Level Switch ENS 3000

Capacitive | **Display**

Up to 4 switching outputs
Up to 2 analogue outputs
Optional temperature measurement

Description:

The ENS 3000 is an electronic level switch with integrated display. The instrument has 1, 2 or 4 switching outputs and an analogue output signal is available as an option.

In addition to the standard minimum and maximum switching signals, with the 4 switching output version it is possible to set additional warning signals to prevent problems such as tank overflow or aeration of the pump.

Using the device is easy, thanks to the menu-guided key operation, so adjusting the user-specific parameters takes little time.

The ENS 3000 can be used not only for oil but also for water; the type of fluid can be selected in an menu item.

One of the other advantages of the ENS 3000 is that no moving parts are used that come into contact with the fluid.

The main applications of the ENS 3000 are primarily in hydraulics, e.g. for fluid level monitoring of a tank.

The ENS 3000 is available in standard rod lengths of 250 mm, 410 mm, 520 mm and 730 mm. The instrument is also available with or without temperature probe.

When the device is used with temperature probe, the switching outputs can be individually assigned to the level or temperature variables.

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		1; 2; 4 PNP transistor outputs Switching current: 1; 2 SP: max. 1.2 A per output 4 SP: max. 0.25 A per output Switching cycles: > 100 million			
Analogue output, permitted load resistance		1; 2 SP: 4 .. 20 mA load resist. max. 500 Ω 0 .. 10 V load resist. min. 1 kΩ 4 SP: 0 .. 10 V load resist. min. 1 kΩ			
Accuracy		Level: ≤ ± 2 % FS Temperature: ± 1.5 °C			
Temperature drift (enviroment)		≤ 0.0 15 % 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			
cULus 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[3]		IP 67			
Other data					
Supply voltage when applied acc. to UL specifications		9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output - limited energy - acc. to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950			
Residual ripple of supply voltage		≤ 5 %			
Current consumption		≤ 2.470 A total ≤ 90 mA with inactive switching outputs and 2 analogue outputs			
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 (**F**ull **S**cale) = 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

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Th. Niehues GmbH • Bahnhofstraße 81 • D - 48308 Senden / Westf. • Tel: +49 2536 990-01 • Fax: +49 2536 990-19 • E-Mail: info@niehues.com • www.niehues.com

Setting options:

All settings available on the ENS 3000 are combined in two easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges of the switch points and switch-back hystereses:

Fluid level switch point function

Rod length in cm	Measuring range in cm	Switch point in cm *	Hysteresis in cm *
25.0	17.0	0.3 .. 17.0	0.1 .. 16.8
41.0	29.0	0.5 .. 29.0	0.2 .. 28.7
52.0	39.0	0.6 .. 39.0	0.2 .. 38.6
73.0	59.0	0.9 .. 59.0	0.3 .. 58.4

The increment for all units is 0.1 cm.

Fluid level window function

Rod length in cm	Lower switch value in cm *	Upper switch value in cm *
25.0	0.3 .. 16.7	0.4 .. 16.8
41.0	0.5 .. 28.4	0.7 .. 28.7
52.0	0.6 .. 38.3	0.9 .. 38.6
73.0	0.9 .. 57.9	1.4 .. 58.4

The increment for all units is 0.1 cm.

Fluid level offset function

Rod length in cm	Measuring range in cm *	Offset in cm *
25.0	17.0	0 .. 68.0
41.0	29.0	0 .. 116.0
52.0	39.0	0 .. 156.0
73.0	59.0	0 .. 177.0

The increment for all units is 0.1 cm.

Temperature switch point function

Unit	Measuring range	Switch point	Hysteresis
°C	-25 .. +100	-23.0 .. +100.0	1.0 .. 123.5

The increment for all units is 0.5 °C.

Temperature window function

Unit	Lower switch value	Upper switch value
°C	-23.5 .. +97.5	-22.0 .. +98.5

The increment for all units is 0.5 °C.

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

Additional functions:

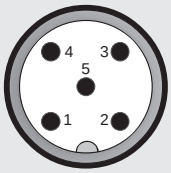
- Switching mode of the swiching outputs adjustable (switch point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switching outputs can be assigned to the fluid level or to the temperature
- Switch-on and switch-off delay adjustable from 0.00 .. 9999 seconds
- Choice of display (current level, current temperature, peak values, switch point 1, 2, 3, 4 or display off)
- Analogue output can be assigned to fluid level or temperature as required (depending on model)

Pin connections:

M12x1, 4 pole

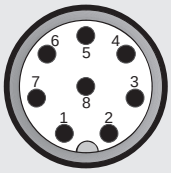
Pin	ENS 3X16-2	ENS 3X16-3
1	+U_B	+U_B
2	SP2	Analogue
3	0 V	0 V
4	SP1	SP1

M12x1, 5 pole



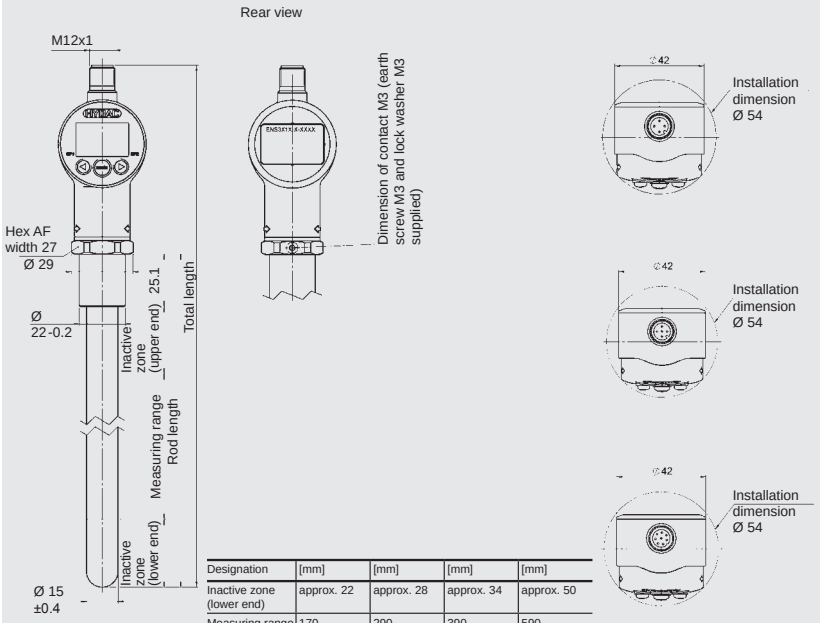
Pin	ENS 3X18-5
1	+U_B
2	Analogue
3	0 V
4	SP1
5	SP2

M12x1, 8 pole



Pin	ENS 3X1P-8
1	+U_B
2	SP2
3	0 V
4	SP1
5	SP3
6	SP4
7	Analogue fluid level
8	Analogue temperature

Dimensions:



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

Model code:

ENS 3 X 1 X – X – 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
only possible on output models “2” and “3”
8 = male M12x1, 5 pole
only possible on output model “5”
P = Male M12x1, 8 pole
only possible on output model “8”

Output
2 = 2 switching outputs
only in conjunction with electrical connection type “6”
3 = 1 switching output and 1 analogue output
only in conjunction with electrical connection type “6”
5 = 2 switching outputs and 1 analogue output
only in conjunction with electrical connection type “8”
8 = 4 switching outputs and 2 analogue outputs
only in conjunction with electrical connection type “P”
and temperature probe “1”

Rod length (physical) in mm
0250; 0410; 0520; 0730

Modification number
000 = standard

Probe material
K = ceramic

Accessories:
Appropriate accessories, such as mating connectors, splash guards, etc. 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.

HYDAC ELECTRONIC GMBH
Hauptstraße 27, 66128 Saarbrücken
Germany
Telephone +49 (0)6897 509-01
Fax +49 (0)6897 509-1726
E-mail: electronic@hydac.com
Internet: www.hydac.com