EN 18.061.5/02.18

DADINTERNATIONAL



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:

Measuring ranges mm 170 290 390 590 Max. speed of change in fluid level 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 Weasuring range ²¹ -25 +100 °C Output data Switching outputs Switching outputs Switching cycles: > 100 million Analogue output, permitted load resistance 1; 2; 4 PNP transistor outputs Switching current: 1; 2; SP: max. 1.2 A per output Assistance acc. stream superinter in 1; 2 SP: max. 1.2 A per output Accuracy Level: ≤ ± 2 % FS Temperature: 1.5 °C Temperature: 1.5 °C Repeatability ³ Level: ≤ ± 2 % FS <td< th=""><th>Input data</th><th></th><th></th><th></th><th></th><th></th></td<>	Input data					
Max speed of change in fluid level mm/s 40 60 80 100 Max not level Collar 22 mm for cutting ring fitting Rod: Ceramic, coated Fluids¹¹ Hydraulic oils (mineral based), synth. oils, fluids containing water Temperature Measuring range ¹¹ -25 +100 °C Coutput data Switching outputs 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 witching cycles: > 100 million Analogue output, permitted load resistance 1; 2 SP: 4 20 mA load resist. max. 500 Ω Ω Ω 10 V load resist. min. 1 kΩ Accuracy Level: ≤ ± 2 % FS Temperature drift (enviroment) ≤ 0.0 15 % FS / °C Repeatability³ Level: ≤ ± 2 % FS Repeatability³ Level: ≤ ± 2 % FS Response time acc. to DIN EN 60751 (temperature probe) teo ~ 180 s Environmental conditions Ambient temperature range 0 +60 °C Storage temperature range 0 +60 °C Max. tank pressure 0 5 ar (short-term 3 bar, t < 1 min)	Measuring ranges	mm	170	290	390	590
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Mechanical connection Collar 22 mm for cutting ring fitting		mm/s	40	60	80	100
Parts in contact with fluid Rod: Ceramic, coated Fluids¹¹ Hydraulic oils (mineral based), synth. oils, fluids containing water Temperature Post of the part of						
Fluids Hydraulic oils (mineral based), synth. oils, fluids containing water					ring fitting	
Sýnth. oils, fluids containing water Temperature Measuring range ²) -25 + 100 °C Output data 1; 2; 4 PNP transistor outputs Switching outputs 1; 2; 4 PNP transistor outputs 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 Accuracy Level: ≤ ± 2 % FS Temperature: ± 1.5 °C Temperature drift (enviroment) ≤ 0.0. 15 % FS/ °C Repeatability³) Level: ≤ ± 2 % FS Temperature: ± 1.5 °C Response time acc. to DIN EN 60751 (temperature probe) Level: ≤ ± 2 % FS Temperature: ≤ ± 1.5 °C Response time acc. to DIN EN 60751 (temperature range 0 +60 °C Ambient temperature range 0 +60 °C Storage temperature range 0 +60 °C Max. tank pressure 0.5 bar (short-term 3 bar, t < 1 min)						
Measuring range 2)	Fluids ¹⁾					
Output data Switching outputs 1; 2; 4 PNP transistor outputs Switching current: 1; 2 SP: max. 0.25 A per output 4 SP: max. 0.25 A per output 4 SP: max. 0.25 A per output 9 Switching cycles: > 100 million 0 10 V load resist. min. 1 kΩ 0 load resist. min. 1 kΩ 1 SP: 0 10 V load resist. min. 1 kΩ 1 SP: 0 10 V load resist. min. 1 kΩ 1 SP: 0 10 V load resist. min. 1 kΩ 1 SP: 0 10 V load resist. min. 1 kΩ 1 SP: 0 10 V load resist. min. 1 kΩ 1 SP: 0 10 V load resist. min. 1 kΩ 1 SP: 0 10 V load resist. min. 1 kΩ 1 SP: 0 10 V load resist. min. 1 kΩ 1 SP: 0 10 V load resist. min. 1 kΩ 1 SP: 0 10 V load resist. min. 1 kΩ 1 SP: 0 10 V load resist. min. 1 kΩ 1 SP: 0 10 V load resist. min. 1 kΩ 1 SP: 0 10 V load resist. min. 1 kΩ 1 SP: 0 10 V load resist. min. 1 kΩ 1 SP: 0 10 V load resist. min. 1 kΩ 1 SP: 0 10 V load resist. min. 1 kΩ 1 SP: 0 10 V load resist. min. 1 kΩ 1 SP: 0 10 V load resist. min. 1 kΩ 1 SP: 0 10 V load resist. min. 1 kΩ 1 SP: 0 V FS 1 Temperature: ± 1.5 °C 1 Level: ≤ ± 2 % FS 1 Temperature: ± 1.5 °C 1 Level: ≤ ± 2 % FS 1 Temperature: ± 1.5 °C 1 Level: ≤ ± 2 % FS 1 Temperature: ± 1.5 °C 1 Level: ≤ ± 2 % FS 1 Temperature: ± 1.5 °C 1 Level: ≤ ± 2 % FS 1 Temperature: ± 1.5 °C 1 Level: ≤ ± 2 % FS 1 Temperature: ± 1.5 °C 1 Level: ≤ ± 2 % FS 1 Temperature: ± 1.5 °C 1 Level: ≤ ± 2 % FS 1 Temperature: ± 1.5 °C 1 Level: ≤ ± 2 % FS 1 Temperature: ± 1.5 °C 1 Level: ≤ ± 2 % FS 1 Temperature: ± 1.5 °C 1 Level: ≤ ± 2 % FS 1 Temperature: ± 1.5 °C 1 Level: ≤ ± 2 % FS 1 Temperature: ± 1.5 °C 1 Level: ≤ ± 2 % FS 1 Temperature: ± 1.5 °C 1 Level: ≤ ± 2 % FS 1 Level:						
Switching outputs	Measuring range 2)		-25 +100 °	С		
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Response time acc. to DIN EN 60751 (temperature probe) Environmental conditions Ambient temperature range $0+60 ^{\circ}\text{C}$ Storage temperature range $0+60 ^{\circ}\text{C}$ Fluid temperature range $0+60 ^{\circ}\text{C}$ Storage temperature range $0+60 ^{\circ}\text{C}$ Fluid temperature range $0+60 ^{\circ}\text{C}$ Max. tank pressure $0+60 ^{\circ}\text{C}$ Storage temperature range $0+60 ^{\circ$	Accuracy					
Temperature: ≤ ± 1.5 °C	Temperature drift (enviroment)		≤ 0.0 15 % F	S/°C		
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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)	Environmental conditions					
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Other data Supply voltage 9 35 V DC without analogue output when applied acc. to UL specifications 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	Shock resistance acc. to DIN EN 60068-2-27 (11 ms)		≤ 25 g			
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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	when applied acc. to UL specifications		- limited energy - acc. to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950			
Simple Series S	Residual ripple of supply voltage		≤ 5 %			
height of digits 7 mm Weight g 180 220 250 300	Current consumption		≤ 90 mA with inactive switching outputs			
Weight g 180 220 250 300	Display					
			180	220		

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

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	Measuring range	Switch point	Hysteresis
in cm	in cm	in cm *	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

Measuring range	Offset
in cm *	in cm *
17.0	0 68.0
29.0	0 116.0
39.0	0 156.0
59.0	0 177.0
	in cm * 17.0 29.0 39.0

The increment for all units is 0.1 cm.

Temperature switch point function

	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	

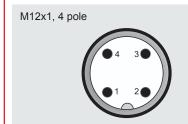
The increment for all units is 0.5 °C.

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

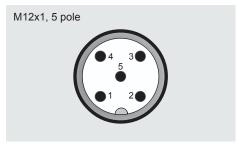
Additional functions:

- 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

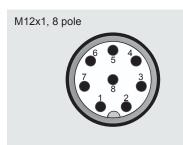
Pin connections:



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

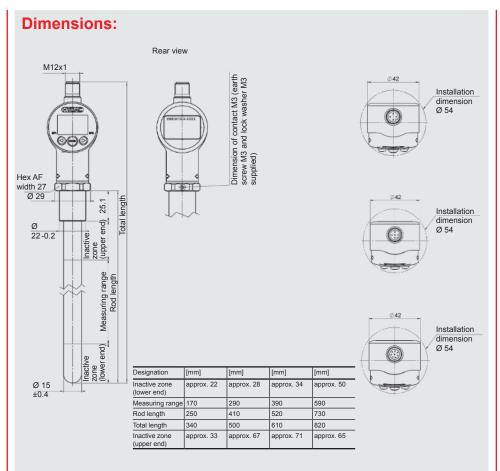


Pin ENS 3X18-5 1 +U _B 2 Analogue 3 0 V			
1 +U _B 2 Analogue 3 0 V	Pin	² in	ENS
2 Analogue 3 0 V			3X18-5
3 0 V	1	1	+U _B
	2	2	Analogue
4 SP1	3	3	0 V
7 011	4	1	SP1
5 SP2	5	5	SP2



Pin	ENS
	3X1P-8
1	+U _B
2	SP2
2 3	0 V
4	SP1
<u>4</u> 5	SP3
6	SP4
7	Analogue fluid level
8	Analogue temperature





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

Subject to technical modifications.

Model code:

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

Temperature probe

- = with temperature probe
- = without temperature probe

Mechanical connection

= 22 mm collar for cutting ring fitting G22L

Electrical connection

- = male M12x1, 4 pole
 - only possible on output models "2" and "3"
- = male M12x1, 5 pole
 - only possible on output model "5"
- = Male M12x1, 8 pole
 - only possible on output model "8"

Output

- = 2 switching outputs
 - only in conjunction with electrical connection type "6"
- = 1 switching output and 1 analogue output 3 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

 $\overline{000}$ = standard

Probe material

= ceramic

Accessories:

Appropriate accessories, such as mating connectors, splash guards, etc. can be found in the Accessories brochure.

HYDAC ELECTRONIC GMBH

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