



Electronic Level Switch ENS 3000

Description:

The ENS 3000 is an electronic level switch with integrated display. The instrument has 1, 2 or 4 switching outputs and an analog 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. The ENS 3000 can be used for oil as well as water. The fluid type can be selected for specific applications via the menu.

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 probe lengths of 9.80", 16.20", 20.50" and 28.70".

The instrument is also available with or without an integrated temperature sensor.

Special features:

- 1, 2 or 4 independent PNP transistor switching outputs
- Selectable for use with oil or water
- User-selectable switch outputs based on the measured value
- Switching and switch-back points can be adjusted independently
- Selectable analog output (optional)
- 4-digit display
- Simple to operate due to menu-based key operation

Technical data:

Input data

Sensor type	Capacitive fluid level sensor
Probe lengths	9.80"; 16.20"; 20.50"; 28.70"
Active zone	6.70"; 11.4"; 15.35"; 23.2"
Max. speed of change in fluid level	1.57; 2.36; 3.14; 3.94 inch/s
Repeatability ¹⁾	≤ ± 2 % FS

Temperature (optional)

Sensor type	Semiconductor sensor
Measuring range	-13 .. +212 °F
Accuracy	-/+ 3.0 °F
Reaction time (t ₅₀)	180 s

Output data

Analog output (optional)

With 1 or 2 SP selectable	4 .. 20 mA ohmic resistance ≤ 500 Ω 0 .. 10 V ohmic resistance ≥ 1 kΩ corresponds to measuring range selected
With 4 SP (only with temperature sensor)	0 .. 10 V ohmic resistance ≥ 1 kΩ corresponds to measuring range selected

Switch outputs

Type	PNP transistor output programmable as N/O / N/C
Assignment	On version with temperature measurement, user can select temperature or fluid level
Switching current	1 or 2 SP: max. 1.2 A per output 4 SP: max. 0.25 A per output
Switching cycles	> 100 million

Environmental conditions

Compensated temperature range	32 .. +140 °F
Operating temperature range	32 .. +140 °F
Storage temperature range	-40 .. +176 °F
Fluid temperature range	32 .. +140 °F
 mark	EN 61000-6-1 / 2 / 3 / 4
 mark ²⁾	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 5 g
Shock resistance to DIN EN 60068-2-29 (1 ms)	≤ 25 g
Protection class to IEC 60529	IP 67

Other data

Max. tank pressure	7.25 psi (short-term 43.5 psi, t < 1 min)
Supply voltage	9 .. 35 V DC without analog output 18 .. 35 V DC with analog output - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
for use acc. to UL spec.	
Current consumption	max. 2.47 A total max. 90 mA with inactive switching outputs and 2 analog outputs
Residual ripple of supply voltage	≤ 5 %
Fluids ³⁾	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; 220; 250; 300 g

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

FS (Full Scale) = relative to complete measuring range

¹⁾ Specified for calm, non-turbulent fluid.

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

³⁾ Other fluids on request

Setting options:

All settings available on the ENS 3000 are combined in 2 easy-to-navigate menus. To prevent unauthorized adjustment of the instrument, a programming lock can be set.

Setting ranges of the switching points and switch-back hysteresis:

Fluid level switching point function

Probe length in inches	Meas. range in inches	Switching point in inches	Hysteresis in inches
9.80	6.70	0.10 .. 6.70	0.05 .. 6.60
16.20	11.40	0.20 .. 11.40	0.05 .. 11.25
20.50	15.35	0.25 .. 15.35	0.05 .. 15.15
28.70	23.20	0.35 .. 23.20	0.15 .. 22.85

The increment for all units is 0.05 inch.

Fluid level window function

Probe length in inches	Lower switch value in inches	Upper switch value in inches
9.80	0.10 .. 6.55	0.20 .. 6.60
16.20	0.20 .. 11.15	0.30 .. 11.25
20.50	0.25 .. 15.05	0.35 .. 15.15
28.70	0.40 .. 22.80	0.60 .. 23.00

The increment for all units is 0.05 inch.

Fluid level offset function

Probe length in inches	Meas. range in inches	Offset in inches
9.8	6.7	0 .. 26.8
16.2	11.4	0 .. 45.6
20.5	15.35	0 .. 61.4
28.7	23.2	0 .. 69.6

The increment for all units is 0.05 inch.

Temperature switching point function

Unit	Meas. range	Switching point	Hysteresis
°F	-13 .. +212	-9 .. +212	2 .. 222

The increment for all units is 1 °F.

Temperature window function

Unit	Lower switch value	Upper switch value
°F	-10 .. 207	-7 .. 209

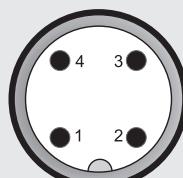
The increment for all units is 1 °F.

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 fluid level or temperature, as required
- Switch-on and switch-off delay adjustable from 0.00 .. 9999 seconds
- Display can be adjusted (actual fluid level, actual temperature, peak values, switching point 1, 2, 3, 4 or display off)
- Analog output can be assigned to fluid level or temperature as required (depending on model)

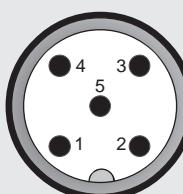
Pin connections:

M12x1, 4 pole



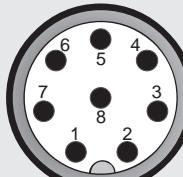
Pin	ENS 3X16-2	ENS 3X16-3
1	+U _B	+U _B
2	SP 2	Analog
3	0 V	0 V
4	SP 1	SP 1

M12x1, 5 pole



Pin	ENS 3X18-5
1	+U _B
2	Analog
3	0 V
4	SP 1
5	SP 2

M12x1, 8 pole



Pin	ENS 3X1P-8
1	+U _B
2	SP 2
3	0 V
4	SP 1
5	SP 3
6	SP 4
7	Analog fluid level
8	Analog temperature

* All ranges given in the table are adjustable by the increments shown.

Model code:

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

Temperature sensor

- 1 = With temperature sensor
- 2 = Without temperature sensor

Mechanical connection

- 1 = 22 mm collar
to fit cutting ring coupling 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 analog output
only in conjunction with electrical connection type "6"
- 5 = 2 switching outputs and 1 analog output
only in conjunction with electrical connection type "8"
- 8 = 4 switching outputs and 2 analog outputs
only in conjunction with electrical connection type "P"

Probe length (physical) in inches

0100 = 9.80"

0162 = 16.2"

0205 = 20.5"

0287 = 28.7"

Modification number

400 = Standard in inch

Probe material

K = Ceramic

Accessories:

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

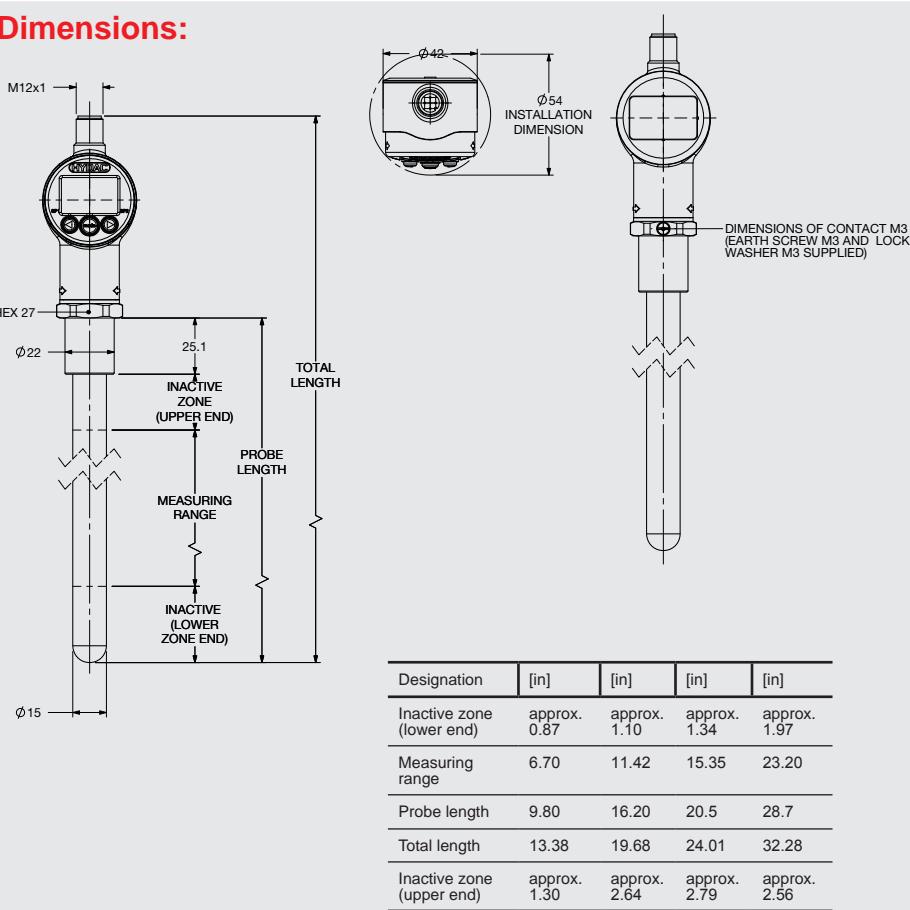
Note:

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.

Dimensions:



HYDAC ELECTRONICS

90 Southland Dr. Bethlehem, PA 18017
Telephone +1 (610) 266-0100
E-mail: electronics@hydacusa.com
Website: www.hydacusa.com