Electronic Level Switch
ENS 3000
with IO-Link Interface

IO-Link

Description:

The ENS 3000 with IO-Link communication interface is an electronic level switch with integrated display. The instrument has a switching output and additional output that can be configured as switching or analogue (4 .. 20 mA or 0 .. 10 V). The ENS 3000 can be used not only for oil but also for water and is available with or without temperature sensor.

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control. Parameterisation and cyclical transmission of process and service data is therefore possible.

The level switch series ENS 3000 with communication interface IO-Link according to specification V1.1 has been specially designed to connect sensors in automation systems. Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

Special features:

- IO-Link interface
- 1 PNP transistor output
- Additional signal output, can be configured as PNP transistor switching output or analogue output
- Selectable for use with oil or water
- 4-digit display
- Display rotates in two axes for optimal alignment

Technical data:

Input data	
Sensor type	Capacitive level sensor
Probe length	250; 410; 520; 730 mm
Measuring range	170; 290; 390; 590 mm
Max. speed of change in the fluid level	40; 60; 80; 100 mm/s
Repeatability[1)]	≤ ± 2 % FS
Switching point accuracy	≤ ± 2 % FS
Temperature (optional)	
Sensor type	Semi-conductor sensor
Measuring range	-25 .. +100 °C
Accuracy	± 1.5 °C
Reaction time (t_{90})	180 s
Output data	
Output signals	Output 1: PNP transistor switching output Output 2: can be configured as PNP transistor switching output or analogue output
Analogue output	
Signal	selectable: 4 .. 20 mA load resistance max. 500 Ω 0 .. 10 V load resist. min. 1 kΩ corresponds to measuring range selected
Switch outputs	
Type	PNP transistor switching output
Assignment	On version with temperature measurement user-selectable temperature or fluid level
Switching current	max. 250 mA per output
Switching cycles	> 100 million
Parameterisation	**Via IO-Link interface, with HYDAC programming device HPG 3000 or push buttons on the ENS 3000**
Environmental conditions	
Compensated temperature range	0 .. +60 °C
Operating temperature range	0 .. +60 °C
Storage temperature range	-40 .. +80 °C
Fluid temperature range	0 .. +60 °C
CE - mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 5 g
Shock resistance according to DIN EN 60068-2-29 (11 ms)	≤ 25 g
Protection class to IEC 60529	IP 67
Other data	
Max. tank pressure	0.5 bar (short-term 3 bar, t < 1 min)
Supply voltage	9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output
Current consumption	≤ 0.590 A with active switching outputs ≤ 90 mA with inactive switching outputs ≤ 110 mA with inactive switching output and analogue output
Residual ripple of supply voltage	≤ 5 %
Fluids[2)]	Hydraulic oils (mineral based), synth. oils, fluids containing water
Parts in contact with medium	Ceramic
Display	4-digit, LED, 7-segment, red, height of digits 7 mm
Weight	180 .. 300 g, dependent on the probe length

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
FS (**F**ull **S**cale) = relative to complete measuring range

1) Specified for calm, non-turbulent fluid

2) Other fluids on request

E 18.061.1.0/11.13

Setting options:

All terms and symbols used for setting the ENS 3000 as well as the menu structure comply with the specifications in the VDMA Standard for level switches.

Setting ranges for the switch outputs:

Measuring range/ probe length in cm	Lower limit of RP / FL in cm	Upper limit of SP / FH in cm
17.0 / 25.0	0.2 / 0.3	17.0 / 16.8
29.0 / 41.0	0.3 / 0.5	29.0 / 28.7
39.0 / 52.0	0.4 / 0.6	39.0 / 38.6
59.0 / 73.0	0.6 / 0.9	59.0 / 58.4

Measuring range in cm	Min. difference betw. RP & SP and FL & FH in cm	Increment* in cm
17.0 / 25.0	0.1 / 0.1	0.1
29.0 / 41.0	0.2 / 0.2	0.1
39.0 / 52.0	0.2 / 0.3	0.1
59.0 / 73.0	0.3 / 0.5	0.1

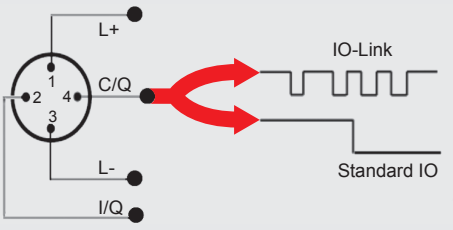
* All ranges given in the table are adjustable by the increments shown.
SP = switch point
RP = switch-back point
FL = level window lower value
FH = level window upper value

Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switching outputs can be assigned to the fluid level or temperature
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Optional analogue output signal to 4 .. 20 mA or 0 .. 10 V
- Analogue output can be assigned to fluid level or temperature as required (depending on version)

Pin connections:

M12x1, 4 pole



Pin	Signal	Description
1	L+	Supply voltage
2	I/Q	Switching output (SP2) / analogue output
3	L-	Gnd
4	C/Q	IO-Link communication / switching output (SP1)

IO-Link-specific data:

Baud rate	38.4 kBaud *
Cycle time	2.5 ms
Process data width	16 Bit
Frame type	2.2
Specification	V1.1

* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:
http://www.hydac.com/de-en/service/downloads-software-on-request/

Model code:

ENS 3 X 1 6 – L – XXXX – 000 –K

Temperature sensor
1 = With temperature sensor
2 = Without temperature sensor

Mechanical connection
1 = Collar Ø 22

Electrical connection
6 = Male M12x1, 4 pole (connector not supplied)

Output
L = IO-Link interface

Probe length, physical
0250; 0410; 0520; 0730 mm

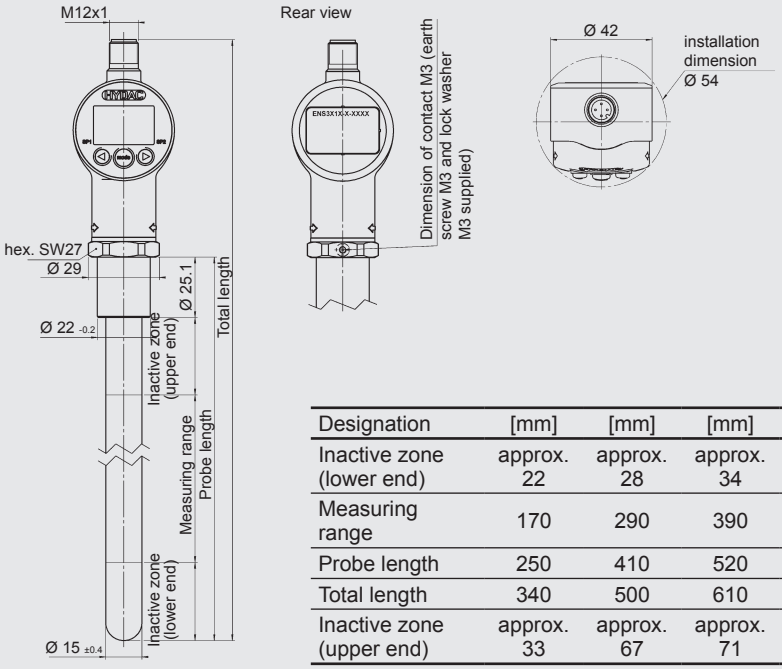
Modification number
000 = Standard

Probe material
K = Ceramic

Notes:
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Accessories:
Appropriate accessories, such as electrical connectors, mechanical connection adaptors, splash guards, etc. can be found in the Accessories brochure.

Dimensions:



Designation	[mm]	[mm]	[mm]	[mm]
Inactive zone (lower end)	approx. 22	approx. 28	approx. 34	approx. 50
Measuring range	170	290	390	590
Probe length	250	410	520	730
Total length	340	500	610	820
Inactive zone (upper end)	approx. 33	approx. 67	approx. 71	approx. 65

Note:

The information in this brochure relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

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