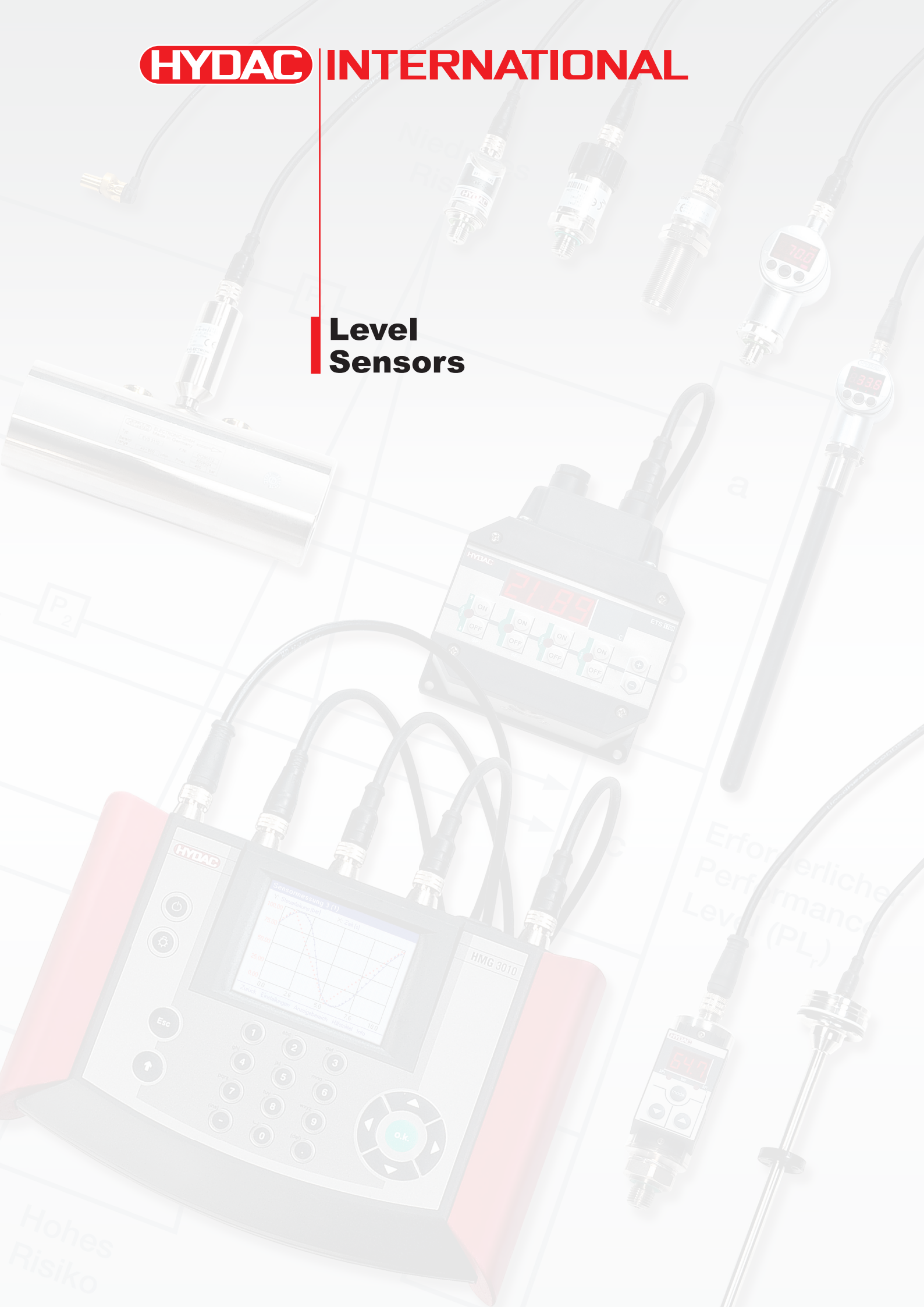


## Level Sensors



## ELECTRONIC LEVEL SENSORS

In industry, level sensors are used for the most diverse tasks. In the main, sensors which are based on capacitive, magnetostrictive or ultrasonic measurement are used.

HYDAC ELECTRONIC has level sensors for each of these measurement principles in its product range.

Electronic level switches for general applications:

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ENS 3000 (capacitive)

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ENS 3000 IO-Link (capacitive)

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HNS 3000 (magnetostrictive)

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HNS 526 (based on ultrasound)

Electronic level measuring transmitter for general applications:

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HNT 1000 (magnetostrictive)

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## 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 <sup>1)</sup>	≤ ± 2 % FS
Switching point accuracy	≤ ± 2 % FS
Temperature (optional)	
Sensor type	Semiconductor sensor
Measuring range	-13 .. +212 °F
Accuracy	-/+ 3.0 °F
Reaction time (t <sub>90</sub> )	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
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>2)</sup>	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 <sup>3)</sup>	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

<sup>1)</sup> Specified for calm, non-turbulent fluid,

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No. 61010-1

<sup>3)</sup> 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.

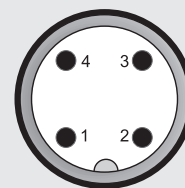
\* All ranges given in the table are adjustable by the increments shown.

## 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)

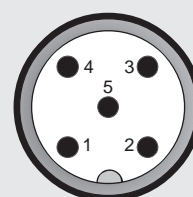
## Pin connections:

M12x1, 4 pole



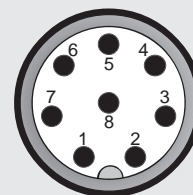
Pin	ENS 3X16-2	ENS 3X16-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	SP 2	Analog
3	0 V	0 V
4	SP 1	SP 1

M12x1, 5 pole



Pin	ENS 3X18-5
1	+U <sub>B</sub>
2	Analog
3	0 V
4	SP 1
5	SP 2

M12x1, 8 pole



Pin	ENS 3X1P-8
1	+U <sub>B</sub>
2	SP 2
3	0 V
4	SP 1
5	SP 3
6	SP 4
7	Analog fluid level
8	Analog temperature



## 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.

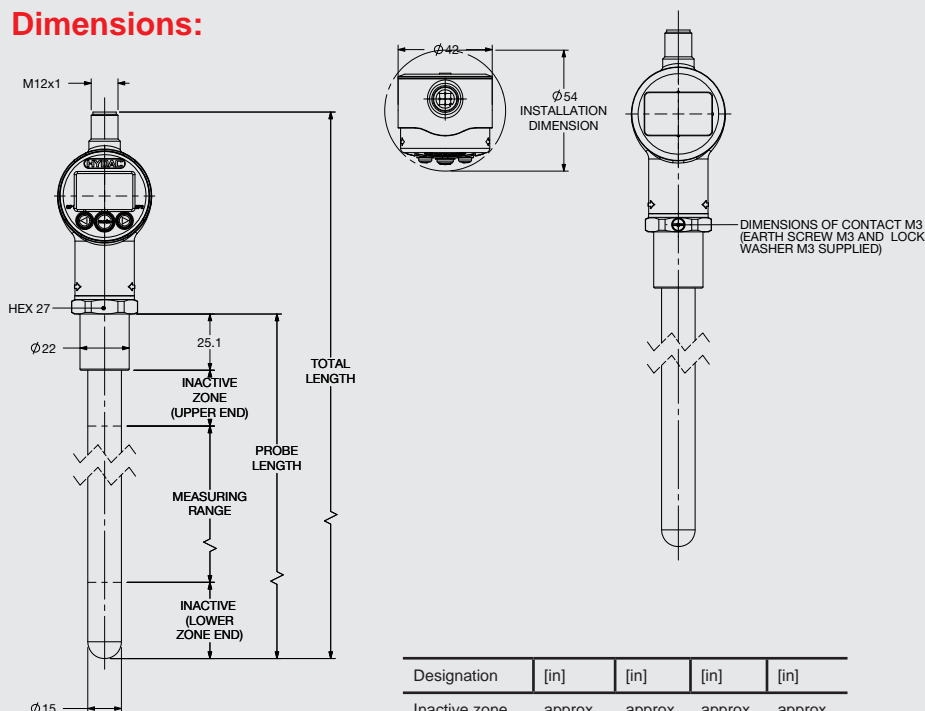
## Note:

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:



Designation	[in]	[in]	[in]	[in]
Inactive zone (lower end)	approx. 0.87	approx. 1.10	approx. 1.34	approx. 1.97
Measuring range	6.70	11.42	15.35	23.20
Probe length	9.80	16.20	20.5	28.7
Total length	13.38	19.68	24.01	32.28
Inactive zone (upper end)	approx. 1.30	approx. 2.64	approx. 2.79	approx. 2.56

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## Electronic Level Switch ENS 3000 with IO-Link Interface



### Description:

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

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control. Parameterization and cyclical transmission of process and service data is therefore possible.

The level switch series ENS 3000 with communication interface IO-Link according to specification V1.1 has been specially designed to connect sensors in automation systems. Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

### Special features:

- IO-Link interface
- 1 PNP transistor output
- Additional signal output, can be configured as PNP transistor switching output or analog output
- Selectable for use with oil or water
- 4-digit display
- Display rotates in two axes for optimal alignment

### Technical data:

Input data	
Sensor type	Capacitive level sensor
Probe length	9.80"; 16.20"; 20.50"; 28.70"
Measuring range	6.70"; 11.4"; 15.35"; 23.2"
Max. speed of change in the fluid level	1.57; 2.36; 3.14; 3.94 inch/s
Repeatability <sup>1)</sup>	≤ ± 2 % FS
Switching point accuracy	≤ ± 2 % FS
Temperature (optional)	
Sensor type	Semi-conductor sensor
Measuring range	-13 .. +212 °F
Accuracy	± 3.0 °F
Reaction time (t <sub>90</sub> )	180 s
Output data	
Output signals	Output 1: PNP transistor switching output Output 2: can be configured as PNP transistor switching output or analog output
Analog output	
Signal	selectable: 4 .. 20 mA load resistance max. 500 Ω 0 .. 10 V load resist. min. 1 kΩ corresponds to measuring range selected
Switch outputs	
Type	PNP transistor switching output
Assignment	On version with temperature measurement user-selectable temperature or fluid level
Switching current	max. 250 mA per output
Switching cycles	> 100 million
Parameterization	
	<b>Via IO-Link interface, with HYDAC programming device HPG 3000 or push buttons on the ENS 3000</b>
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
CE - mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 5 g
Shock resistance according to DIN EN 60068-2-29 (11 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
Current consumption	≤ 0.590 A with active switching outputs ≤ 90 mA with inactive switching outputs ≤ 110 mA with inactive switching output and analog output
Residual ripple of supply voltage	≤ 5 %
Fluids <sup>2)</sup>	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 .. 300 g, dependent on the probe length

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) Other fluids on request

## 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 switch outputs:

Measuring range/ probe length in inches	Lower limit of RP / FL in inches	Upper limit of SP / FH in inches
6.70 / 9.80	0.05 / 0.10	6.70 / 6.60
11.40 / 16.20	0.10 / 0.20	11.40 / 11.25
15.35 / 20.50	0.15 / 0.25	15.35 / 15.15
23.20 / 28.70	0.25 / 0.35	23.20 / 22.85

Measuring range in inches	Min. difference betw. RP & SP and FL & FH in inches	Increment* in inches
6.70 / 9.80	0.05 / 0.05	0.05
11.40 / 16.20	0.10 / 0.10	0.05
15.35 / 20.50	0.10 / 0.15	0.05
23.20 / 28.70	0.15 / 0.25	0.05

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

SP = switch point

RP = switch-back point

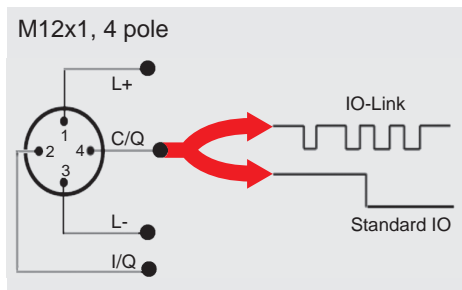
FL = level window lower value

FH = level window upper value

## 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 the fluid level or temperature
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Optional analog output signal to 4 .. 20 mA or 0 .. 10 V
- Analog output can be assigned to fluid level or temperature as required (depending on version)

## Pin connections:



Pin	Signal	Description
1	L+	Supply voltage
2	I/Q	Switching output (SP2) / analog output
3	L-	Gnd
4	C/Q	IO-Link communication / switching output (SP1)

## IO-Link-specific data:

Baud rate	38.4 kBaud *
Cycle time	2.5 ms
Process data width	16 Bit
Frame type	2.2
Specification	V1.1

\* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:

<http://www.hydac.com/de-en/service/downloads-software-on-request/>

## Model code:

ENS 3 X 1 6 - F31 - XXXX - 400 - K

### Temperature sensor

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

### Mechanical connection

- 1 = Collar Ø 22

### Electrical connection

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

### Output

- L = IO-Link interface

### Probe length, physical

0100 = 9.80"

0162 = 16.2"

0205 = 20.5"

0287 = 28.7"

### Modification number

- 400 = Standard in inch

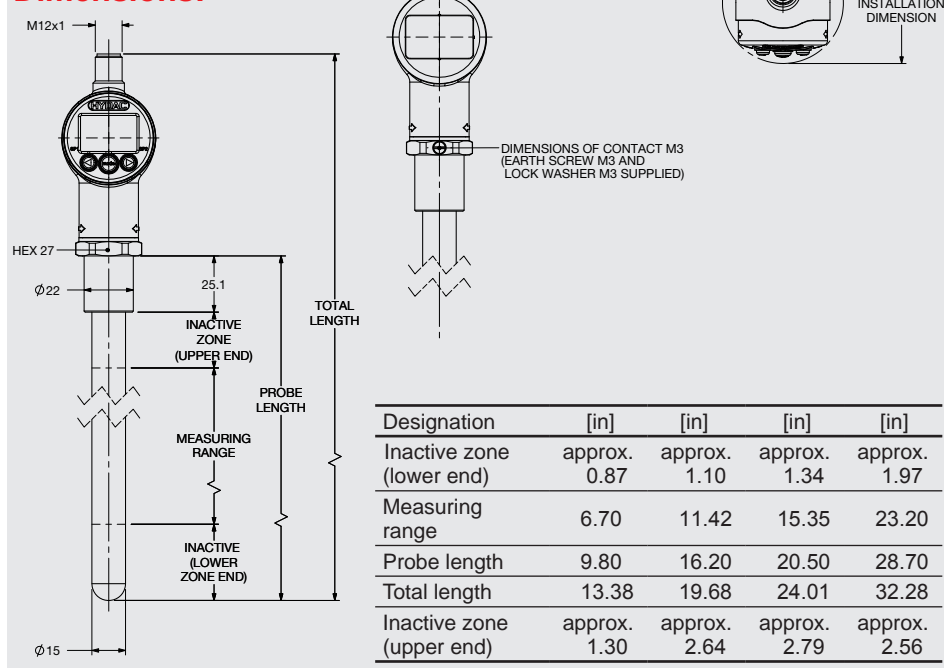
### Probe material

- K = Ceramic

### Accessories:

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

## Dimensions:



## Note:

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Subject to technical modifications.

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## Electronic Level Switch HNS 3000

### Description:

The HNS 3000 is an electronic level switch with integrated display. The float-based sensor for high-precision analog monitoring of the fluid level has 1, 2 or 4 switching outputs and an analog output signal is available as an option.

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

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

The sensor is available in probe lengths from 9.84 to 98.4 inches. The instrument is also available with or without temperature sensor.

Depending on the application, several different floats are available, e.g. stainless steel for aggressive media or plastic.

### Special features:

- 1, 2 or 4 independent PNP transistor switching outputs
- User-selectable switch outputs based on the measured value
- Switching and switch-back points can be adjusted independently
- Selectable analog output available as an option
- 4-digit display
- Various types of float available

### Technical data:

Input data	
Sensor type	Magnetostrictive
Measuring ranges	7.01"; 8.19"; 11.73"; 13.31"; 17.64"; 25.90"
Probe length <sup>1)</sup>	9.84"; 11.02"; 14.57"; 16.14"; 20.47"; 28.74"
Max. speed of change in fluid level	Optional
Repeatability <sup>2)</sup>	≤ ± 1 % FS
Switching point accuracy	≤ ± 1 % FS
Temperature (optional)	
Sensor type	Semi-conductor sensor
Measuring range	-13 .. +212 °F
Accuracy	± 3.0 °F
Reaction time (t <sub>90</sub> )	< 100 s
Output data	
Analog output (optional)	
With 1 or 2 SP selectable	4 .. 20 mA load resistance ≤ 500 Ω 0 .. 10 V load resistance ≥ 1 kΩ corresponds to measurement range selected
With 4 SP (only with temperature sensor)	0 .. 10 V load resistance ≥ 1kΩ corresponds to measurement range selected
Switch outputs	
Type	PNP transistor output programmable as N/O / N/C
Assignment	On version with temperature measurement user-selectable 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	
Max. tank pressure	43.5 psi (short-term 145 psi, t < 1 min)
Operating temperature range	-40 .. +185 °F
Storage temperature range	-40 .. +212 °F
Fluid temperature range	-40 .. +248 °F
CE-mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6	7.5 mm (5 .. 8.2 Hz) 2.0 g (8.2 .. 150 Hz)
Shock resistance to DIN EN 60068-2-27	20 g (11ms)
Protection class to IEC 60529	IP67
Other data	
Supply voltage (U <sub>s</sub> )	9 .. 35 V DC (without analog output) 18 .. 35 V DC (with analog output)
Current consumption (without output)	≤ 150 mA
Residual ripple of supply voltage	≤ 250 mV
Fluids	Hydraulic oils, cooling lubricants
Parts in contact with medium	Stainless steel (1.4301 / 1.4571)
Float	PP (polypropylene); 0.6 kg/dm <sup>3</sup>
Display	4-digit, LED, 7-segment, red, height of digits 7 mm
Weight (dependent on the probe length)	~ 1000 g

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

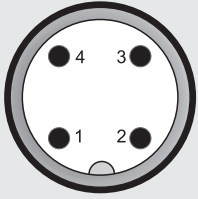
**FS (Full Scale)** = relative to the complete measuring range

<sup>1)</sup> Other probe lengths on request

<sup>2)</sup> Specified for calm, non-turbulent fluid

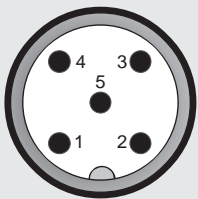
## Pin connections:

M12x1, 4 pole



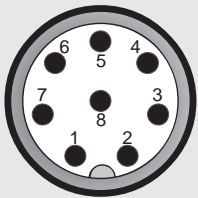
Pin	HNS 3X26-2	HNS 3X26-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	SP 2	Analog
3	0 V	0 V
4	SP 1	SP 1

M12x1, 5 pole



Pin	HNS 3X28-5
1	+U <sub>B</sub>
2	Analog
3	0 V
4	SP 1
5	SP 2

M12x1, 8 pole



Pin	HNS 3X2P-8
1	+U <sub>B</sub>
2	SP 2
3	0 V
4	SP 1
5	SP 3
6	SP 4
7	Analog level
8	Analog temperature

## Model code:

HNS 3 X X X - X - XXXX - 400

### Temperature sensor

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

### Mechanical connection

- 2 = G3/4 A DIN 3852 (male)

### Electrical connection

- 6 = Male M12x1, 4 pole  
only for output models "2" and "3"
- 8 = Male M12x1, 5 pole  
possible only for output model "5"
- P = Male M12x1, 8 pole  
only for 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 code type "8"
- 8 = 4 switching outputs and 2 analog outputs  
only in conjunction with electrical connection type "P"

### Probe length (physical)

- 0250 = 9.84"
- 0280 = 11.02"
- 0370 = 14.57"
- 0410 = 16.14"
- 0520 = 20.47"
- 0730 = 28.74"

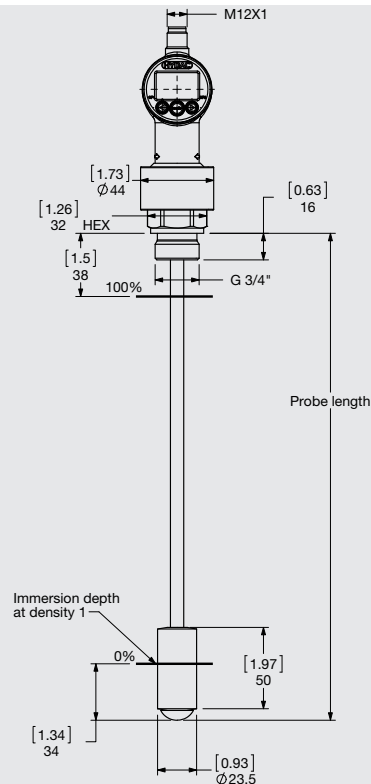
### Modification number

- 400 = Standard in inch

### Accessories:

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

## 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.

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## Electronic Level Switch HNS 526

### Description:

The level switch HNS 526 is a non-contact, highly compact sensor for fluid level measurement in stationary applications.

By definition, its functional principle (measurement of sound transmission time) means that it operates with an extremely high resolution and measurement rate.

The HNS 526 is available for measurement ranges up to 6400mm (252") and is obtainable in different signal output variants (2 switching outputs;

1 switching output and 1 analog output, either 4 .. 20 mA or 0 .. 10 V).

The sensor can be adjusted simply and conveniently via two push-buttons and a self-explanatory menu structure according to VDMA.

The actual fluid level can be displayed in a 3-digit digital display either in absolute value or in percent (selectable); 2 three-color LEDs also indicate the operating status.

### Special features:

- Non-contact distance measurement
- Measurement range up to 6400mm (252")
- Various signal output versions available
- Very high resolution and measurement rate
- Integrated temperature compensation
- 3-digit digital display to show the actual distance
- 2 three-color LEDs to display the operating status can be adjusted independently
- Switching and switch-back points selectable analog output (optional) Only for use in depressurized applications
- Must be installed vertically to the fluid surface

### Technical data:

Input data	
Operating range: mm (inches) *	280 (11.02"); 480 (18.9"); 1600 (63"); 4000 (157); 6400 (252")
Blind zone: mm (inches) *	0..30 (0..1.18"); 0..85 (0..3.35"); 0..200 (0..7.87"); 0..350 (0..13.78"); 0..600 (0..23.62")
Maximum range: mm (inches) *	350 (13.78"); 600 (23.62"); 2000 (78.74"); 5000 (197"); 8000 (315")
Resolution	0.18mm (0.007")
Output data	
Accuracy	≤ ± 1 % of the actual measured value
Repeatability	± 0.15 % of the actual measured value
Analog output (optional)	
Signal (short-circuit resistant)	selectable: 4 .. 20 mA, $R_{Lmax} = 100 \Omega (U_B \leq 20 V)$ $R_{Lmax} = 500 \Omega (U_B > 20 V)$ 0 .. 10 V, $R_{Lmin} = 100 k\Omega (U_B \geq 20 V)$
Switch outputs	
Type	PNP transistor output (short-circuit resistant)
Switching current	max. 200 mA per switching output
Switching direction	N/O or N/C, adjustable
Switching cycles	> 100 million
Reaction time	32; 64; 92; 172; 240 ms
Environmental conditions	
Operating temperature	-13 °F .. +158 °F
Storage temperature range	-40 °F .. +185 °F
CE mark	DIN EN 60947-5-2 DIN EN 60947-5-7
Vibration resistance to DIN EN 60068-2-6 (10 .. 55 Hz)	≤ 2 g
Shock resistance to DIN EN 60068-2-27 (11 ms)	≤ 30 g
Protection class to EN 60529	IP 67
Other data	
Supply voltage	9 .. 30 V DC without analog output 20 .. 30 V DC with analog output
Time delay before availability	< 300 ms
Residual ripple	± 10%
No-load current consumption	≤ 80 mA
Electrical connection	Male M12x1, 4 pole
Housing	Brass, nickel-plated; Ultrasonic transducer with PEEK film
Controls	2 push-buttons
Display	3-digit, LED-display, 2 three-color-LEDs
Weight	150; 150; 150; 210; 270 g

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

## Setting options:

All the terms and symbols used for setting the HNS 526 as well as the menu structure comply with the specifications of the German Engineering Federation Standard (VDMA 24574-4) for level switches.

In order to prevent unauthorized adjustment of the device, a key-lock can be set.

## Setting ranges of the switching points or switch-back points:

Switching point function distance and window function distance

Oper. scanning range	SP1, SP2, FH1, FH2 *	RP1, RP2, FL1, FL2*
280mm (11.02 inch)	2 .. 32 cm 2 .. 13 inch	1 .. 31 cm 1 .. 12 inch
480mm (18.9 inch)	2 .. 59 cm 2 .. 23 inch	1 .. 58 cm 1 .. 22 inch
1600mm (63 inch)	2 .. 180 cm 2 .. 71 inch	1 .. 179 cm 1 .. 70 inch
4000mm (157 inch)	2 .. 465 cm 2 .. 183 inch	1 .. 464 cm 1 .. 182 inch
6400mm (252 inch)	2 .. 740 cm 2 .. 291 inch	1 .. 739 cm 1 .. 290 inch

Switching point function:

SP1, SP2 = switching points 1 or 2  
RP1, RP2 = switch-back points 1 or 2

Window function.

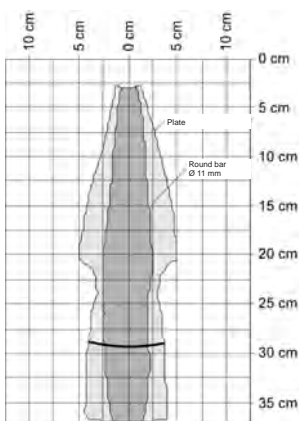
FH1, FH2 = upper switch values 1 or 2  
FL1, FL2 = lower switch values 1 or 2

\* The increment for all devices is 1 cm or 1 inch.

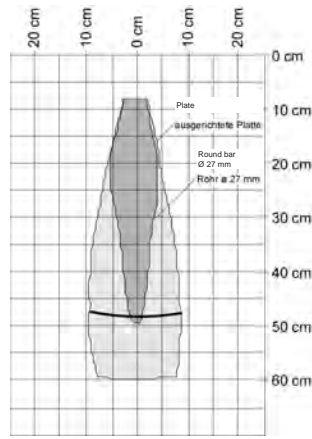
## Recording ranges (for different objects):

The grey areas show the detection range for a very large reflector, e.g. a fluid surface, providing the sensor is ideally positioned. Outside the grey area, it is not possible to evaluate the ultrasonic reflections.

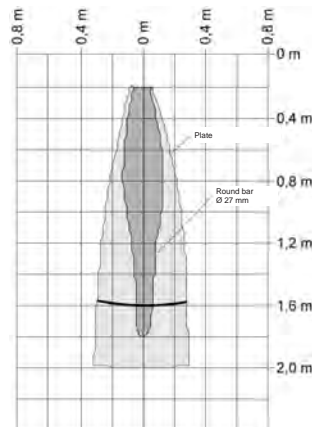
Operational scanning range:  
280mm (11.02 inch)



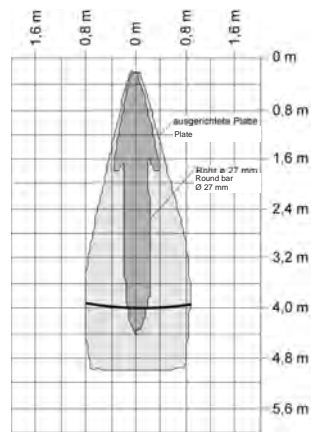
Operational scanning range:  
480mm (18.9 inch)



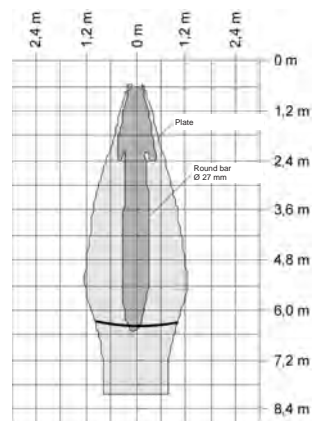
Operational scanning range:  
1600mm (63 inch)



Operational scanning range:  
4000mm (157 inch)



Operational scanning range:  
6400mm (252 inch)

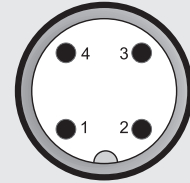


## Additional functions:

- 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)
- Switch-on delay adjustable from 0 to 20 seconds
- Energy saving mode

## Pin connections:

M12x4, 4 pole



Pin	HNS 526-2	HNS 526-3
1	+UB	+UB
2	SP2	I/U
3	0 V	0 V
4	SP1	SP1

\* The default for the unit of the HNS 526 is in mm. It can be changed to inch from the menu.

The unit inch is not shown in the display.

## Model code:

HNS 5 2 6 - X - XXXX - 000 - F

### Mechanical connection

2 = M30x1.5

### Electrical connection

6 = Male M12x1, 4 pole  
(connector not supplied)

### Output

2 = 2 switching outputs

3 = 1 switching output and 1 analog output

### Operational scanning range \*

0280 = 11.02 inch

0480 = 18.9 inch

1600 = 63 inch

4000 = 157 inch

6400 = 252 inch

### Modification number

000 = Standard

### Design, front face of sensor

F = Foil

\*Note: The default for the unit of the HNS 526 is mm. It can be changed to inch from the menu.

### Accessories:

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

## Note:

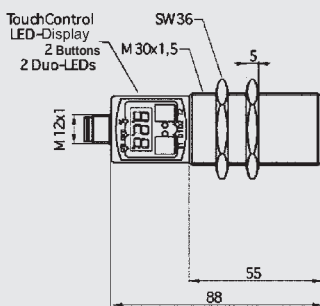
The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

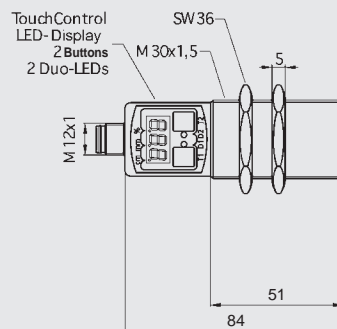
Subject to technical modifications.

## Dimensions:

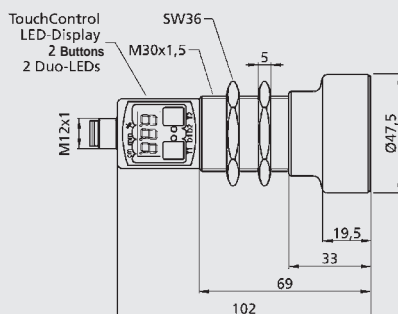
Operational scanning range:  
280mm (11.02 inch)



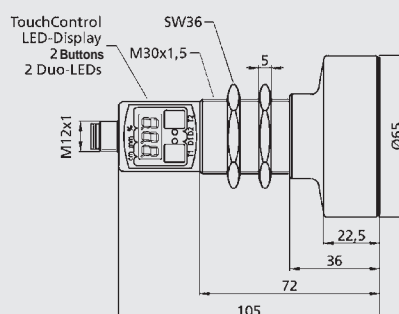
480mm (18.9 inch), 1600mm (63 inch)



Operational scanning range:  
4000mm (157 inch)



6400mm (252 inch)



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Website: [www.hydacusa.com](http://www.hydacusa.com)



## Electronic Level Transmitter HNT 1000

### Description:

The level transmitter HNT 1000 is a float-based sensor for highly accurate analog recording of fluid levels.

The sensor is available in probe lengths from 7.87 to 98.4". HYDAC offers the HNT 1000 in a pressure-resistant stainless steel housing for in-tank installation.

Depending on the application, a variety of different floats are available, e.g. stainless steel for aggressive media or plastic.

The output signals enable connection to all HYDAC ELECTRONIC GMBH measurement and control devices as well as connection to standard evaluation systems (e.g. PLC controls).

### Special features:

- Probe lengths from 7.87 to 98.4"
- Process connection:  
G3/4 A threaded connection
- High degree of accuracy
- Very robust housing
- Highly resistant to shock and vibration
- Excellent EMC characteristics
- Various float variants available

### Technical data:

Input data	
Sensor type	magnetostrictive
Measuring ranges	7.01", 8.19", 11.73", 13.31", 17.64", 25.90"
Probe length <sup>1)</sup>	9.84", 11.02", 14.57", 16.14", 20.47", 28.74"
Max. speed of change in fluid level	No orientation restrictions
Output data	
Output signal	4 .. 20 mA load ≤ 500 Ω 0 .. 10 V load ≥ 1 kΩ
Accuracy to DIN 16086 <sup>2)</sup>	≤ ± 1 % FS
Non-linearity at max. setting to DIN 16086	≤ ± 1 % FS
Repeatability	≤ ± 1 % FS
Hysteresis	≤ ± 1 % FS
Rise time	≤ 30 ms
Environmental conditions	
Max. tank pressure	43.5 psi (short-term 145 psi, t < 1 min)
Operating temperature range	-40 .. +185 °F
Storage temperature range	-40 .. +212 °F
Fluid temperature range	-40 .. +248 °F
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6	7.5 mm (5 .. 8.2 Hz) 2.0 g (8.2 .. 150 Hz)
Shock resistance to DIN EN 60068-2-27	20 g (11ms)
Protection class to IEC 60529	IP67
Other data	
Supply voltage (U <sub>B</sub> )	9 .. 36 V DC
Current consumption (without output)	≤ 100 mA
Residual ripple of supply voltage	≤ 250 mV
Fluids	Hydraulic oils, cooling lubricants
Parts in contact with medium	Stainless steel (1.4301 / 1.4571)
Float	PP (polypropylene); 0.6 kg/dm <sup>3</sup>
Weight (dependent on probe and cable lengths)	~ 1000 g

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

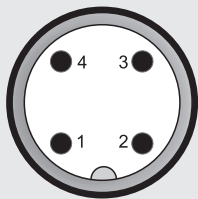
**FS (Full Scale)** = relative to complete measuring range

<sup>1)</sup> Other probe lengths on request

<sup>2)</sup> Specified for calm, non-turbulent fluid

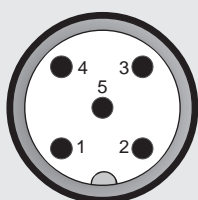
## Pin connections:

M12x1, 4 pole



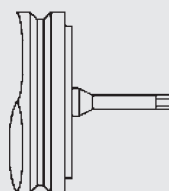
Pin	HNT 1226
1	+U <sub>B</sub>
2	n.c.
3	0 V
4	Signal

M12x1, 5 pole



Pin	HNT 1228
1	+U <sub>B</sub>
2	n.c.
3	0 V
4	Signal
5	n.c.

Cable outlet



Core	HNT 1221
brown	+U <sub>B</sub>
white	0 V
green	Signal
yellow	n.c.

## Model code:

HNT 1 2 2 X - X - XXXX - 000

### Temperature sensor

2 = Without temperature sensor

### Mechanical connection

2 = G 3/4 A DIN 3852 (male)

### Electrical connection

1 = Flying lead, 2 m

6 = Male M12x1, 4 pole

8 = Male M12x1, 5 pole

### Output

B = 0 .. 10 V, 3 conductor

C = 4 .. 20 mA, 3 conductor

### Probe length (physical) in mm

0250 = 9.84"; 0280 = 11.02"; 0370 = 14.57"; 0410 = 16.14";

0520 = 20.47"; 0730 = 28.74";

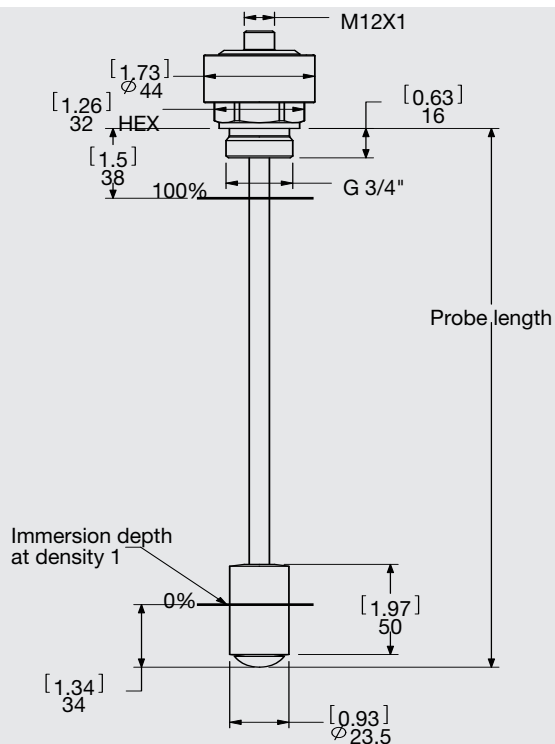
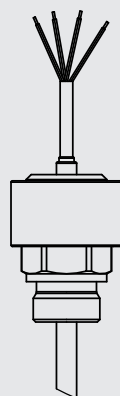
### Modification number

000 = Standard

### Accessories:

Appropriate accessories, such as electrical female connectors, can be found in the Accessories section of the Electronics brochure.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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