T: +44 (0)1444 410040 E: sales@psmmarine.com
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APT 1000 Intelligent Hydrostatic Level Transmitter for Marine Tank Gauging

Key features

- Robust all welded submersible construction
- Choice of construction materials compatible with all common marine liquid measurement applications
- Process connections and fixings for side of tank or submersible installation
- Simple to install, accurate and stable, robust and reliable
- Gauge or Absolute options with a wide measuring span and 0.1% performance
- Dual-mode operation provides outputs as 4-20mA and RS485 Modbus
- Fully programmable for calibrated range and application parameters
- DNV Type Approved and IECEx / ATEX certified for hazardous areas (Zone 0)

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Designed and constructed for marine tank gauging

PSM has drawn upon over 50 years of global marine application experience in developing the APT1000 to provide a liquid level transmitter that delivers the highest possible standards in terms of performance, versatility, functionality and reliability.

A choice of construction materials, Stainless Steel, Titanium, and Hastelloy, ensure corrosion resistance in all applications. Body construction is all laser welded and internally encapsulated, eliminating any possibility of leaks, and all versions are IP68 certified suitable for full immersion to a minimum of 50 metres WG. All measurement ranges will tolerate an overload of 2 x nominal range with no adverse effects to performance or calibration.

The transmitters electronics are integrated within the body and incorporate a micro-controller to monitor and process the output of both the pressure measurement cell and an internal temperature sensor which allows for compensation and correction of the pressure reading over varying ambient temperatures.

Dual mode operation

The APT1000 is a dual-mode transmitter. It may be configured to provide both a 2-wire analogue 4-20mA output and an RS485 / Modbus RTU serial communication, in which case it is a 4 wire connection.

Either or both outputs can be used in normal operation. If used as a 4-20mA transmitter it may be programmed such that the output represents either the required pressure range, or tank contents in volumetric terms, where the transmitter location (height above tank base), liquid S.G. and tank table correction are all configured and stored. If used in digital mode the Modbus Master can access the full Modbus Map and read current pressure, pressure corrected for SG and fitting location, which will provide physical liquid level, and current volume based on the stored tank tables.

Configuration may be done by PSM during manufacture, or by use of a free PC utility – ACU1000 which is available from our website.

Certified Intrinsically Safe and Marine Approved

The transmitter is certified according to ATEX, UKEx, and IECEx regulations for installation in a zone 0 hazardous area and Type Approved by DNV-GL as suitable for use in marine applications.

Cost-optimised Systems

When monitoring multiple tanks digital mode enables significant cost and weight savings, removing the need for separate cable runs to each transmitter by utilising a single multi-drop cable for both power and RS485 network. PSM's purposed developed RFM series termination and safety barrier modules are used and save typically more than 50% of installation time and costs. PSM also have a full range of central acquisition and display options developed to communicate directly with the APT1000 to provide a comprehensive and flexible full system.

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Specifications		
Materials	Sensor body	316L Stainless Steel or Titanium. Hastelloy C276 option for Wetted parts for external (to tank) mounting.
	Diaphragm	316L or Titanium to match body material. Hastelloy C276 process ports use Tantalum diaphragm.
Standard Measurement Ranges (Bar)	0.2, 0.5, 1.0, 2.5, 4.0, 10, 25, 40, 60.	
Measurement type	Vented Gauge or Absolute (Absolute version minimum range 1 bar)	
Overload	2 x Nominal range with no effect	
Burst Pressure	15 x Nominal range up to 10 Bar. 7 x Nominal range above 10 Bar	
Turndown	5:1 from Nominal range (relevant to 4-20mA scaling only)	
Temperature measurement span / accuracy	0 to +85°C +/- 1°C (reading only available in digital mode)	
Total Error Band (pressure monitoring	+/- 0.1% of Nominal range including thermal effect	
Thermal compensation	No thermal effect within the range 0 to 70°C	
Long term stability	Error not exceeding +/- 0.1% Per Annum	
Max / Min process temperature	-35 to +85°C	
IP Rating	IP68 suitable for continuous immersion	
IECEx certification	IECEx ITS 19.00023X Ex ia IIC T4 Ga -35°C≤Ta≤+85°C	
ATEX certification	ITS19ATEX204962X Iss.0 Ex ia IIC T4 Ga -35°C≤Ta≤+85°C	
UKEx certification	ITS23UKEX0621X Iss 0 II 1G Ex ia IIC T4 Ga -35°C ≤ Ta ≤ +85°C	
Signal Output / Power supply	4-20mA & RS485 Modbus RTU / 10 to 30V DC	
Maximum load	Supply dependant. Vs-10/0.02 = Load in Ohms	
Reverse polarity protection	Yes	
Weight	0.3Kg typical for body. Cable 0.1Kg / metre	

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APT1000 Intelligent Dual Mode Level / Pressure Transmitter	
1000S	APT 1000 Dual Mode 4-20mA & RS485 Modbus Intelligent Transmitter Submersible with Cable (Cable Length & Cost Specified Separately Below)
1000D	APT 1000 Dual Mode 4-20mA & RS485 Modbus Intelligent Transmitter with DIN 43650 Plug
1000H	APT 1000 Dual Mode 4-20mA & RS485 Modbus Intelligent Transmitter with SS Terminal Head

I.S. Certification	
S	Hazardous Area Approval NOT APPLICABLE
I	Certified Intrinsically Safe to ATEX - Hazardous Area Approved
X	Certified Intrinsically Safe to IECEx - Hazardous Area Approved
U	Certified Intrinsically Safe to UKCA - Hazardous Area Approved
IX	Dual Certification ATEX / IECEx - Hazardous Area Approved

Measurement Type	
A	Absolute
G	Gauge

Nominal Range		
A	0.2 Bar	Available as Gauge & in SS Material Only
B	0.5 Bar	Available as Gauge only
C	1.0 Bar	Available as Gauge only
D	2.5 Bar	
E	4.0 Bar	
F	10 Bar	
H	25 Bar	
I	40 Bar	

Process Connections / Fitting Options	
1	G½" Male (Standard)
3	G1" Male (Adaptor)
7	Pole Adaptor Threaded G½" Female
8	Pole Adaptor Threaded G¾" Female
11	St. Steel Sensor with Drain Wire Adaptor - Specify Length per Metres
14	Titanium Sensor with Drain Wire Adaptor - Specify Length per Metres
15	1" ANSI 150lb SS Flange
17	Stilling Pipe Flexible Cage Installation
18	Pole Adaptor Threaded G½ Female – Replacement for ICT. Transmitter length 156mm
19	2" ANSI 150lb SS Flange
20	3" ANSI 150lb SS Flange
21	G½" Male with Flexible Protection Compound – without Diaphragm Guard Plate
22	Pole Adaptor threaded G½" Male
23	Pole Adaptor threaded G¾" Male
24	Internal Fixing Clamp Assembly – Polypropylene
25	Internal Fixing Clamp Assembly – Anti-Corrosion Flame-Retardant Polypropylene
26	Process Connection DN20 PN16 SS Flange with G½" Female Threaded Centre
27	Process Connection DN25 PN16 SS Flange with G½" Female Threaded Centre
28	Process Connection DN40 PN16 SS Flange with G½" Female Threaded Centre
29	Process Connection DN50 PN16 SS Flange with G½" Female Threaded Centre
30	APT De-Mountable Pole Assembly with Top Flange (SS ONLY) - Flange Size to be Confirmed by Customer
80	Assembled Length From Underside of Top Flange to End of Sensor TBC

Cable Length mtrs	
******	Heavy Duty Vented Cable - 0 mtrs Supplied as Std (Type 1000S only)
Q**	As above but cable outer jacket PTFE coated (Subject to Availability)
R**	As above but cable outer jacket Flame Retardant (Subject to Availability)
S**	As above but cable outer jacket FEP Coated (Subject to Availability)

Transmitter Material	
TI	Titanium (Body and Diaphragm)
SS	Stainless Steel (Body and Diaphragm)
HT	Hastelloy Process Connection / Stainless Steel body – **Absolute Transmitter Only**

Transmitter Orientation - Applicable to 0.2, 0.5 & 1Bar Gauge Transmitters Only	
H	Horizontal
V	Vertical – Diaphragm down
U	Vertical – Diaphragm up

4-20mA Output	
Y	Enabled – Specify mA Output Configured Range
N	Disabled – Digital Output Only

Cable Heat Shrink Colour Coding:
Black = Titanium
Green = Stainless Steel
Blue = Hastelloy

Note: The above table shows only common variants.
- Alternative DIN / ANSI mounting flange sizes and adaptors are available.
- Pole assemblies complete with tank top closing flange can be supplied.

Consult PSM for specific requirements

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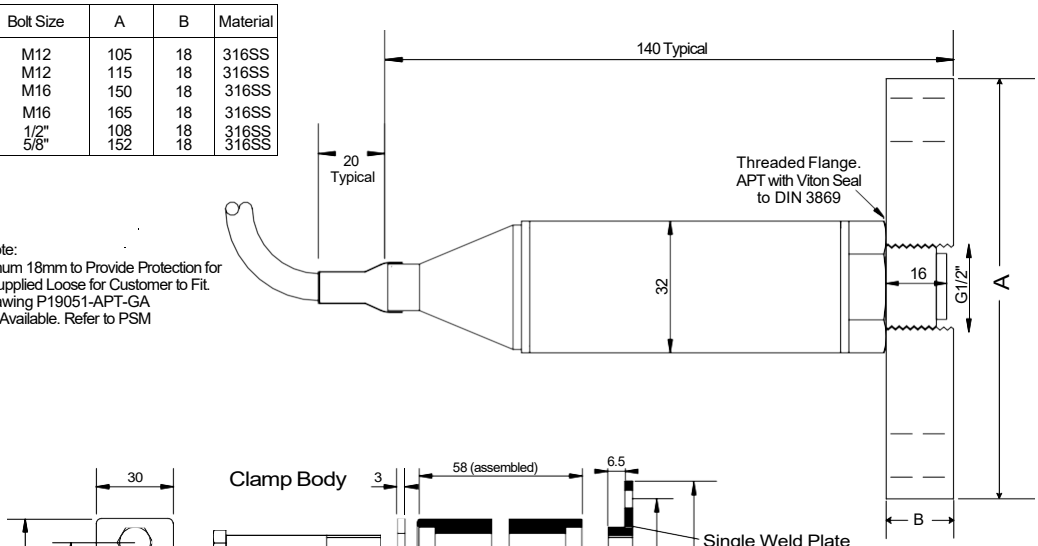
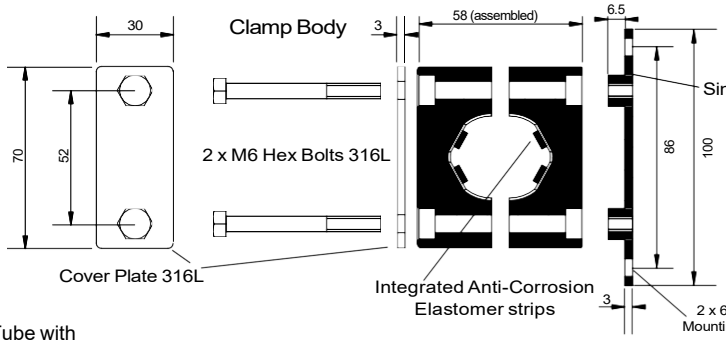
Dimensions

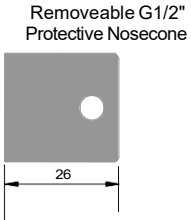
Common Flange Sizes - refer to PSM for specific requirements not listed

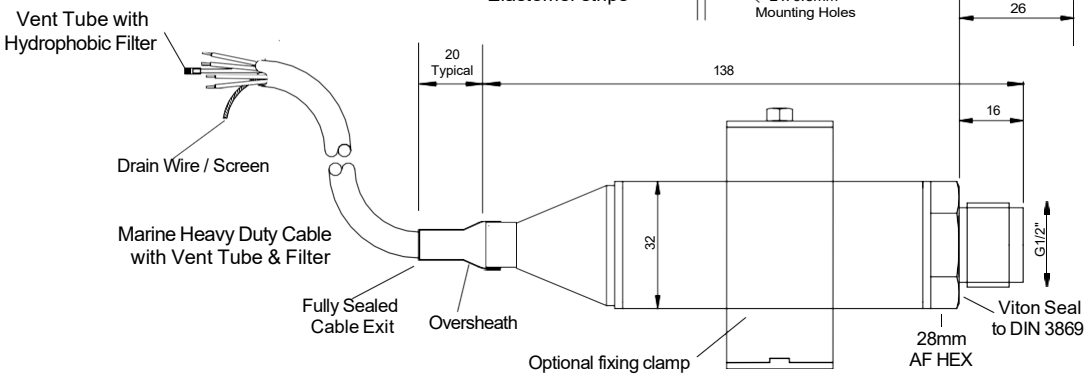
Flange		PCD	Bolt Size	A	B	Material
DN20 PN16	Holes	75	M12	105	18	316SS
DN25 PN16	4	85	M12	115	18	316SS
DN40 PN16	4	110	M16	150	18	316SS
DN50 PN16	4	125	M16	165	18	316SS
1" ANSI 150lb	4	79	1/2"	108	18	316SS
2" ANSI 150lb	4	120.7	5/8"	152	18	316SS

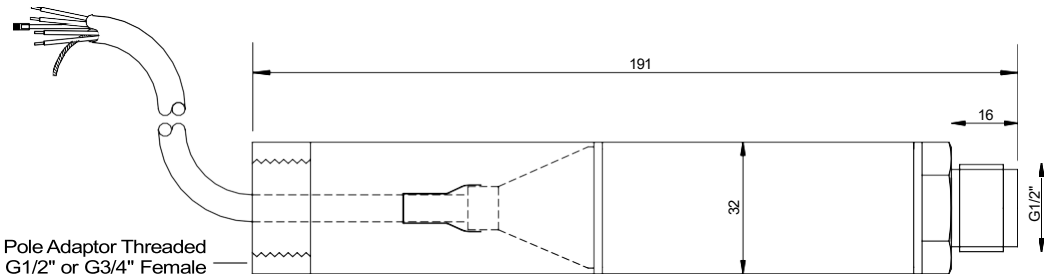
Note:
Flange Thickness (B) Must be Minimum 18mm to Provide Protection for Sensor Diaphragm. All Flanges Supplied Loose for Customer to Fit.
Refer to Instruction Drawing P19051-APT-GA
Other Flange Sizes are Available. Refer to PSM











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