

HYDAC INTERNATIONAL



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 a 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 (environment) | ≤ 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 | | | | |
| RAUS 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 | | | | |
| Other data | | | | | |
| Supply voltage | 9 .. 35 V DC without analogue output 18 .. 35 V DC with 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 | ≤ 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 (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 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.

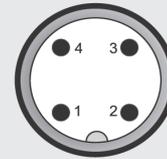
* All ranges given in the table can be adjusted by the increments shown.

Additional functions:

- Switching mode of the 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 .. 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)

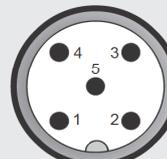
Pin connections:

M12x1, 4 pole



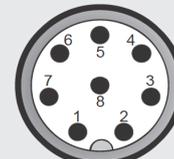
| Pin | ENS 3X16-2 | ENS 3X16-3 |
|-----|-----------------|-----------------|
| 1 | +U _B | +U _B |
| 2 | SP2 | Analogue |
| 3 | 0 V | 0 V |
| 4 | SP1 | SP1 |

M12x1, 5 pole



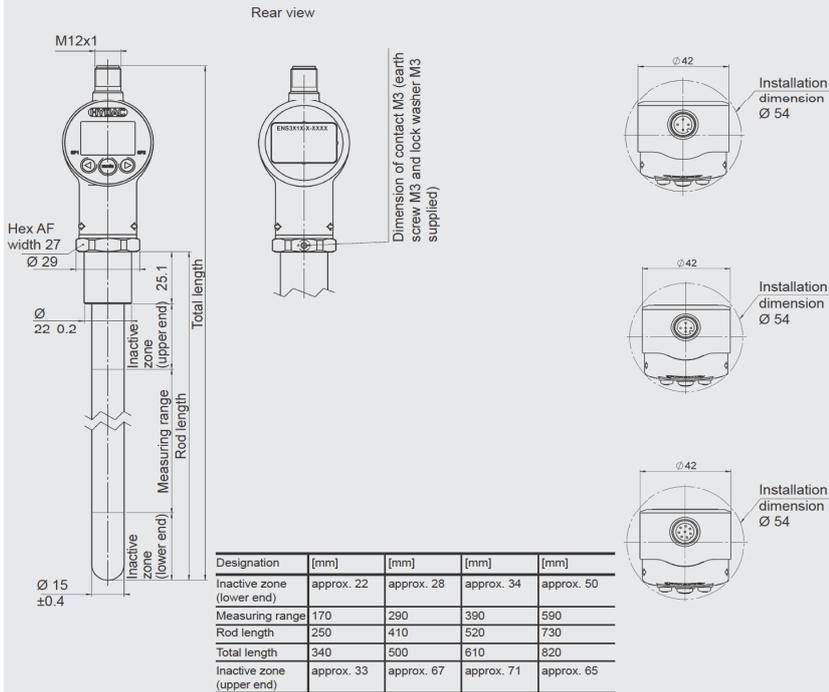
| Pin | ENS 3X18-5 |
|-----|-----------------|
| 1 | +U _B |
| 2 | Analogue |
| 3 | 0 V |
| 4 | SP1 |
| 5 | SP2 |

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:



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.

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.

