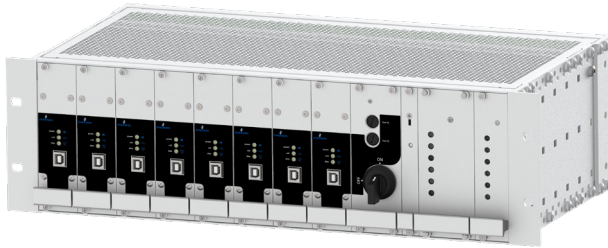




SEMPPELL LINEAR VARIABLE DIFFERENTIAL TRANSDUCER (LVDT) MODEL N-LVDT

Sempell N-LVDT is a linear valve position transmitter for nuclear applications. LVDT stands for Linear Variable Differential Transducer. This instrument is mounted on a linear sliding stem valves and it is designed with two (2) main components, a travel sensor with three (3) different sizes and a common electronic component designed into a rack able controller.



FEATURES

- Protective metal conduit
- Hermetically sealed
- Analogue output and USB interface
- High resolution
- High dynamics
- High noise immunity
- No organic material
- Temperature compensation

TECHNICAL DATA

Measurement Range:	0 to 40 mm 0 to 120 mm 0 to 280 mm
Temperature Range:	-25 to 60°C resistance up to 370°C / 700°F
Housing:	Stainless steel 1.4301

GENERAL APPLICATION

The Sempell Linear Variable Differential Transducer (LVDT) is engineered for precise measurement of linear displacement or position. These transducers are built to be highly robust, with an inherently frictionless and infinite lifecycle design. They operate via electromagnetic coupling, eliminating the need for mechanical contact between the coil assembly and moving part. Sempell N-LVDTs are available in three different construction sizes, depending on the linear displacement range needed and offer low hysteresis and excellent repeatability. With no electronic components, they can function in temperatures up to 370°C / 700°F and are well-suited for harsh environments and high vibration shock levels. By converting mechanical reference position (zero or null) into a proportional electrical signal, the Sempell N-LVDT provides both direction (phase) and displacement (amplitude) information.

SEPELL MODEL N-LVDT

LINEAR VARIABLE DIFFERENTIAL TRANSDUCER (LVDT)

OVERVIEW

The Sempell N-LVDT is a linear valve position transmitter which is composed by six (6) devices all electrically connected. The linear travel or stroke sensor is mounted on a sliding stem valve. This sensor is voltage power supplied by a controller. The connecting cable is designed to be used inside containment area from the sensor up to the connection box. The connection box is the last device with the sensor and the connecting cable to be installed inside containment area. A cable is used to wire the connection box to the sensor controller which is installed in a rack. The controller rack is designed for eight (8) controller slots. A single controller needs to be wired and used with a unique sensor. All the controllers and the rack are protected inside a cabinet which is fixed to a wall or in a technical room. Once mounted, wired and calibrated the N-LVDT instrument transmits a 4 to 20 mA analog signal to the control system according to a linear mechanical calibrated valve stroke.

FIGURE 1
Sempell N-LVDT on a Valve

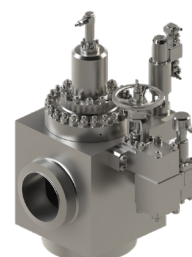


FIGURE 2

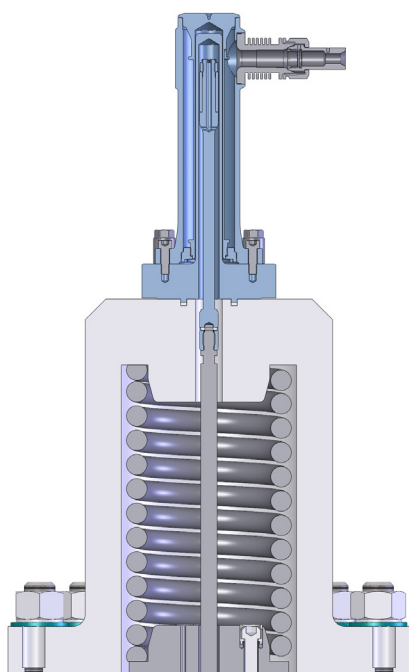
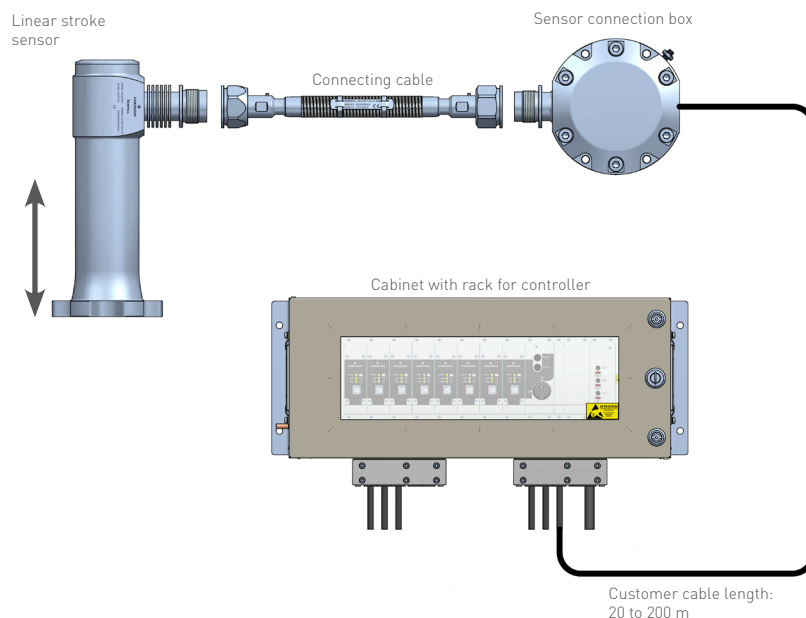


FIGURE 3



SEPELL MODEL N-LVDT

LINEAR VARIABLE DIFFERENTIAL TRANSDUCER (LVDT)

SENSORS

The N-LVDT sensors operate with contactless parts between the coil and the push rod. This design allows high reliability and durability.

FIGURE 4

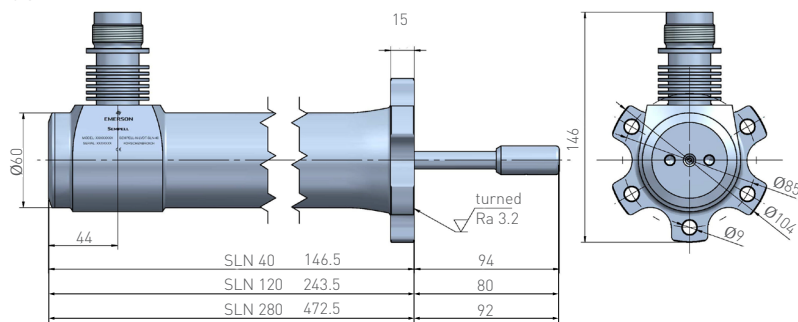


FIGURE 5



TABLE 1

SENSOR	Sempell N-LVDT-SLN-40	Sempell N-LVDT-SLN-120	Sempell N-LVDT-SLN-280
Measurement range (+10 mm tolerance)	0 to 40 mm (+10 mm)	0 to 120 (+10 mm)	0 to 280 (+10 mm)
Minimum valve stroke	8 mm	24 mm	56 mm
Weight (approximate, without cable)	2800 g	3800 g	5800 g
Linearity	0.3% of Full Stroke with Sempell-N-LVDT-TX controller		
Type	Push rod unguided		
Protection class	IP68, 10 bar (sensor, connecting cable, connection box)		
Humidity	100%		
Vibration stability DIN IEC68T2-6	10 G		
Shock stability DIN IEC68T2-27	200 G/2 ms		
Operating/steam temperature	370°C / 700°F		
Mounting	Flange with six (6) bores (9 mm diameter on pcd 85 mm)		
Housing	Stainless steel 1.4301		
Connection	Connector output		
Rated voltage level	Nominal: 3 Vrms Maximum: 10 Vrms		
Rated frequency range	500 to 2000 Hz		
Maximum insulation voltage	50 V DC acc. IEEE-43-2000		
Push rod unguided			
Maximum acceleration of core/push rod	100 G		
Lifecycle	Infinite		

SEPELL MODEL N-LVDT

LINEAR VARIABLE DIFFERENTIAL TRANSDUCER (LVDT)

CONTROLLER

The Sempell-N-LVDT-TX controller will be remotely wired to the N-LVDT sensor. TX controller will be connected with a single SLN sensor. A maximum of eight (8) controller slots are available per rack. The controller installed in the rack will be installed in the cabinet.

A USB port is dedicated for the controller setting via the software. The Sempell-N-LVDT-TX controller will considerably improve the linearity of inductive displacement transducers.

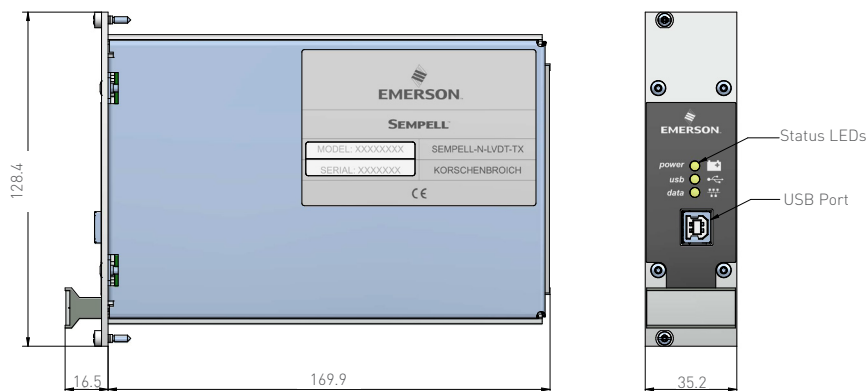
TABLE 2

LVDT-Basic Module	SEPELL-N-LVDT-TX
Channels	1 channel
Operating temperature range	40 to +50°C
Storage temperature range	-40 to +85°C
Humidity	98% (no condensation)
Vibration	5 g, DIN EN 60068-2-6
Shock	15 g/11 ms, DIN EN 60068-2-27
Protection class	IP20
Housing	Anodised aluminium, 19 in. rack unit
Housing size L x W x H	185 x 35.2 x 129 mm
Weight	350 g
Supply	
Supply Voltage	5 V DC/±12 V DC
Current consumption	280 mA (5 V DC), 50 mA (±12 V DC)
Power on peak current	5 V DC: 600 mA (2 ms), ±12 V DC: no peak
Reverse polarity protection	Yes
Protection circuit	Bipolar suppressor diode 36 V/polyfuse 0.5 A
Isolation voltage	1 kV
Analog output	
Output signals	4 to 20 mA (standard), 0 to 20 mA, 0 to 10 V, 0 to 5 V, ±5 V (additional calibration necessary)
Filter corner frequency	10 Hz/100 Hz/1 kHz (-3 dB)
Maximum working resistance (current output)	< 400 Ohm
Temperature coefficient electronic	-0.025 %/K
Switching-on delay (boot-time)	3.1 s
Switching-on drift	< 1%
Connection output	1 x rear connector
Output protection circuit	Polyfuse 50 mA
General data and industrial standards	
Electromagnetic compatibility	EN 61326-1/EN 55011
RoHS	Appropriate standard 2002/95/EG
MTBF	EN 61709, > 360.000 h
Customs declaration number	90318034 country of origin Germany

FIGURE 6



FIGURE 7



SEPELL MODEL N-LVDT

LINEAR VARIABLE DIFFERENTIAL TRANSDUCER (LVDT)

CONNECTION BOX AND CONNECTION CABLE

FIGURE 8
Sempell-N-LVDT-CB

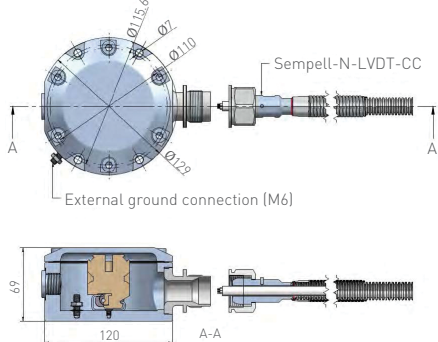


FIGURE 9
Inside view

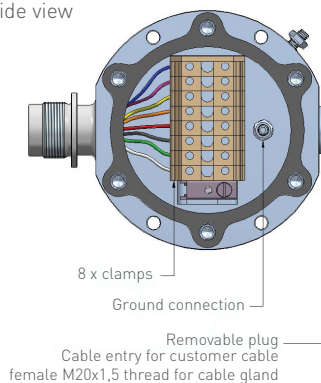


FIGURE 10
Terminal assignment

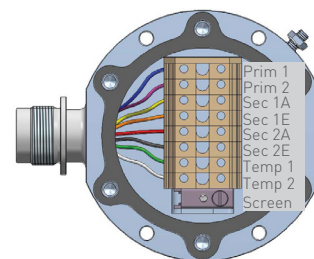


FIGURE 11



TABLE 3

Ceramic feed-through terminal (clamp)	
Rated cross-section	Maximum 4 mm ² (AWG 22-10)
Connecting method	Screw connection
Recommended stripping length	10 mm
Tightening torque	0.5 Nm
Tightening screw	M3 slot head (bit with blade width 3 mm)
Material	Ceramic (steatite)
UL 94 flammability rating	V-0, 5 VB

TABLE 4

Recommended connecting cable between connection box and rack Sempell-N-LVDT-R19

Cable specification	
Type	Twin twisted pair, 2 x 2
Conductor	(Tin plated) copper conductor, cross section 0.5 to 1.5 mm ²
Outer shielding	Braided screen of tin plated copper wire, minimum coverage 85%
Inner shielding (optional)	Single shielding of twisted pairs
Recommended cable length	20 to 200 m

FIGURE 12

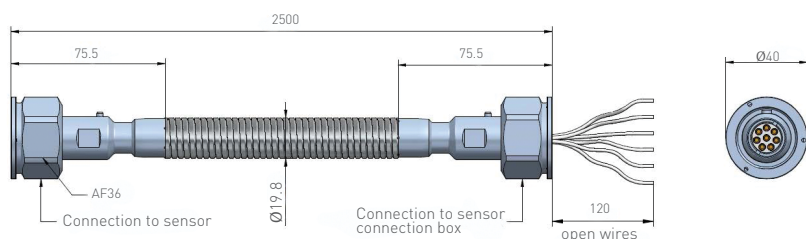


TABLE 5

Connection cable Sempell-N-LVDT-CC	
Material	Stainless steel, 1.4301/1.4404
Construction	Corrugated hose with two stainless steel wire braidings
Cable end sensor	8-pole connector
Cable end connection box	Connector with open wires
Wires	8 x 0.5 mm ² , halogen-free, asbestos and cadmium-free
Bending radius (static)	≥140 mm
Available sizes	1.0 and 2.5 m

SEPELL MODEL N-LVDT

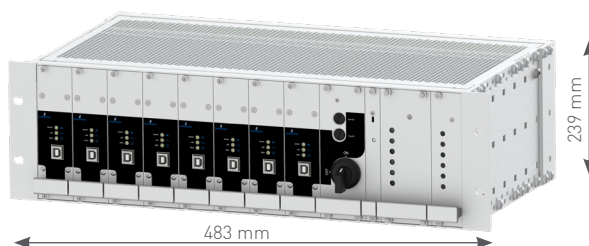
LINEAR VARIABLE DIFFERENTIAL TRANSDUCER (LVDT)

R19" RACK UNIT

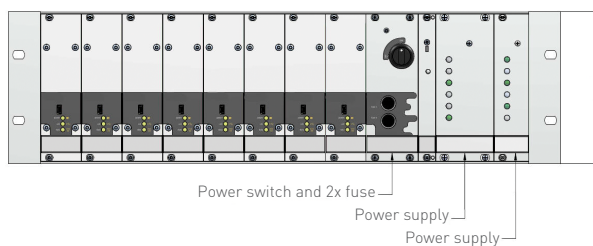
The rack unit is designed with eight (8) controller slots to be installed with a single up to eight (8) controllers. The nineteen (19) inches rack housing is anodized aluminum. Two voltage options are available to supply power to the controller rack:

- 230 V AC (fuse protected)
- 24 V DC (fuse protected)

FIGURE 13
SEPELL-N-LVDT-R19



Fully equipped rack, including 8 x electronics Sempell-N-LVDT-TX



SEPELL-N-LVDT-WM

The wall-mounted enclosure or cabinet is designed to receive the controller rack inside to protect it against all severe ambient conditions. This wall-mounted enclosure is composed by two devices inside the cabinet:

- The rack controller location
- The field sensor terminal connection blocks

FIGURE 14



FIGURE 15

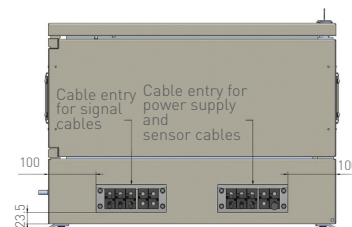


FIGURE 16

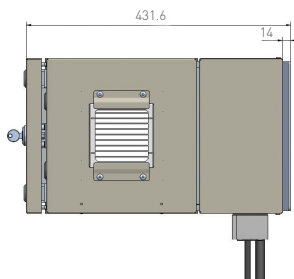
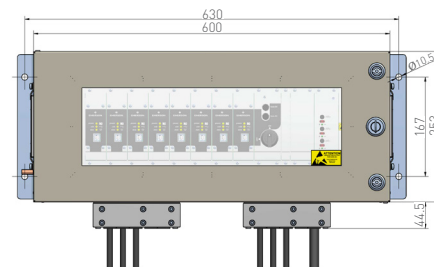


FIGURE 17



SEMPELL MODEL N-LVDT

LINEAR VARIABLE DIFFERENTIAL TRANSDUCER (LVDT)

FIGURE 18
Detail: Cable Entry Plates

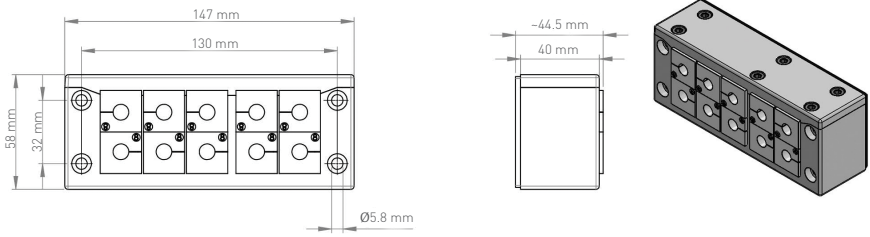


TABLE 6

Sempell-N-LVDT-WM	
Material	Zincor [steel 1.0330, electrolytic zinc plated]
Surface	Powder coated, gray RAL 7032, certified according to decontaminability DIN 25415/ISO 8690
Cable entry plates	
Cable entries	10 bores for cable diameter 3 to 17.0 mm*
Material	Polyamid, silicone and halogen free, highly conductive coated
Flame class	UL94-V0/UL94-HB
Protection class	IP54
Outer cable grommet (gray)	For strain relief of the cable and sealing
Inner cable grommet (black)	Electrically conductive for electrical contacting of the cable shield (EMC)

* In the case of an order, the cable types used (diameter and structure) must be specified so that the appropriate cable grommets can be supplied.

SOFTWARE

The “Sempell Motion” software is designed to configure each Sempell-N-LVDT-TX controller to perfectly adjust each sensor to the required travel range.

The “Sempell Motion” software is a powerful intuitive interface used in conjunction with the TX controller to visualize live data and to configure the SLN sensor.



FIGURE 19



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