DATASHEET

SL SERIES | LVDT

The SL series offers an ultra-robust, stable construction and features a complete stainless steel housing. Predestined for use in harsh industrial environments.

- Measurement ranges 10...600 mm
- Housing ø20 mm
- Linearity up to ±0,10 % of full scale
- Protection class IP67, optional IP68
- Sensor working temperature up to 200 °C
- Customized versions available

eddylab

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LVDTs (Linear Variable Differential Transformers) are inductive sensors excellent for use in harsh industrial environments, e.g. high temperature and pressure ranges, as well as high accelerations and measuring cycles.

The **SL series** offers ultimate reliability and precision in a small size, and is designed for industrial and lab use. The sensors can also be used under water because of their high protection class and the stainless steel housing.

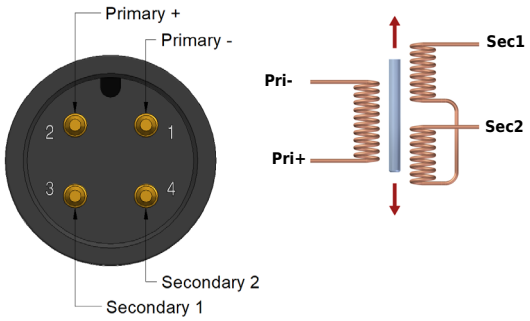
Note: A measuring amplifier is required to operate LVDT sensors. eddylab offers the digital signal conditioners **DEEneo** for DIN rail mounting and **DEEneo-ISC**, a version integrated into the sensor connection cable. See p.5 or separate data sheets at www.eddylab.com.
The electronics take over the sensor supply and convert the sensor signal into a standardized, analogue output signal with the help of a microcontroller output signal. They also feature simple adjustment (teach function) and linearization of the sensor characteristic curve to achieve the highest possible precision.

TECHNICAL DATA - SENSORS

SENSOR											
Measurement range FS [mm]	0...10	0...25	0...50	0...80	0...100	0...150	0...200	0...300	0...400	0...500	0...600
Linearity [% of FS]	0.30 % (0.20 % optional); 1.50 % SL500 and SL600, 0.10 % for selected models										
Types	free core, push rod guided/ unguided, rod end bearings										
Protection class	IP67, optional IP68										
Vibration stability DIN IEC68T2-6	10 G										
Shock stability DIN IEC68T2-27	200 G/2 ms										
Supply voltage/ frequency	3 V_{eff}/3 kHz										
Supply frequency	2...10 kHz										
Temperature range	-40...+120 °C (150 °C / 200 °C on request)										
Mounting	ø 20 mm clamp diameter or rod end bearings										
Housing	stainless steel 1.4571, 1.4305										
Connection	4 core cable or M12-connector with coupling nut										
cable TPE (standard)	ø 4.5 mm, 0.14 mm², non-halogen, suitable for drag chains										
cable PTFE (option H)	ø 4.8 mm, 0.24 mm², max. temperature 200 °C, UL-Style 2895										
Max. cable length	100 m between sensor and electronics										
Free core/ push rod/ push rod guided											
Max. acceleration of core/ push rod	100 G										
Life cycle	infinite										
Weight (approx., without cable) [g]	125	150	230	290	320	360	420	550	670	670	670

CABLE/PIN ASSIGNMENT (AC OUTPUT)

	WIRE COLOUR OF EDDYLAB CABLES		M12 CONNECTOR
FUNCTION	TPE CABLE	PTFE-UL CABLE	PIN
Primary +	white	white	2
Primary -	brown	yellow	1
Secondary 1	blue	brown	3
Secondary 2	black	green	4

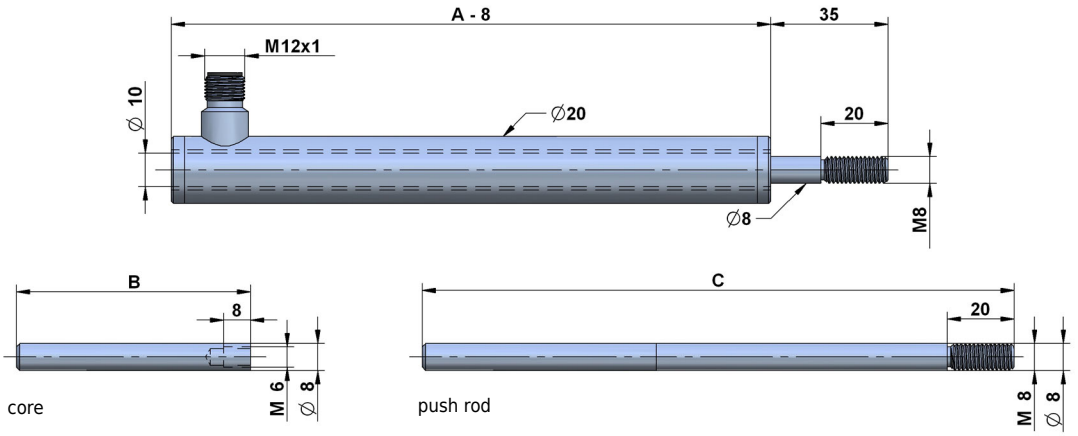


TECHNICAL DRAWINGS

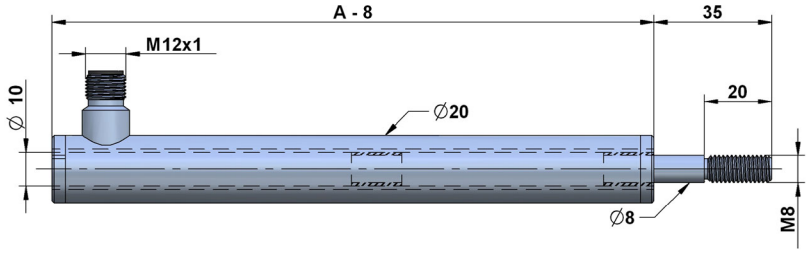
RANGE (FS) [MM]	BODY LENGTH A [MM]	CORE LENGTH B [MM]	PUSH ROD LENGTH C [MM]
0...10	107	30	97
0...25	137	50	132
0...50	187	70	177
0...80	247	100	237
0...100	287	120	277
0...150	387	170	377
0...200	487	220	477
0...300	687	320	677
0...400	905	420	887
0...500	905	185	780
0...600	905	185	880

Other measurement ranges are available on request.

TYPE: FREE CORE, PUSH ROD

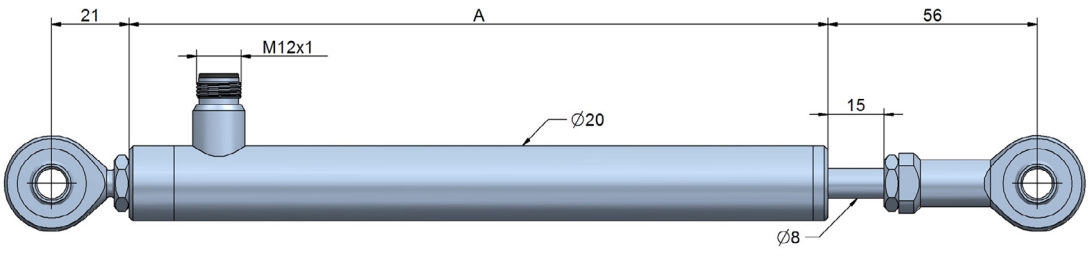


TYPE: GUIDED PUSH ROD

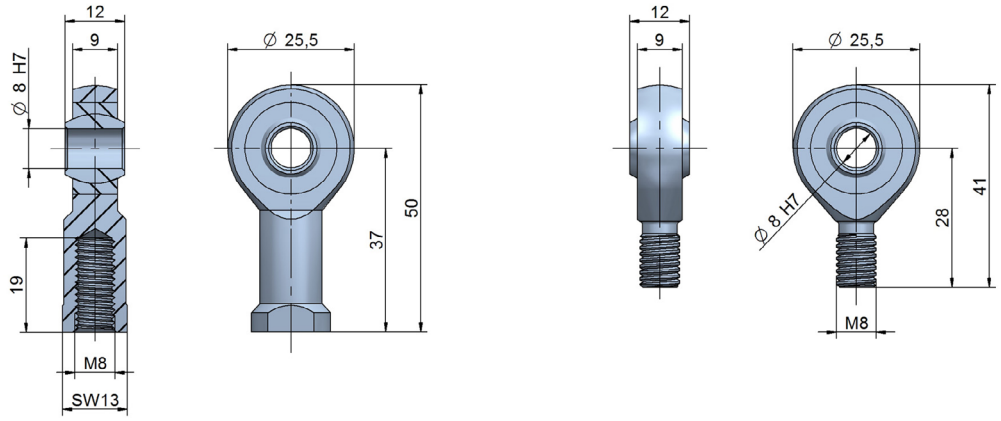


push rod supported by Iglidur bearings, push rod completely extricable

TYPE: ROD END BEARINGS

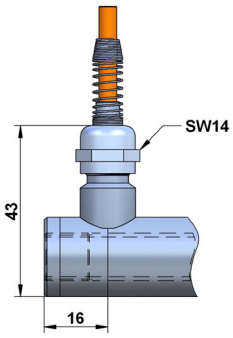


DETAIL: ROD END BEARINGS



SENSOR TYPES

CABLE OUTPUT RADIAL



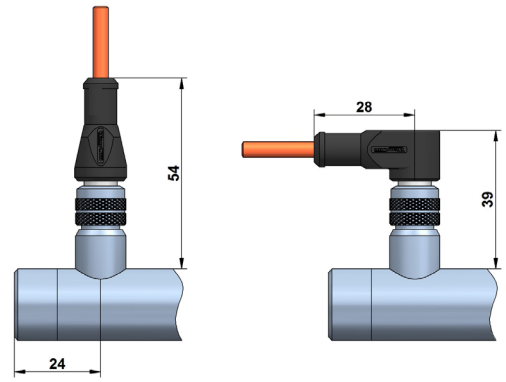
Sensors with cable output have a cable fitting and a spring for bend protection of the cable. For installation, the bending radius should not be less than 3 times the cable diameter. The standard cable length is 2 m.

Instruments with option H for temperatures up to 150 °C feature a PTFE cable.

Sensors have a through hole. Please use this type for application at heavy dirt exposure. The movement of the push rod removes the dirt from the sensor and conveys it to the rear.

The variant G (rod end bearings) is closed on the rear end for structural reasons.

CONNECTOR OUTPUT RADIAL (CABLE WITH STRAIGHT OR ANGULAR CONNECTOR)

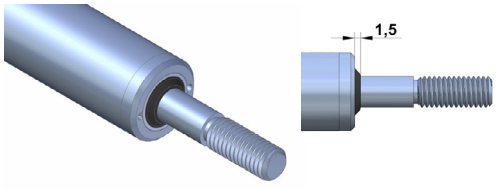


For sensors with connector output the cable has to be ordered separately. You can choose from a cable with a straight connector or with an angular connector.

The connector is protected from accidental removal by a threaded fitting (M12). The cable lengths are 2/5/10 m.

When bolted, the connector pair has the protection class IP67.

WIPER RING (OPTION W)



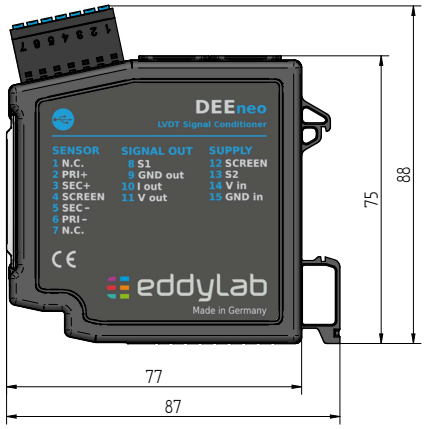
Sensors with guided push rod (type „SG“) or rod end bearings („G“) can be equipped with a wiper ring to prevent the penetration of dust, dirt and metal swarf.
The displacement speed of the push rod is limited to 2 m/s and the working temperature to -35...+100 °C.

DEENEO | DEENEO-ISC

The **DEEneo** signal conditioner was developed for operating inductive LVDT sensors (full bridge). The electronics supply the sensor and convert the sensor signal into a standardized, analogue output signal with the help of a microcontroller. A push button (SET button) is used for the basic configuration and to set the measuring range limits - this enables quick and easy adaptation to the customer's application. Where possible, eddylab calibrates the sensor and electronics together. The sensor characteristic curve can be linearized to meet the highest demands on the accuracy of the measuring chain. Further features can be configured via the **eddySetup** configuration software. Further information can be found in the DEEneo and DEEneo-ISC data sheets.

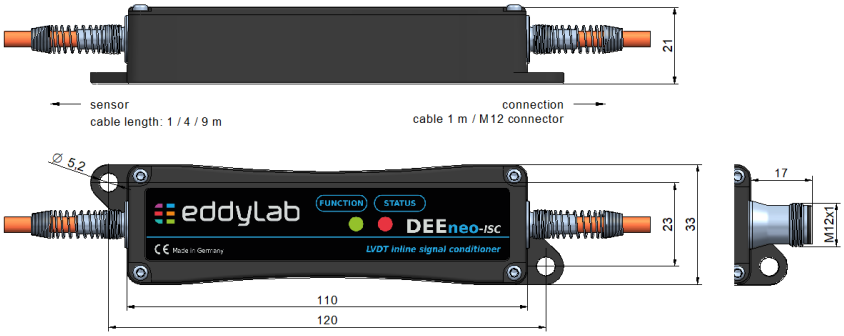
DEEneo*

Digital signal converter for DIN rail mounting



DEEneo-ISC*

Inline Signal Conditioner (cable electronics)



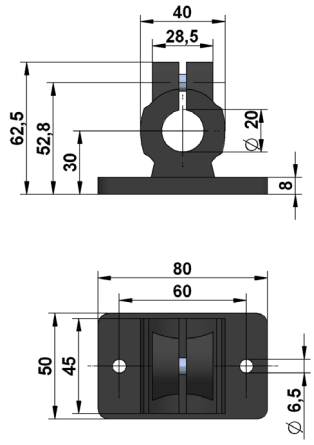
TECHNICAL DATA

ELECTRONICS	DEEneo*	DEEneo-ISC*
Output signal	0...20 mA, 4...20 mA (Last < 300 Ohm)	
	0...5 V, ± 5 V; 0...10 V, ± 10 V	
Mounting	on 35 mm DIN rail in accordance with DIN EN 60715	integrated in sensor cable
Power supply	9...36 VDC	
Power consumption	70 mA at 24 VDC, 130 mA at 12 VDC	
Sensor supply	standard: 3V / 3.3 kHz, can be modified by software	
Settings (factory setting)	frequency, amplitude, output signal	
Resolution	16 bit	
Signal processing	digital via microcontroller	
Signal adjustment	via SET-button or software	
Linearisation of sensor	yes, optionally possible	
Features		
Switching output	open drain up to 60 V, max. 115 mA	-
Alarm output	open drain up to 60 V, max. 115 mA	-
Cable break detection	yes	

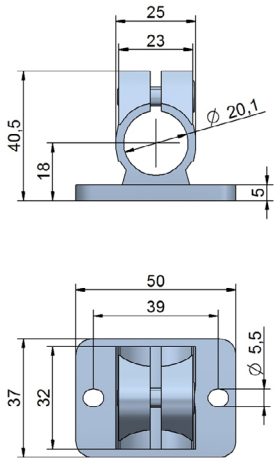
ACCESSORIES

MOUNTING PARTS

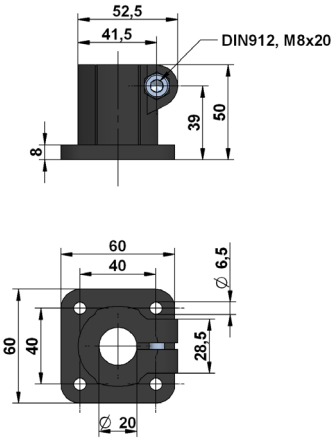
Flanschklemmstück 20-PA, flange clamp
material: polyamide, reinforced, temperature resistant up to 100 °C



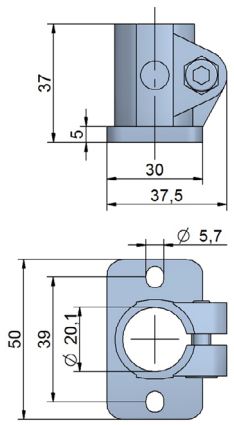
Flanschklemmstück 20-VA, flange clamp
material: stainless steel, temperature resistant up to 200 °C



Fußklemmstück 20-PA, base clamp
material: polyamide, reinforced, temperature resistant up to 100 °C



Fußklemmstück 20-VA, base clamp
material: stainless steel, temperature resistant up to 200 °C



CONNECTION CABLE (SHIELDED) FOR CONNECTOR OUTPUT

CABLE M12 WITH ANGULAR CONNECTOR	
K4P2M-SW-M12	2 m
K4P5M-SW-M12	5 m
K4P10M-SW-M12	10 m
K4P15M-SW-M12	15 m
K4P20M-SW-M12	20 m
K4P50M-SW-M12	50 m

CABLE M12 WITH STRAIGHT CONNECTOR	
K4P2M-S-M12	2 m
K4P5M-S-M12	5 m
K4P10M-S-M12	10 m
K4P15M-S-M12	15 m
K4P20M-S-M12	20 m
K4P50M-S-M12	50 m

MATING CONNECTOR M12 (SHIELDED)

	STRAIGHT CONNECTOR D4-G-M12-S	ANGULAR CONNECTOR D4-W-M12-S
Protection class	IP67	
Temperature range	-25...+90 °C	
Mode of connection	spring closure construction	
Cable diameter	ø 4...8 mm	
Conductor	0,14...0,34 mm²	

ORDER CODE SENSOR

SL X (a) – X (b) – X (c) – X (d) X (e) X (f) X (g) X (h)

a measurement ranges [mm]
10 / 25 / 50 / 80 / 100 / 150 / 200 / 300 / 400 / 500 / 600

b type
- A = free core
- S = unguided push rod
- SG = guided push rod
- G = rod end bearings

c cable / connector
- KR = radial cable
- SR = radial connector M12

d cable / connector output

S1: sensor with connector output
- 1 = radial connector output M12 (no cable)

S2: sensor with cable output, open cable end for DEEneo
- A = TPE cable 2 m
- B = TPE cable 5 m
- C = TPE cable 10 m
- D = PTFE-UL cable 2 m (option H)
- E = PTFE-UL cable 5 m (option H)
- F = PTFE-UL cable 10 m (option H)

S3: sensor with cable output for DEEneo-ISC
- G = TPE cable 2 m
- H = TPE cable 5 m
- J = TPE cable 10 m
- K = PTFE-UL cable 2 m (option H)
- L = PTFE-UL cable 5 m (option H)
- M = PTFE-UL cable 10 m (option H)

e linearity
- 1 = 0,30 % (standard)
- 2 = 0,20 % (option L20)
- 3 = 0,10 % (option L10)

f temperature range
- 1 = -40...+120 °C (standard)
- 2 = -40...+150 °C (option H)
- 3 = -40...+200 °C (option H200)

g push rod sealing
- 1 = - (standard)
- 2 = wiper ring (option W)

h protection class
- 1 = IP67
- 2 = IP68 (option IP68)

ORDER CODE ELECTRONICS

DEEneo – X (a)

DEEneo-ISC – X (a) – X (b)

type
- DEEneo = external electronics
- DEEneo-ISC = inline signal conditioner

a output signal
- 020A = 0...20 mA
- 420A = 4...20 mA
- 10V = 0...10 V
- 5V = 0...5 V
- ±5V = -5...5 V
- ±10V = -10...10 V

b type of cable / length

E1: for sensor with cable output
- - = integrated in sensor cable

E2: for sensor with connector output
- A = cable 2 m, M12 straight female conn.
- B = cable 2 m, M12 angular female conn.
- C = cable 5 m, M12 straight female conn.
- D = cable 5 m, M12 angular female conn.
- E = cable 10 m, M12 straight female conn.
- F = cable 10 m, M12 angular female conn.

b type of cable / length

E3: for sensor with cable output
- M12 = integrated in sensor cable, M12 connector

E4: for sensor with connector output
- M12A = cable 2 m, M12 straight female conn., M12 conn.
- M12B = cable 2 m, M12 angular female conn., M12 conn.
- M12C = cable 5 m, M12 straight female conn., M12 conn.
- M12D = cable 5 m, M12 angular female conn., M12 conn.
- M12E = cable 10 m, M12 straight female conn., M12 conn.
- M12F = cable 10 m, M12 angular female conn., M12 conn.

possible combinations:

- S3+E1: sensor with cable output, DEEneo-ISC integrated in sensor cable
- S3+E3: sensor with cable output, DEEneo-ISC integrated in sensor cable, M12 connector
- S1+E2: sensor with connector output, DEEneo-ISC with cable K4PxM
- S1+E4: sensor with connector output, DEEneo-ISC with cable K4PxM, M12 connector
- S1+DEEneo: sensor with connector output, cable K4PxM, electronics DEEneo
- S2+DEEneo: sensor with cable output, electronics DEEneo