sensor is between $r = 0,3 R$ and $0,5 R$ of the cylindrical tank. The sonic cone on page 1 has also to be taken into consideration



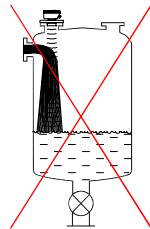
SENSOR ALIGNMENT

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

OBSTACLES

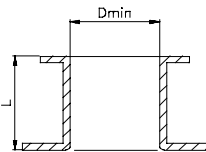
Make sure that no in-flow path or objects (e.g. cooling pipes, ladders, bracing strut, thermometers, etc) or no uneven tank wall surfaces (welding seam) protrude into the sensing cone of the ultrasonic beam.

One fixed object in the tank / silo that disturb the measurement can be blocked out by appropriate programming of the EchoTREK



STAND-OFF PIPE FOR SenSonar (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.



L [mm]	Dmin[mm]			
	S-38	S-36	S-34	S-32
500	125	150	200	300
300	100	125	175	200
200	85	100	150	175

FOAM

In cases where there is 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.

DECLARATIONS & CERTIFICATES OF CONFORMITY

The above mentioned product complies with the following regulations of the EC:

- Directive 93/68 EEC (CE mark)
- Directive 73/23 EEC(LVD)
- Directive 89/336 EEC (EMC)
- Directive 94/9 EEC (ATEX)*

Hazardous area approvals of intrinsically safe 2-wire EchoTREK:

- SE/SG-300 series certificate ATEX II 1 / 2 G EEx ia IIB T6

Hazardous area approvals of intrinsically safe SenSonar Sensors:

- SIA/SIB-300 series Certificate for EEx ia IIB T6 (no ATEX)

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

- SMM/SMZ-300 series Certificate for [EEx ia] (no ATEX)
- SMW/SMD- 300 series Certificate for [EEx ia] (no ATEX)

FUMES/VAPOUR

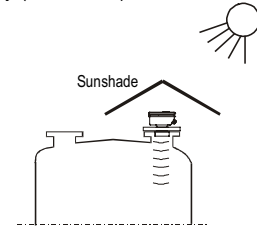
In case of closed tanks containing chemicals or other liquids creating fumes/gases above the liquid surface, especially outdoor tanks exposed to the sun, a strong reduction of the nominal measuring range of the unit must be taken into consideration. Units with lower measuring frequency (40, 20 kHz) are 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 wind or storm may "blow away" the ultrasound. Units with lower measuring frequency (40, 20 kHz) are recommended.

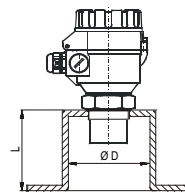
TEMPERATURE

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

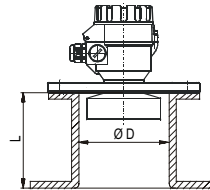


STAND-OFF PIPE FOR THE EchoTREK

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

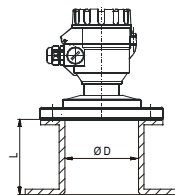
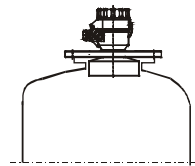


L (mm)	Dmin		
	S□□ -39□	S□□ -38□	S□□ -37□
150	50	60	60
200	50	60	75
250	65	65	90
300	80	75	105
350	95	85	120



L (mm)	Dmin	
	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)	Dmin		
	S□S -36□	S□S -34□	S□S -32□
320	80	-	-
440	-	125	-
800	-	-	150

The product has been tested according to the standards below (corresponding standards have been applied):

- EN 61010-1:1993/A2:1995
- CE/IEC 61326-1:2000
- EN 50081-1:1993
- EN 50082-2:1997

- EN 50014:1997 A1: 1999/A2:1999*
- EN 50018:2000*
- EN 50028:1992*
- EN 50281-1:1998*
- EN 50020:1994

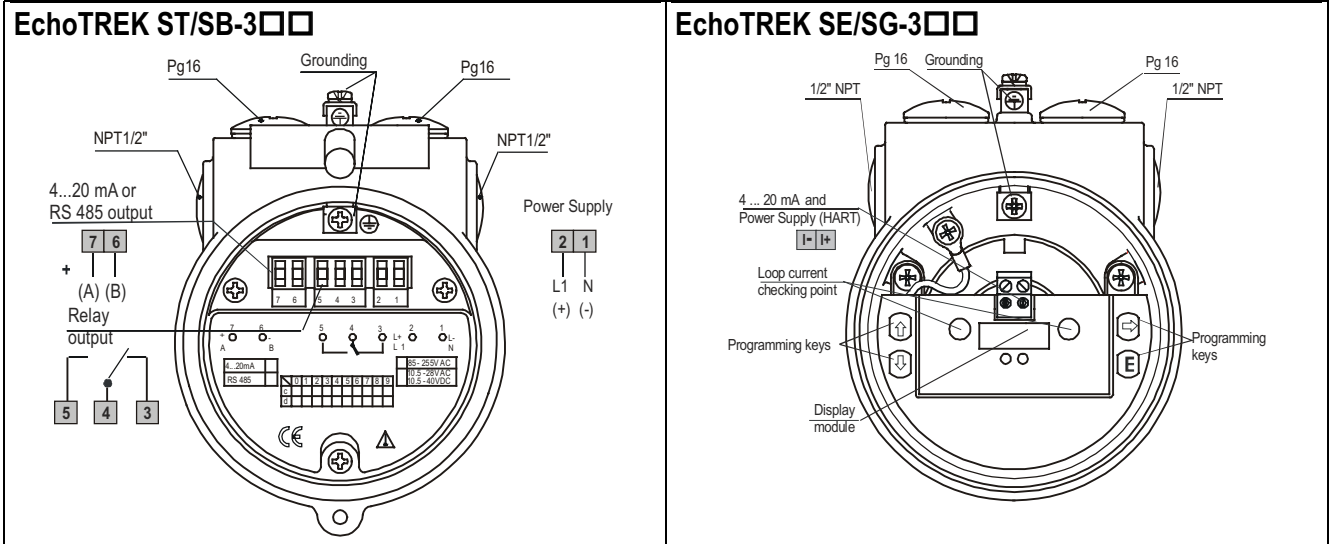
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No.: Ex 98.D.007X Issued by: TÜV, Austria

No.: Ex 98.D.006X Issued by: TÜV, Austria

No.: Ex 98.D.004X Issued by: TÜV, Austria

Electrical Connections for the EchoTREK Compact Transmitters



- For wiring one or two (shielded) cables can be used. The 4 ... 20 mA current output has to be led separately from the 110/230 V AC power supply and the output relay cable.
- Three-wire installation is also possible for the 24VDC versions by connecting terminals 1 and 6. In this case the galvanic isolation is not provided.

Electrical Connections for the Two-Part Measurement Systems

SenSonar SI-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 a common duct, ensure that they are individually shielded/screened
- The SYNC input of the Control Units is 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 ($U_{MAX} = 12 V$).

Wiring between Sensor and Control Unit

Wiring, with extended sensor signal cable

SMM, SMZ Panel Mounting Control Units

SMW, SMC, SMD, SMH and SW-300 Wall Mounting Control Units

Cut-out dimensions: $68^{+0.7} \times 138^{+1.0}$

TECHNICAL DATA, COMPACT TRANSMITTERS

EchoTREK Compact Transmitters

General Specifications

Product name	EchoTREK ST/SB - 300 series	EchoTREK SE/SG - 300 series
Product description	4-wire compact type ultrasonic level transmitter	2-wire compact type ultrasonic level transmitter
Transducer materials	Polypropylene (PP) Kynar (PVDF) Teflon (PTFE) Stainless Steel (DIN 1.4571, AISI SS316Ti)	
Housing material	Plastic: PBT fibre-glass reinforced, flame-retardant (DuPont®) Aluminium: Powder paint coated	
Process temperature	PP, PVDF and PTFE versions: -30°C ... +90°C Stainless steel versions: -30°C...+100°C (120°C for max. 2 hours)	PP transducers -20°C...+70°C, PVDF and PTFE transducers: -20°C...+80°C Stainless Steel transducer: -30°C...+100°C (120°C for max. 2 hours)
Ambient temperature	-30°C ... +60°C with SAP-100 progr. module -25°C ... +70°C (if necessary protect the device from over heating by direct sunshine!)	
Pressure ** (Absolute.)	Plastic versions: 0.5 ... 3 bar (0.05 ... 0.3 MPa) ; Stainless steel versions 0.9... 1.1 bar (0.090 ... 0.11 MPa)	
Seals	PP transducer: EPDM All other transducer versions: FKM (Viton®) ¹	
Ingress protection	Sensor: IP68 (submersible) Housing: IP67 (NEMA 6)	
Power supply / Consumption	Version I: 85 ... 255 V AC (50-60 Hz) / 6 VA Low voltage version: 10.5 ... 28 V AC (50-60 Hz) / 4 VA, 10.5 ... 40 V DC / 3.6 W	11.4 ... 36 V DC / 48 mW ... 720 mW
Accuracy*	±(0.2% of the 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, overvoltage protection	Analogue: 4/20 mA, (3.9...20.5 mA), $R_{max}=(U_r-11.4V) / 0.02$ isolated protection against surge transients
	Relay: SPDT; 250 V AC, 3 A	—
	Display (SAP-100): 6 digit LCD, icons and bargraph	Display (SAP-200) 6 digit LCD, icons and bargraph
Digital communication	HART or RS 485*** (with MODBUS protocol)	HART
Electrical connections	2 x Pg16 or 2 x ½" NPT Wire cross section: 0.5 ... 2.5 mm ²	
Electrical protection	Class I. with aluminium housing and Class II with plastic housing	

*Under optimal conditions of reflection and stabilised transducer temperature. ** In case of pressure below 0,7 bar consult Nivelco ***Under development

Special data of EchoTREK for liquids with PP and PVDF transducers

Type	4-wire	S□□-39□-□	S□□-38□-□	S□□-37□-□	S□□-36□-□	S□□-34□-□	S□□-32□-□
	2-wire	S□□-39□-□	S□□-38□-□	S□□-37□-□	S□□-36□-□	—	—
Transducer material	PP or PVDF	PP or PVDF	PP or PVDF	PP or PVDF	PP or PVDF	PP or PVDF	PP or PVDF
Max. measuring distance * [m / ft]	4 / 13	6 / 20	8 / 26	10 / 33	15 / 49	25 / 82	
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 ½" thread	2" thread	2" thread	Flange	Flange	Flange	

* (from transducer face)

Special data of EchoTREK for liquids with PTFE and Stainless Steel transducers (for ST/SB series and SE/SG-39/38/37 only)

Type	S□□-39□-□	S□□-38□-□	S□□-37□-□	S□□-36□-□	S□□-34□-□	S□□-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 ½" thread	2" thread	2" thread	Flush flange	Flush flange	Flush flange

* (from transducer face)

SAP Programmer and display module

Type	SAP-100 Programmer and display module	SAP 200 Display module
Front panel	6 digits Custom LCD, icons eng units and bargraph, Programming keys	6 digits, icons and bargraph, Custom LCD,
Ambient temperature	-25°C... +60°C	
Housing material	PBT fibre-glass reinforced plastic, flame-retardant (DuPont®)	PBT fibre-glass reinforced plastic, flame-retardant (DuPont®)

¹ Viton® is a registered trademark from DuPont Performance Elastomers"

TECHNICAL DATA, TWO-PART SYSTEMS

SenSonar Sensors

General Specifications

Product name	SenSonar SI-300 series	
Product description	Sensor for Two-Part Ultrasonic Level Metering System	
Transducer materials	SIA: Polypropylene (PP) SIB: Kynar (PVDF) SIT: Teflon (PTFE) SIS: Stainless Steel (DIN 1.4571, AISI SS316Ti)	
Housing material	SI: Same as transducer material; SS: Paint coated Aluminium; SIT-380 and SIS-3□□: PP	
Process temperature	SIA/SIB: -30°C... +80°C SIS/SIT: -30°C... +100°C (CIP 120°C for max. 2 hours)	Ex versions: SIA: -20°C... +70°C (no ATEX) SIB: -20°C... +75°C
Ambient temperature	SIT,SIS -30 ... + 60 °C SIA, SIB: -30 ... +80 °C	Ex: SIA, SIB: -20°C... +70°C (no ATEX)
Pressure (Absolute.)*	0.3 ... 6 bar (0.03 ... 0.6 MPa) with or without suitable flange. Ex versions at atmospheric pressure only! (no ATEX)	
Seals	PP version: EPDM All other versions: FKM (Viton®)	
Ingress protection	SI: IP68 (NEMA 6X), submersible;	
Electrical connections	SI: Direct cable outlet;	
Signal cable	4-wire shielded cable; wire cross section: 0.5 ... 2.5 mm ² ; max. 50nF, 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	

* In case of pressure below 0.7 bar consult Nivelco.

PP and PVDF sensors

Type	SI□-38□	SI□-36□	SI□-34□	SI□-32□
Transducer material	PP or PVDF	PP or PVDF	PP or PVDF	PP or PVDF
Max. measuring distance [m/ft] (no ATEX)	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 sensors

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 °C SMW, SMC, SMD: -20°C... +50 °C SMH: -30°C... +50 °C	
Analogue output	Galvanically isolated; 0/4 ... 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 reflection and stabilised transducer temperature.

HART MODEM SAT-303

WIRING	SPECIFICATIONS																		
	<table border="1"> <tr> <td>Ambient temperature range</td> <td>-25°C ... +50°C</td> </tr> <tr> <td>Enclosure</td> <td>Polystyrol</td> </tr> <tr> <td>Connection (to PC)</td> <td>DB-9 – RS232</td> </tr> <tr> <td>Cable length (to PC)</td> <td>0,2 m</td> </tr> <tr> <td>Connection (to field device)</td> <td>KLEPS 2</td> </tr> <tr> <td>Cable length (to field device)</td> <td>0,6 m (1,1 m)</td> </tr> <tr> <td>Ingress protection</td> <td>IP 20</td> </tr> <tr> <td>Electrical protection</td> <td>Class III</td> </tr> <tr> <td>Weight</td> <td>0,1 kg</td> </tr> </table>	Ambient temperature range	-25°C ... +50°C	Enclosure	Polystyrol	Connection (to PC)	DB-9 – RS232	Cable length (to PC)	0,2 m	Connection (to field device)	KLEPS 2	Cable length (to field device)	0,6 m (1,1 m)	Ingress protection	IP 20	Electrical protection	Class III	Weight	0,1 kg
	Ambient temperature range	-25°C ... +50°C																	
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Cable length (to field device)	0,6 m (1,1 m)																		
Ingress protection	IP 20																		
Electrical protection	Class III																		
Weight	0,1 kg																		

MOUNTING ACCESSORIES

Damping Gland	Fast Connecting Gland	Flanges for SIA/SIB	Mounting Brackets								
<p>SAA-106</p> <p>Recommended for mounting SIA/SIB sensors on a thin resonating plate</p>	<p>For easy mounting to pipes</p>	<p>SIA/SIB sensors are factory equipped with a suitable flange for appropriate mounting on flanged tanks</p>	<table border="1"> <thead> <tr> <th>Code</th> <th>A</th> </tr> </thead> <tbody> <tr> <td>K</td> <td>200 mm</td> </tr> <tr> <td>L</td> <td>500 mm</td> </tr> <tr> <td>M</td> <td>700 mm</td> </tr> </tbody> </table>	Code	A	K	200 mm	L	500 mm	M	700 mm
Code	A										
K	200 mm										
L	500 mm										
M	700 mm										

DIMENSIONS

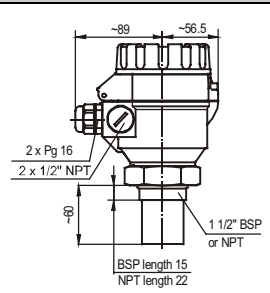
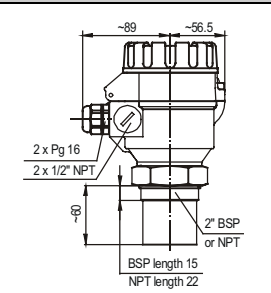
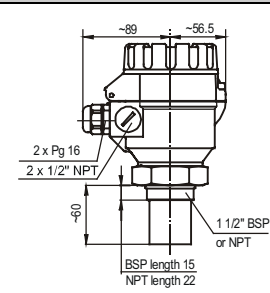
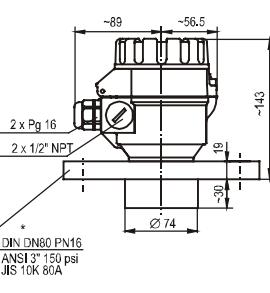
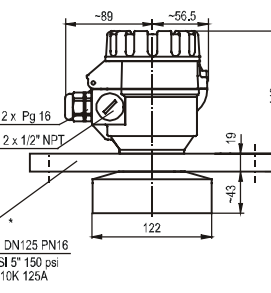
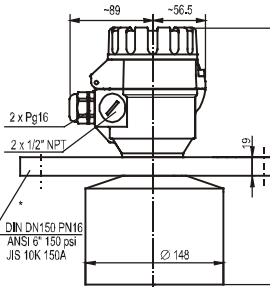
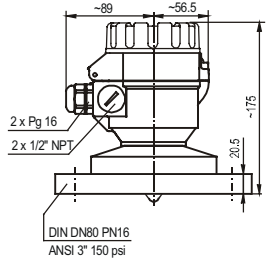
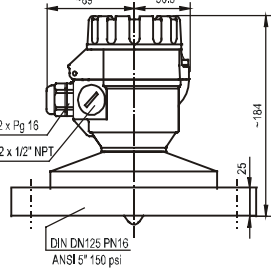
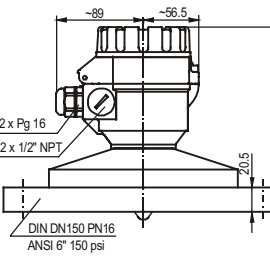
2-WIRE COMPACT TRANSMITTERS (SE, SG SERIES)

<p>EchoTREK S□□-39□-□ PP, PVDF, PTFE</p> <p>~89, 97.5, 2 x Pg 16, 2 x 1/2" NPT, 1 1/2" BSP or NPT, BSP length 15, NPT length 22, 60</p>	<p>EchoTREK S□□-38□-□ PP, PVDF, PTFE</p> <p>~89, 97.5, 2 x Pg 16, 2 x 1/2" NPT, 2" BSP or NPT, BSP length 15, NPT length 22, 60</p>	<p>EchoTREK S□□-37□-□ PP, PVDF, PTFE</p> <p>~89, 97.5, 2 x Pg 16, 2 x 1/2" NPT, 2" BSP or NPT, BSP length 15, NPT length 22, 60</p>
<p>EchoTREK S□□-36□-□ ** PP, PVDF</p> <p>~89, 97.5, 2 x Pg 16, 2 x 1/2" NPT, 19, 30, 74, * DIN DN80 PN16, ANSI 3" 150 psi, JIS 10K 80A</p>	<p>EchoTREK S□□-34□-□ ** PP, PVDF</p> <p>~89, 97.5, 2 x Pg 16, 2 x 1/2" NPT, 19, 43, 122, * DIN DN 125 PN 16, ANSI 5" 150 psi, JIS 10 K 125 A</p>	<p>EchoTREK S□□-36□-□ ** SS316 Ti</p> <p>~89, 97.5, 2 x Pg 16, 2 x 1/2" NPT, 20.5, * DIN DN80 PN16, ANSI 3" 150 psi</p>
<p>EchoTREK S□□-34□-□/ SS316 Ti**</p> <p>~89, 97.5, 2 x Pg 16, 2 x 1/2" NPT, 25, 157, * DIN DN125 PN16, ANSI 5" 150 psi</p>	<p>EchoTREK SAT-303</p> <p>39, 2.1, 9.5, 79, 40</p>	<p>EchoTREK SAP-200</p> <p>56, 46</p>

* Minimum flange size for the model (larger flange can be selected).

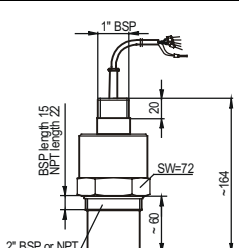
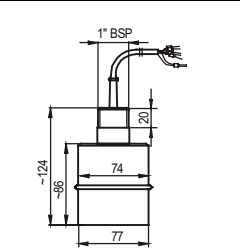
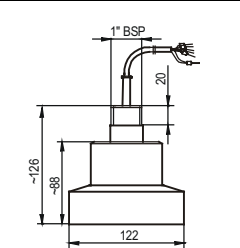
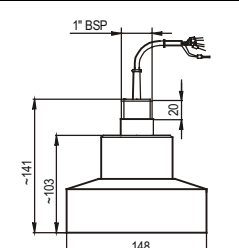
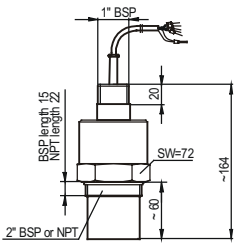
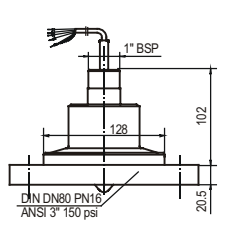
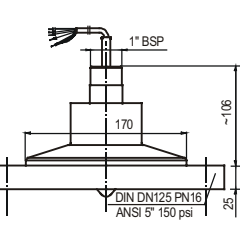
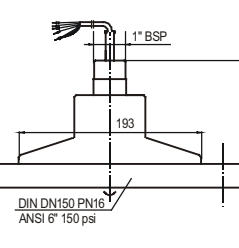
** Under development

4-WIRE COMPACT TRANSMITTERS (ST/SB SERIES)

<p>EchoTREK S□□-39□-□ PP, PVDF, PTFE</p> 	<p>EchoTREK S□□-38□-□ PP, PVDF, PTFE</p> 	<p>EchoTREK S□□-37□-□ PP, PVDF, PTFE</p> 
<p>EchoTREK S□□-36□-□ PP, PVDF</p> 	<p>EchoTREK S□□-34□-□ PP, PVDF</p> 	<p>EchoTREK S□□-32□-□ PP, PVDF</p> 
<p>EchoTREK S□S-36□-□ St. St.</p> 	<p>EchoTREK S□S-34□-□ St. St.</p> 	<p>EchoTREK S□S-32□-□ St. St.</p> 

* minimum flange size of the model (larger flange can be selected)

SenSonar Sensors

<p>SenSonar SI□-38□ PP, PVDF</p> 	<p>SenSonar SI□-36□ PP, PVDF</p> 	<p>SenSonar SI□-34□ PP, PVDF</p> 	<p>SenSonar SI□-32□ PP, PVDF</p> 
<p>SenSonar SIT-38□ PTFE</p> 	<p>SenSonar SIS-36□ St.St.,</p> 	<p>SenSonar SIS-34□ St.St.,</p> 	<p>SenSonar SIS-32□ St.St.,</p> 

* minimum flange size of the model (larger flange can be selected)

ORDER CODES (Note: not all combinations of order numbers are possible)

EchoTREK Compact Transmitters

EchoTREK 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 255 A AC		
Transmitter with indicator	B	PVDF / Aluminium	B	15 m	4	NPT thread	N	4 ... 20 mA + Relay	1	
		PTFE / Aluminium	T	10 m	6	DN 80	2	4 ... 20 mA + Relay + HART	3	
Two-wire transmitter	E	St. St. / Aluminium	S	8 m	7	DN 100	3	RS 485 + Relay	5	
		PP / Plastic	P	6 m	8	DN 125	4	4 ... 20 mA + Relay (limited pr.)	A	
Two-wire transmitter with indicator	G	PVDF / Plastic	V	4 m	9	DN 150	5	10.5 to 40 V DC		
		PTFE / Plastic	F			DN 200	6	10.5 to 28 V AC		
		St. St. / Plastic	M			200 mm bracket	K	4 ... 20 mA + Relay	2	
							500 mm bracket	L	4 ... 20 mA + HART + Relay	4
							700 mm bracket	M	RS 485 + Relay	6
									4 ... 20 mA + Relay (limited pr.)	B
									TWO WIRE	
									4 ... 20 mA / LOGGER	1
									4 ... 20 mA	2
									4 ... 20 mA / HART / LOGGER	3
									4 ... 20 mA / HART	4
									4 ... 20 mA / LOGGER / Ex	5
									4 ... 20 mA / Ex	6
									4 ... 20 mA / HART / LOGGER / Ex	7
									4 ... 20 mA / HART / Ex	8

* for measuring ranges of PTFE (teflon) and St.St. (stainless steel) versions, see Technical Data table
 ** S...-39, 38 or 37 with thread, all other models with flange or bracket
 *** not available in two-wire
 Note: for relevant ANSI & JIS flanges consult your Nivelco distributor

EchoTREK S A P - 1 0 0

Programming / display module

EchoTREK S A P - 2 0 0

Display module

EchoTREK S A T - 3 0 3

HART Modem

EchoTREK S A S - 3 0 2

EView HART software (on CD)

TWO-PART SYSTEM SenSonar Sensors

SenSonar 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
		PVDF	B	15 m	4	NPT thread	N	EEx ia IIB T6	9
		PTFE	T	10 m	6	DN 80	2		
		Stainless steel	S	6 m	8	DN 100	3		
						DN 125	4		
						DN 150	5		
						DN 200	6		
						200 mm bracket	K		
						500 mm bracket	L		
						700 mm bracket	M		
						Fast conn. gland	F		

* SI-300 sensors are delivered with 3 m cable unless otherwise specified (max. order length: 30 m; further extension possible).
 ** For measuring ranges of PTFE, St.St. and Ex versions, see Technical Data table
 *** 1" for all St. versions, 2" for SI-38.

NIVOSONAR Control Units

NIVOSONAR S M - 3 -

TYPE	CODE	CURRENT OUTPUT / Rs 485				RELAY OUTPUT	CODE	POWER SUPPLY / APPROVAL		CODE
		Single channel version		Dual channel version						
Panel mount	M	None	1	None	5	0 Relay	0	230 V AC / Standard	1	
Panel mount, lockable cover	Z	1x 4 ... 20 mA	2	2x 4 ... 20 mA	6	1 Relay	1	110 V AC / Standard	2	
Wall mount IP 54	W	RS 485	3	RS 485	7	2 Relays	2	24 V AC / Standard	3	
Wall mount IP 65 screw cover	C	1x 4 ... 20 mA + RS 485	4	2x 4 ... 20 mA + RS 485	8	3 Relays	3	24 V DC / Standard	4	
Wall mount IP 65 locable cover	D					4 Relays	4	230 V AC / [EEx ia]	5	
Wall mount IP 65 heated	H					5 Relays	5	110 V AC / [EEx ia]	6	
						6 Relays	6	24 V AC / [EEx ia]	7	
						7 Relays	7			
						8 Relays	8			

NIVELCO PROCESS CONTROL CO.

H-1043 BUDAPEST, DUGONICS U. 11.

TEL.: (36-1) 369-7575 ◆ FAX: (36-1) 369-8585

E-mail: sales@nivelco.com http://www.nivelco.com