DATASHEET



SM-HYD SERIES | LVDT

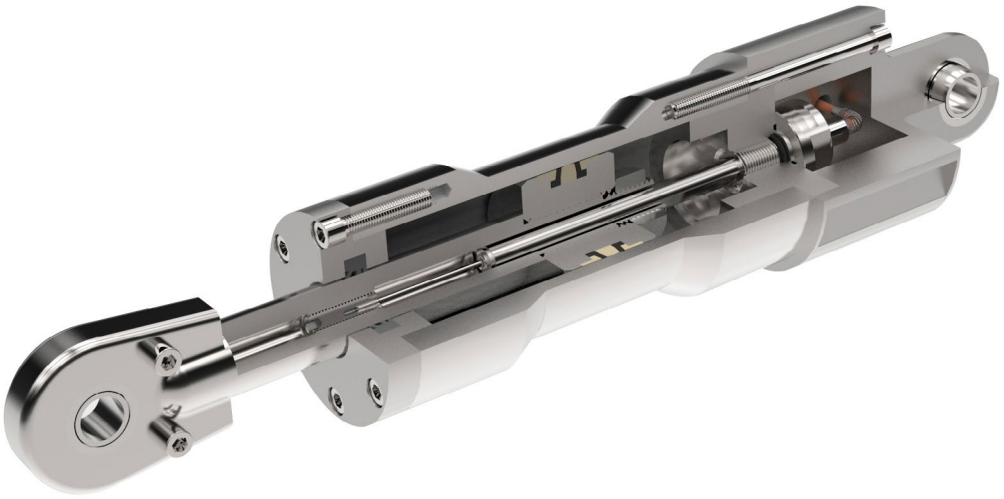
Pressure-tight designed for integration into hydraulic and pneumatic cylinders or servo valves.

- Measurement range 2...180 mm
- Screw flange M18x1,5 / M30x1,5 or plug-in flange Ø 18
- Pressure up to 400 bar
- Sensor working temperature up to 150 °C
- Linearity up to ±0.10 %

eddylab

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 SM-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.
The **SM-HYD-series** are used in hydraulic cylinders with a maximum pressure resistance of up to 400 bar. The sensors are especially suited to be installed in harsh industrial environments where a high electromagnetic tolerance is required. The sensor works nearly unaffected by electric or magnetic fields.
This sensor enables a connection between the hydraulic cylinder and the machine control.

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.
They also feature simple adjustment (teach function) and linearization of the sensor characteristic curve to achieve the highest possible precision.



TECHNICAL DATA - SENSORS

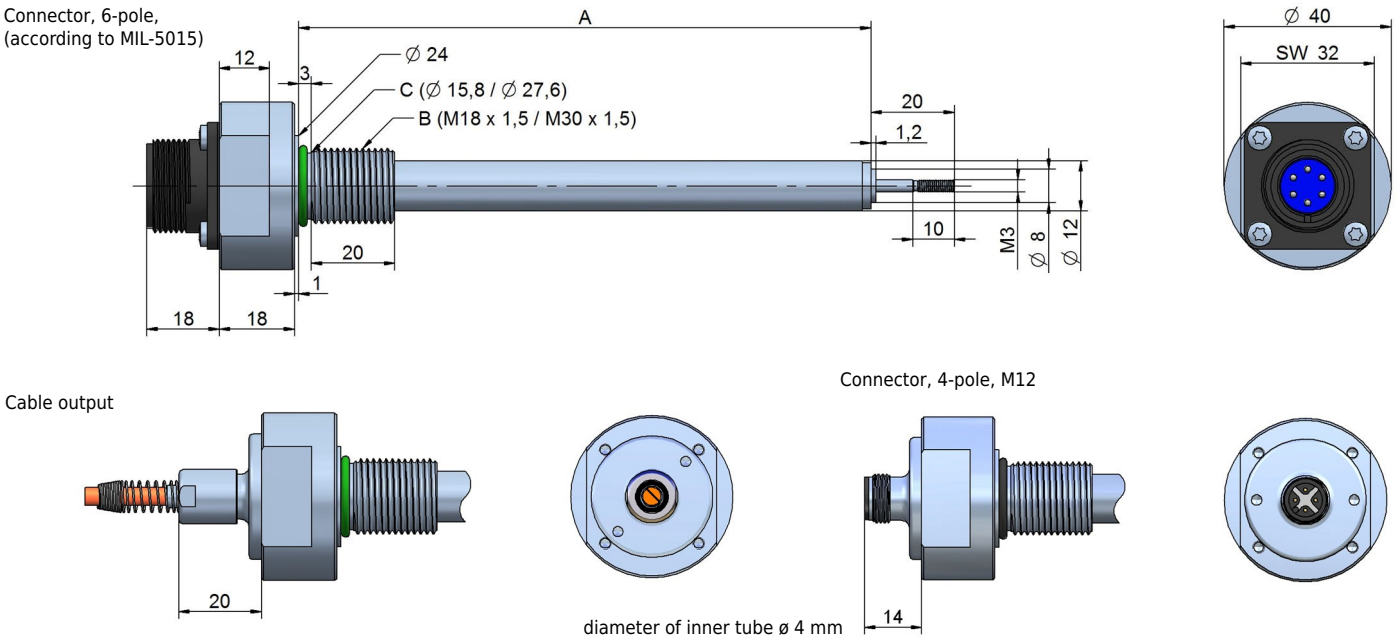
SENSOR	
Ranges [mm]	2...180 mm (see chart on page 3)
Linearity [% of FS]	±0.30 % - 0.80 % (see chart on page 3), (0.20 % optional, 0.10 % for selected models)
Temperature range	-40...+120 °C, optional up to 150 °C (H-option)
Vibration stability DIN IEC68T2-6	10 G
Shock stability DIN IEC68T2-27	200 G / 2 ms
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

TECHNICAL DIMENSIONS

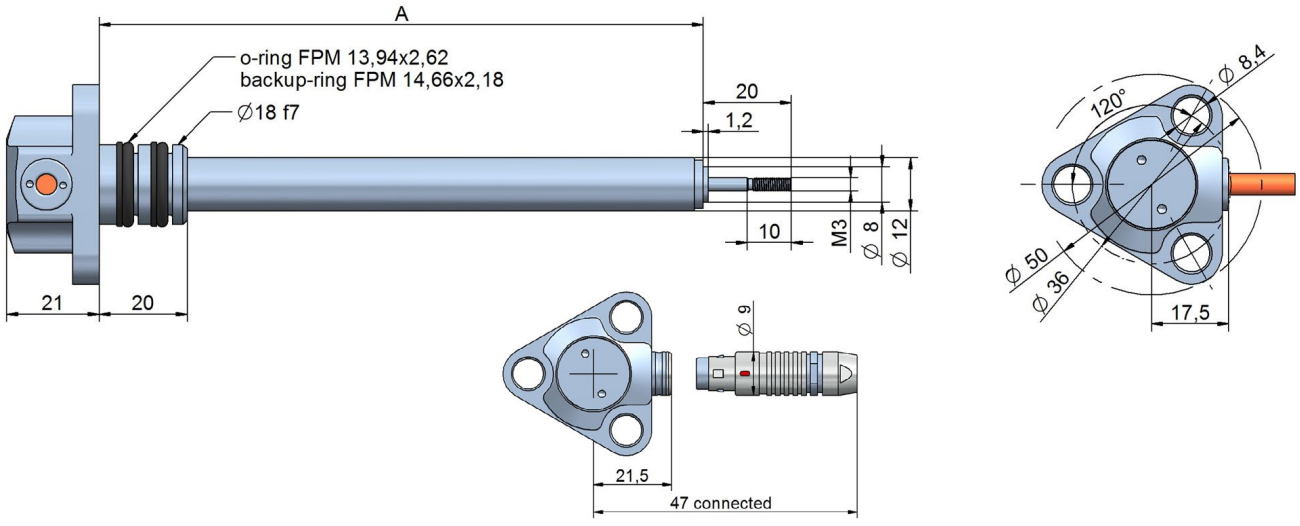
RANGE (FS) [MM]	TYPE	BODY TYPE	BODY LENGTH A [MM]	LINEARITY [%] (STANDARD)	LINEARITY [%] (OPTIONAL)
0...2	SM2-HYD	1	48	0.30	0.20
0...5	SM5-HYD	1	54	0.30	0.20
0...10	SM10-HYD	1	64	0.30	0.20
0...25	SM25-HYD	2	94	0.30	0.20
0...25	SM25-HYD	1	137	0.30	0.20
0...50	SM50-HYD	2	144	0.30	0.20
0...50	SM50-HYD	1	207	0.30	0.20
0...100	SM100-HYD	2	220	0.80	-
0...100	SM100-HYD	1	244	0.30	0.20
0...120	SM120-HYD	1	227	0.80	-
0...140	SM140-HYD	1	260	0.80	-
0...160	SM160-HYD	1	336	0.80	-
0...180	SM180-HYD	1	300	0.80	-

other ranges on request

FLANGE TYPE THREAD M18 X 1,5 / M30 X 1,5

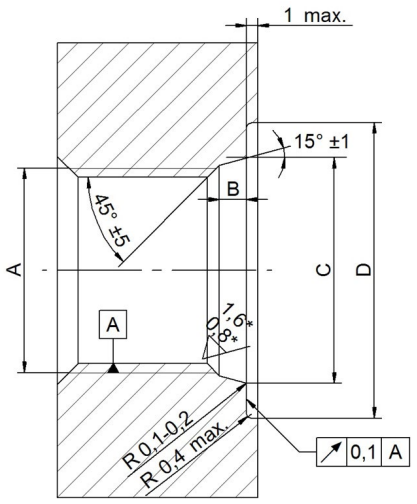


PLUG-IN FLANGE S18 WITH RADIAL CABLE OR RADIAL CONNECTOR OUTPUT



INSTALLATION DRAWING

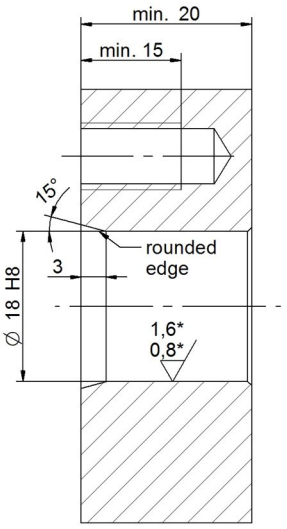
SCREW FLANGE M18 / M30

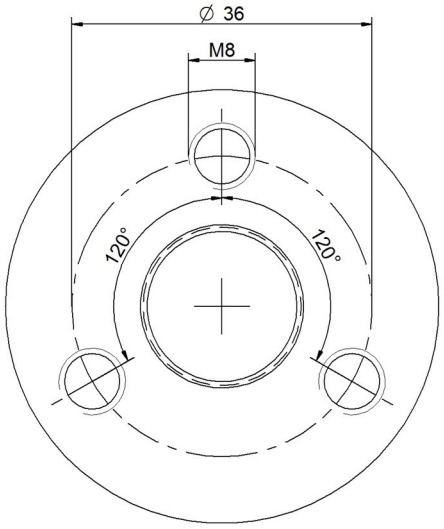


* note: Rz = 1,6 for non pulsating pressure
Rz = 0,8 for pulsating pressure

	M18X1,5	M30X1,5
A	M18x1,5	M30x1,5
B	2,4	3,1
C	19,8	32,4
D	26	42

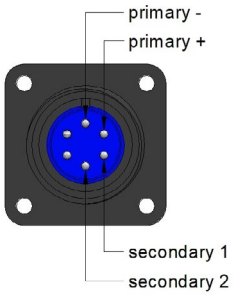
PLUG-IN FLANGE S18



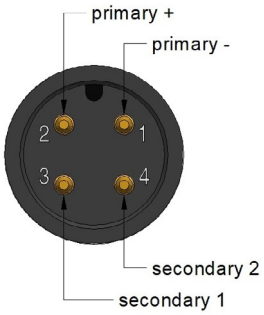


CABLE/PIN ASSIGNMENT (AC OUTPUT)

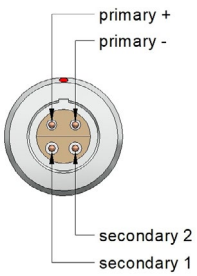
connector output type MIL-5015 for flange M18 / M30



connector output, type M12 for flange M18 / M30



connector output, type Lemo for flange S18



	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

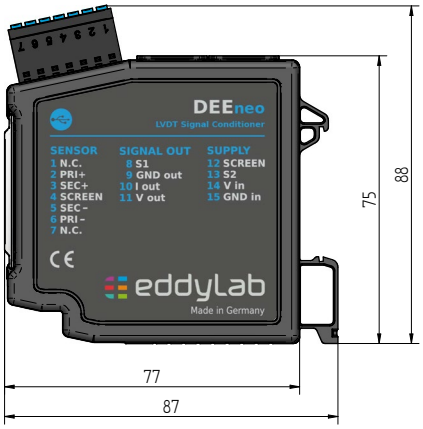
DEENEO | DEENEO-ISC

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 information can be found in the DEEneo and DEEneo-ISC data sheets.

DEEneo*

Digital signal converter for DIN rail mounting



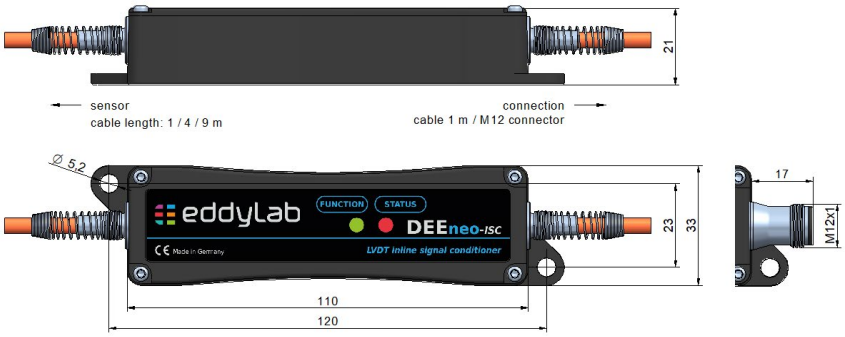




DEEneo-ISC*

Inline Signal Conditioner (cable electronics)





TECHNICAL DATA

ELECTRONICS	DEEneo*	DEEneo-ISC*
Current output signal	configurable in the range -20...+20 mA (e.g. 4...20 mA)	
Voltage output signal	configurable in the range -10...+10 V (e.g. 0...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	configurable: 0...5 Vrms differential; 1...10 kHz (standard: 3 Vrms / 3.3 kHz)	
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	configurable (standard: enabled)	

*Separate data sheets for DEEneo and DEEneo-ISC at www.eddylab.com

ACCESSORIES

CONNECTION CABLE (SHIELDED) FOR CONNECTOR OUTPUT





CABLE M12 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 FOR SELF ASSEMBLY (SHIELDED)









FUNCTION	STRAIGHT CONNECTOR D4-G-M12-S M18 / M30 FLANGE	ANGULAR CONNECTOR D4-W-M12-S M18 / M30 FLANGE	STRAIGHT CONNECTOR LEMO-FGG.0T S18 FLANGE	MATING CONNECTOR AT3106F ACCORDING TO MIL-5015
Protection class	IP67		IP68	IP40
Temperature range	-25...+90 °C		-40...150 °C	-25...125 °C
Mode of connection	spring closure construction		soldering contacts	soldering contacts
Cable diameter	ø 4...8 mm		Ø 4,5...5,0 mm	max. 8 mm
Conductor	0,14...0,34 mm²		0,14...0,25 mm²	0,14...1,0 mm²

ORDER CODE SENSOR

SM **X** –**HYD**– **X** – **X** – **X** **X** **X** **X**
(a) (b) (c) (d) (e) (f) (g)

(a) measurement ranges [mm]
2 / 5 / 10 / 25 / 50 / 100
120 / 140 / 160 / 180

(b) type of flange
18 = thread M18 x 1,5
30 = thread M30 x 1,5
S18 = plug-in flange ø18

(c) output
S = connector output (MIL-5015 / LEMO)
M12 = connector output (M12)
K = cable output

(d) cable / connector output

S1: sensor with connector output
1 = connector output

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 / 0,80 % (see table page 3)
2 = 0,20 %
3 = 0,10 %

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

(g) housing
1 = standard body length
2 = short body length

ORDER CODE ELECTRONICS

DEEneo – **X**
(a)

DEEneo-ISC – **X** – **X**
(a) (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.

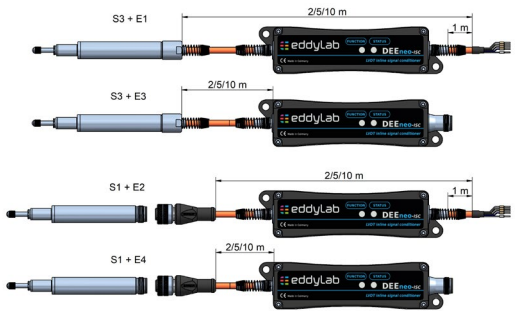
(b) type of cable / length

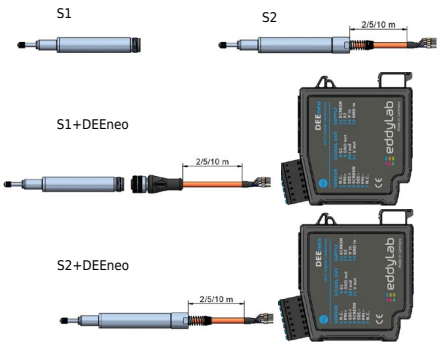
E3: for sensor with cable output
M12 = integrated in sensor cable, M12 connector

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







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