



Level Switch ENS 3000

Capacitive

Display

IO-Link
Optional temperature measurement

IO-Link

UL US

Description:

The ENS 3000 with IO-Link communication interface is an electronic level switch with integrated display. The instrument has a switching output and an additional output that can be configured as switching or analogue output (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 probe.

IO-Link is the communication between the sensor/actuator (IO-Link device) and an IO-Link master based on a point-to-point interface.

The advantages:

Process data, parameters and diagnostic information of the level switch can be transmitted via a standard cable (SDCI mode). The integrated LED display provides information on the operating mode and the switching statuses.

Simple exchange: the IO-Link master saves the parameters of the connected level switch and transmits them to the newly connected level switch when replaced. Thus, time-consuming new parameterisations will no longer be required.

If IO-Link is not used, the sensor still functions as a level switch with two switching outputs (SIO mode).

To create customer-specific small series or to duplicate sensor settings across the system, the sensor can also be easily adjusted outside the system to suit the particular application, with the HYDAC Programming Device HPG P1-000, the HYDAC Programming Adapter ZBE P1-000 or by means of the Portable Data Recorder HMG 4000.

Typical fields of application for ENS 3000 IO-Link are machine tools, handling and assembly automation, intralogistics or the packaging industry.

Technical data:

Input data					
Measuring ranges	mm	170	290	390	590
Rod length	mm	250	410	520	730
Max. speed of change in fluid level	mm/s	40	60	80	100
Mechanical connection	Collar 22 mm for cutting ring fitting				
Parts in contact with fluid	Rod: Ceramic, coated				
Fluids ¹⁾	Hydraulic oils (mineral-based), synth. oils, fluids containing water				
Temperature					
Measuring range ²⁾	-25 .. +100 °C				
Output data					
Switching outputs	PNP transistor outputs Switching current: max. 250 mA per switching output				
Analogue output, permitted load resistance	Selectable: 4 .. 20 mA load resist. max. 500 Ω 0 .. 10 V load resist. min. 1 kΩ				
Accuracy	Level: ≤ ± 2 % FS Temperature: ± 1.5 °C				
Temperature drift (environment)	≤ 0.015 % FS / °C				
Repeatability ³⁾	Level: ≤ ± 2 % FS Temperature: ≤ ± 1.5 °C				
Response time acc. to DIN EN 60751 (temperature probe)	t ₉₀ ~180 s				
Environmental conditions					
Ambient temperature range	0 .. +60 °C				
Storage temperature range	-40 .. +80 °C				
Fluid temperature range	0 .. +60 °C				
Max. tank pressure	0.5 bar (short-term 3 bar, t < 1 min)				
CE mark	EN 61000-6-1 / 2 / 3 / 4				
UL mark ⁴⁾	Certificate-No.: E318391				
Vibration resistance acc. to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 5 g				
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 25 g				
Protection class acc. to DIN EN 60529 ⁵⁾	IP 67				
IO-Link specific data					
IO-Link revision	V1.1 / support V1.0				
Transmission rate, baud rate ⁶⁾	38.4 kBaud (COM2)				
Minimum cycle time	20 ms				
Process data width	Version without temperature sensor: 16 Bit Version with temperature sensor: 32 Bit				
SIO mode supported	Yes				
M-sequence capability	PREOPERATE: TYPE_0 OPERATE: TYPE_2_2 (level) TYPE_2_V (level / temperature) ISDU: Supported				
IO Device Description (IODD) download at: https://ioddfinder.io-link.com/#/					
Other data					
Supply voltage	9 .. 35 V DC, if PIN 2 = SP2 18 .. 35 V DC, if PIN 2 = analogue output				
when applied acc. to UL specifications	- limited energy – acc. to 9.3 UL 61010; Class 2; UL 1310 / 1585; LPS UL 60950				
Residual ripple of supply voltage	≤ 5 %				
Current consumption	≤ 0.535 A with active switching outputs ≤ 35 mA with inactive switching outputs ≤ 55 mA with inactive switching output and analogue output				
Display	4-digit, LED, 7 segment, red, height of digits 7 mm				
Weight	g	180	220	250	300

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ Other fluids on request

²⁾ Observe ambient temperature range

³⁾ Specified at calm, non-turbulent fluid

⁴⁾ Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No. 61010-1

⁵⁾ With mounted mating connector in corresponding protection class

⁶⁾ Connection with unshielded standard sensor line possible up to a maximum line length of 20 m.

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 switching outputs:

Measuring range/ rod length in cm	Lower limit of RP (FL) in cm	Upper limit of SP (FH) in cm
17.0 / 25.0	0.2	17.0
29.0 / 41.0	0.3	29.0
39.0 / 52.0	0.4	39.0
59.0 / 73.0	0.6	59.0

Measuring range/ rod length in cm	Min. difference betw. RP & SP and FL & FH in cm	Increment* in cm
17.0 / 25.0	0.2	0.1
29.0 / 41.0	0.3	0.1
39.0 / 52.0	0.4	0.1
59.0 / 73.0	0.6	0.1

Measuring range Temperature	Lower limit of RP (FL)	Upper limit of SP (FH)
-25 .. +100 °C	-23.5 °C	100.0 °C

Measuring range Temperature	Min. difference betw. RP and SP & FL and FH	Increment*
-25 .. +100 °C	1.5 °C	0.5 °C

*All ranges given in the table can be adjusted by the increments shown.

SP = switch point

RP = switch-back point

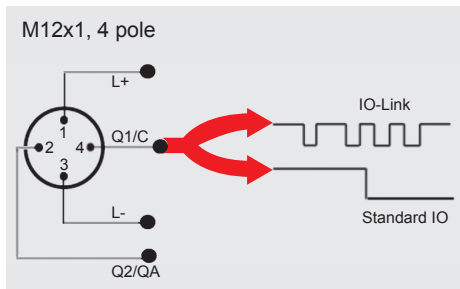
FL = level/temperature window lower value

FH = level/temperature window upper value

Additional functions:

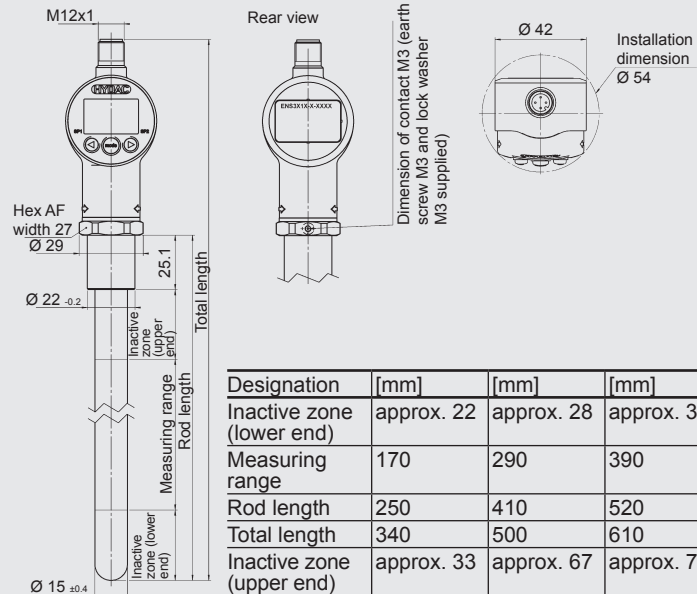
- Switching mode of the switching outputs adjustable (switch point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switching outputs can be assigned to the fluid level or to the temperature
- Switch-on and switch-off delay adjustable from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

Pin connections:



Pin	Signal	Description
1	L+	+U _B
2	Q2/QA	Switching output (SP2) / analogue output
3	L-	0 V
4	Q1/C	IO-Link communication / switching output (SP1)

Dimensions:



Model code:

ENS 3 X 1 6 - F31 - XXXX - 000 - K

Temperature probe

- 1 = with temperature probe
- 2 = without temperature probe

Mechanical connection

- 1 = 22 mm collar for cutting ring fitting G22L

Electrical connection

- 6 = male M12x1, 4 pole (mating connector not supplied)

Output

F31 = IO-Link interface

Rod length, physical

0250; 0410; 0520; 0730 mm

Modification number

000 = standard

Probe material

K = ceramic

Accessories:

Appropriate accessories, such as mating connectors, mechanical adapters, splash guards and programming units, can be found in the Accessories brochure.

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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