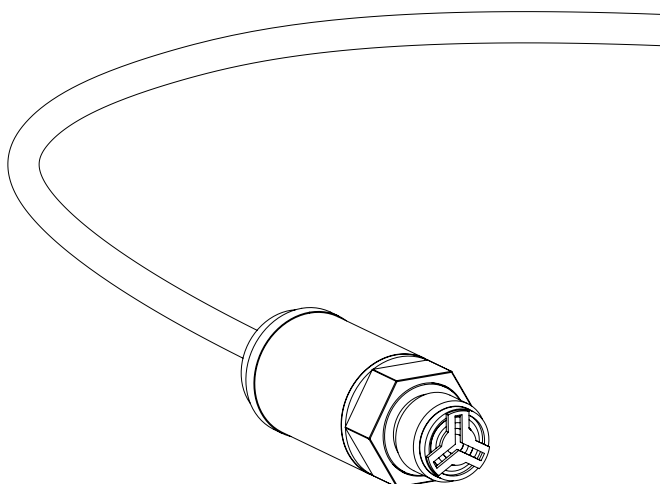


Instruction Manual

APT590

Tank Management



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Original manual

This manual is intended for the handling and operation of the APT590 tank level transmitter. The policy of PSM Instrumentation Ltd is to do continuous product improvement and we reserve the right to change the specifications at any time without prior notice.

This manual applies for the following products:

Type

PSM APT590

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1. Safety Information

Read the instruction manual carefully. Obey the safety information and instructions given in the instruction manual.

The APT590 transmitters are precision instruments intended for use in marine and industrial environments. The transmitter has been designed and tested for safe operation when installed and maintained in accordance with the instructions provided in this manual.

Installation of the transmitter in Ex environment must be carried out only by qualified personnel in accordance with “Directive 1999/92/EC” and applicable national standards for equipment used in potentially explosive atmospheres.

1.1. General Safety

CAUTION: Improper installation can lead to inaccurate readings or hazardous conditions.

Before installation and commissioning, read this manual in full and make sure that all work is performed by competent technicians familiar with electrical and process-safety practices.

The transmitter body and cable gland must remain intact to maintain ingress protection. Do not open, modify, or drill the body. Only approved accessories and fittings supplied or recommended by PSM Instrumentation Ltd can be used.

1.2. Hazardous Area Installation

WARNING: Risk of ignition in explosive atmospheres.

The intrinsically safe transmitter versions are certified for use in Zone 0 hazardous areas under “ATEX, IECEx, and UKEx”. Before installation, verify that the instrument marking corresponds to the area classification and that the entity parameters match the safety barrier or galvanic isolator used.

The transmitter must not be modified or repaired in the field. If mechanical damage or moisture ingress is suspected, remove the unit from service and return it for inspection.

Non-metallic external parts can accumulate electrostatic charge; clean these surfaces only with damp cloth. Sensors with light-metal parts (for example titanium) must be mounted so that mechanical impact or friction cannot occur.

1.3. Handling and Mechanical Safety

CAUTION: The sensing diaphragm is thin and sensitive to mechanical damage.

Do not touch, scrape, or apply pressure to the diaphragm behind the protection guard.

Protect the instrument from mechanical shock and vibration during transport and installation. Use only the specified process connection torque values to avoid thread or seal deformation.

Make sure that the cable is routed clear of moving machinery, hot surfaces, and sharp edges, and secured to prevent movement in service that can damage the outer sheathing.

The minimum bending radius for the cable is 50 mm.

1.4. Electrical Safety

The APT590 operates on a 4-20 mA two-wire current loop supplied from 13-28 V DC.

To maintain electromagnetic-compatibility performance:

- Terminate the cable shield or drain wire through the gland to a grounded metallic enclosure.
- Avoid running signal cables in parallel with high-voltage or motor-control wiring.

Do not apply mains voltage to the transmitter.

1.5. Maintenance and Cleaning

NOTE: If cleaning is necessary, apply fresh water or a mild solvent only to the process side of the transmitter. The diaphragm is sensitive to mechanical impact and must not be exposed to sharp or pointed tools, wire brushes, high-pressure jets, or other forms of mechanical cleaning. After cleaning, confirm that the pressure port or front-end openings are free from residue or sediment.

The transmitter contains no moving parts and requires minimal maintenance.

Periodic inspection of the cable entry, vent filter, and mounting seals are recommended to maintain IP68 protection and long-term reliability.

1.6. Safety Instructions

- Installation, commissioning, and maintenance work on equipment for use in hazardous areas must be performed only by qualified personnel. These individuals must be trained in accordance with 1999/92/EC Directive (ATEX) and relevant national regulations.
- All applicable regulations, standards, and updates relating to hazardous area installations must be observed at all times.
- When installed in a hazardous area, the transmitter must be connected only to a certified safety barrier located in a safe (non-hazardous) area, and the barrier must be compatible for the specific installation: Barrier → Cables → APT590.
- The maximum allowable operating temperatures, as stated in the Technical Data section, must be respected.
- All cabling and installation materials between the barrier and the transmitter must comply with IEC/EN 60079-14 or an equivalent national standard.

1.7. Special Conditions for Safe Use

ATEX: Special Conditions for Safe Use

Non-metallic parts on the exterior of the pressure transmitter can present an electrostatic charging hazard. Refer to warning marking and the manufacturer's instructions for further guidance.

Where external parts of the pressure transmitter incorporate light metal components (that is more than 10 % in total of aluminium, magnesium, titanium and zirconium), the sensor must be protected from impact such that impact / friction sparks cannot occur, taking into account rare malfunction.

IECEx: Special Conditions for Safe Use

Non-metallic parts on the exterior of the pressure transmitter can present an electrostatic charging hazard. Refer to warning marking and the manufacturer's instructions for further guidance.

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Where external parts of the pressure transmitter incorporate light metal components (that is more than 10 % in total of aluminium, magnesium, titanium and zirconium), the sensor must be protected from impact such that impact / friction sparks cannot occur, taking into account rare malfunction.

UKEx: Special Conditions for Safe Use

Non-metallic parts on the exterior of the pressure transmitter can present an electrostatic charging hazard. Refer to warning marking and the manufacturer's instructions for further guidance.

Where external parts of the pressure transmitter incorporate light metal components (that is more than 10 % in total of aluminium, magnesium, titanium and zirconium), the sensor must be protected from impact such that impact / friction sparks cannot occur, taking into account rare malfunction.

Conditions of Manufacture – Routine Tests

None.

1.8. Service and Support

For recalibration, inspection, or replacement, contact your authorised distributor. Before returning any equipment, obtain a Return Material Authorization (RMA) and provide information on the application and observed fault.

2. About this Manual

This manual provides instructions for the installation, operation, and maintenance of the APT590 pressure and level transmitters. It is intended for shipboard and industrial environments where accurate and reliable pressure or level measurement is required.

Purpose

The purpose of this manual is to:

- Provide essential technical information for correct installation and commissioning.
- Outline operational best practices for safe and reliable use.

Intended Audience

This document is intended for:

- Shipyard personnel and installers.
- Commissioning and service engineers.
- Operators and crew that are responsible for monitoring tank levels.

Personnel must be familiar with relevant safety standards, particularly those concerning hazardous areas, before carrying out any installation or maintenance.

Conventions Used in this Manual

- Tables are used to summarize settings, functions, or specifications.
- Measurements are given in SI units unless otherwise stated.

Symbols and Warnings

Symbol	Meaning
WARNING	Indicates a risk of serious injury if instructions are not obeyed.
CAUTION	Indicates a risk of equipment damage if instructions are not obeyed.
NOTE	Provides helpful or explanatory information.

Warnings and notes are provided where applicable. Always read and obey safety instructions before performing any work.

Document Updates

The information in this manual is correct at the time of publication. PSM reserves the right to make changes to the product or documentation without prior notice. The latest revision can be obtained from PSM Instrumentation Ltd.

3. Product Overview

The APT590 transmitters are high-accuracy instruments for continuous measurement of liquid levels and process pressures in marine and industrial systems. Each unit combines a micro-machined sensing element, precision temperature compensation, and a robust welded construction that makes sure of stable operation under harsh environmental conditions.

3.1. Scope of Delivery

Each transmitter is supplied as a complete, factory-calibrated unit, ready for installation.

The delivery includes the transmitter configured to the ordered range and connection type, together with the documentation and certification applicable to the selected version.

3.2. Storage and Handling

NOTE: Extended storage does not affect calibration accuracy if the transmitter is kept sealed and protected from condensation.

Store the instrument in a clean, dry environment within a temperature range of -35 °C to +85 °C.

The unit must remain in its original packaging until installation. Avoid mechanical shock, vibration, and direct exposure to moisture or chemical vapour during storage.

3.3. Identification

NOTE: The model code defines all construction features including measurement type (gauge or absolute), body material, process connection, certification type, and cable length. A decoding guide is available in chapter "11. Drawings & Appendices" on page 28.

Each transmitter carries a permanent laser etching showing its unique serial number, electrical characteristics, pressure range, material specification, and certification marking. Transmitters supplied with a fixed cable have an additional identification label showing the same information as the etched transmitter body.

The serial number is traceable to the manufacturing and calibration records.

When referencing the instrument in correspondence or service requests, always quote the complete model code and serial number.

3.4. Measurement Principle

NOTE: The vent tube in gauge versions must remain open and fitted with a hydrophobic filter to make sure of correct pressure reference, refer to chapter "6.4. Cable Shortening and Unused Cores" on page 17.

The transmitter operates using a piezoresistive MEMS sensor element coupled to a metallic diaphragm. Applied pressure deflects the diaphragm, transferring force through an internal fluid fill to the sensing element. The resulting electrical signal is conditioned, linearised, and transmitted as a 4-20 mA output.

The design provides full temperature compensation between -20 °C and +70 °C, maintaining accuracy under varying ambient and process conditions.

Continued on next page →

When mounted internally (inside the tank and fully submerged in the process medium), the transmitter can operate with process temperatures up to +85 °C.

For externally mounted installations (mounted outside the tank or vessel, with the process medium connected via a process fitting), the design permits exposure to process temperatures up to +125 °C, as heat transfer to the sensing element is limited through the process connection.

Versions are available for both vented-gauge and absolute pressure measurement.

- Vented-gauge sensors reference ambient atmospheric pressure through a vent tube in the cable, allowing the output to represent true process gauge pressure.
- Absolute sensors are fully sealed and reference a fixed internal vacuum, enabling measurement relative to absolute zero pressure.

3.5. Calibration

Each transmitter is factory-calibrated to the specified measurement range using reference standards traceable to national calibration laboratories. The calibration is stored in the transmitter memory and requires no adjustment during normal operation.

Like all pressure transmitters, a small long-term drift can occur over time. The specified maximum drift is stated in the technical data. Where required, any system-level compensation or periodic verification can be handled by the connected control or monitoring system.

If field verification is required, it must be performed using a precision pressure calibrator within the same range as the transmitter.

In practical installation, offset and gain adjustments can be applied within the connected control system to compensate for:

- Transmitter mounting height above the tank datum
- Small linear deviations observed during commissioning

These corrections are part of normal system alignment and do not affect the transmitter's internal calibration.

NOTE: Small long-term drift is a normal characteristic of pressure transmitters and is specified in the Technical Data. Detailed discussion of drift mechanisms and system compensation is provided in separate application guidance documentation.

4. Installation Requirements

4.1. General Installation Requirements

Correct installation is essential to achieve reliable operation and maintain the certified safety rating of the APT590 transmitter.

CAUTION: Installation in hazardous area must only be carried out by qualified personnel familiar with electrical and mechanical practices for such areas, in accordance with Directive 1999/92/EC and relevant national standards.

NOTE: Leave sufficient slack in the cable to allow the transmitter to be removed for cleaning or testing without straining the gland.

NOTE: For certified installations, refer to chapter "7. Intrinsically Safe Installation" on page 19 for requirements.

Before installation, verify that the ordered range, process connection, and materials match the intended application. Confirm that the calibration range corresponds to the actual process pressure or tank depth.

Where the transmitter is delivered as part of a complete system, the applicable system documentation typically specifies which transmitter serial number is assigned to each measuring point and must be followed.

The transmitter can be installed internally (submersed in liquid) or externally (mounted through a fitting or flange to the side of the tank).

For submersible versions, make sure the cable gland and diaphragm remain fully submerged and free from trapped air pockets. The stilling pipe must be vented at the top to prevent pressure build-up that can affect measurement accuracy. Refer to Appendix drawings.

For externally mounted sensors, provide a direct, bubble-free connection between the process medium and the diaphragm. It is recommended to fit the transmitter via an isolation valve to allow removal for service without draining the tank. Refer to Appendix drawings.

CAUTION: More than 30 Nm torque can damage the diaphragm seal or process thread.

The recommended process connection torque is 30 Nm when using the supplied sealing ring or thread sealant equivalent to Loctite 577.

The transmitter must not be exposed to continuous mechanical vibration or impact. If installed near pumps or heavy machinery, use flexible supports or brackets to reduce transmitted vibration.

When fitting to tanks, make sure that:

- The transmitter is mounted at a known vertical position relative to the reference datum
- The process fluid does not contain solids or sludge that can block the pressure port
- The front end protection remains in place to protect the diaphragm

The minimum cable bending radius is 50 mm. Route the cable away from sharp edges, hot surfaces, or moving parts.

5. Transmitter Installation – Mechanical

The process thread is sealed using a FKM (equivalent to Viton) O-ring or compatible gasket to DIN 3869. All flange mounted versions must use a minimum flange thickness of 18 mm to make sure the diaphragm remains protected.

CAUTION: Too much torque can distort the sealing face and effect calibration.

Tighten to a torque of 30 Nm using a calibrated wrench.

If the sensor is fitted to tanks containing viscous fluids or sludge, make sure the front end or adapter provides adequate port clearance to prevent blockage.

Where possible, mount the transmitter in a vertical orientation with the pressure port facing downward to promote free drainage and reduce the risk of sediment accumulation.

5.1. Mounting Accessories

NOTE: An optional Pressure Spike Reducer is available for line-pressure measurement. It limits rapid pressure transients to protect the transmitter diaphragm from mechanical stress.

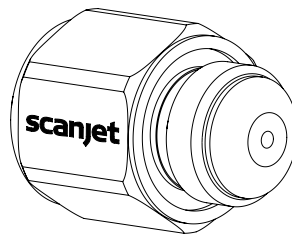


Figure 1.

Several accessories are available to simplify installation, including:

- Threaded or flanged mounting adapters for internal and external tanks.
- Pole adapters for retrofit to legacy systems.
- Protective front end or stilling-well clamps for submersible applications.

5.2. Post-Installation Checks

NOTE: If the transmitter output deviates significantly, re-check venting, polarity, and mounting orientation before requesting service.

After installation:

1. Inspect all cable entries and fittings for tightness.
2. Verify continuity of the 4-20 mA loop and grounding.
3. Confirm that the measured pressure or level corresponds approximately to the expected process condition.

6. Transmitter Installation – Electrical

6.1. Power and Signal Wiring

NOTE: Reversed polarity will not damage the transmitter but will prevent output. Correct polarity must be applied for normal operations.

NOTE: Do not connect the transmitter to 230 V AC or similar high voltage power source.

The transmitter provides a 4-20 mA two-wire output loop. All wiring must comply with marine or industrial standards for instrumentation circuits. The transmitter requires an approved intrinsically safe (Ex ia IIC) 13-28 V DC power supply for Ex installations.

Avoid routing the transmitter cable alongside power lines, variable-frequency drives, or motor conductors.

When installed in a hazardous area, connect the loop through an approved intrinsically safe barrier or galvanic isolator that meets the entity parameters stated in chapter "8.5. Electrical and Entity Parameters" on page 21. Always verify correct barrier configuration before energising.

The use of an isolated power supply is required to avoid earth loops or instability.

Connect as follows:

- Red wire → positive supply +VE
- Black wire → negative return -VE
- Shield / Drain → Earth Connect to ground via gland or terminal

6.2. Shielding and Earthing Rules

Correct shielding and earthing are required to make sure of stable measurement and electromagnetic compatibility (EMC).

Transmitter cable (transmitter to Junction Box)

The transmitter type supplied with a fixed cable, includes a drain wire intended for shielding/earthing. Refer to chapter "6.4. Cable Shortening and Unused Cores" on page 17.

The cable gland at the Junction Box is normally a sealed feed-through gland and must not be used as a shield termination point.

- Route the transmitter cable to a metallic junction box (JB) or termination enclosure.
- Terminate the transmitter drain wire to the JB protective earth (PE) / earth bar using a dedicated earth terminal or earth stud.
- Do not connect the drain wire to the signal terminals.

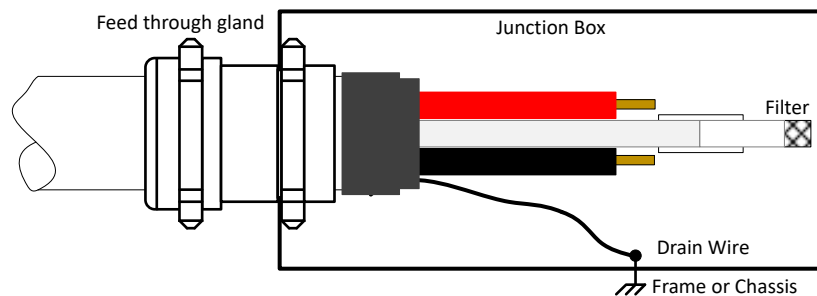


Figure 2.

Junction Box to control system (control room / PLC / I/O)

Use twisted-pair instrumentation cable, preferably shielded, between the JB and the control system.

- Maintain a single-point shield grounding practice to avoid ground-loop currents.
- Connect the JB-to-control-system cable shield to earth at one end only (normally at the control-system/IO end).
- Keep instrument cable routing separated from high-power cables (motors, VFDs, heaters). Where crossing is unavoidable, cross at approximately 90°.

6.3. General Earthing Rules

NOTE: The transmitter incorporates internal measures to improve EMC performance. No installer action is required beyond correct cable routing and proper termination of the drain wire and shields as described above.

NOTE: If a combined earth bar is used, make sure that IS and non-IS earth conductors are clearly segregated and mechanically secured.

- Bond all metallic enclosures, mounting hardware, and Junction Boxes earth bars to the vessel's protective earth system.
- Cable shield must be routed from PLC/Cabinet continuously to junction box, where the shield must be terminated and isolated.
- Do not use the signal return (-VE) as a protective earth path. Signal return and protective earth must be kept separate.

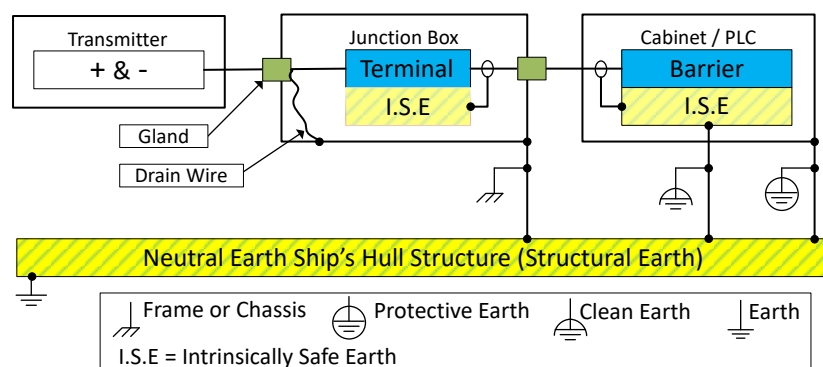


Figure 3.

6.4. Cable Shortening and Unused Cores

The transmitter cable contains multiple signal conductors as well as an internal vent tube used for pressure reference on gauge transmitter versions.

CAUTION: Do not block, pinch, or submerge the vent filter. Moisture or obstruction in the vent path will cause incorrect readings.

NOTE: For absolute transmitters versions, the vent tube is sealed at manufacture and requires no special handling.

If the cable is shortened, the White and Green conductors are not used and must be cut back, individually insulated, and secured. Unused conductors must not be left loose or exposed inside the termination enclosure.

Care must be taken when cutting or stripping the cable to avoid damaging, crushing, or blocking the internal vent tube. The vent tube must remain continuous and unobstructed along the full length of the cable.

When the transmitter cable must be shortened, follow the steps below to maintain safety and measurement accuracy.

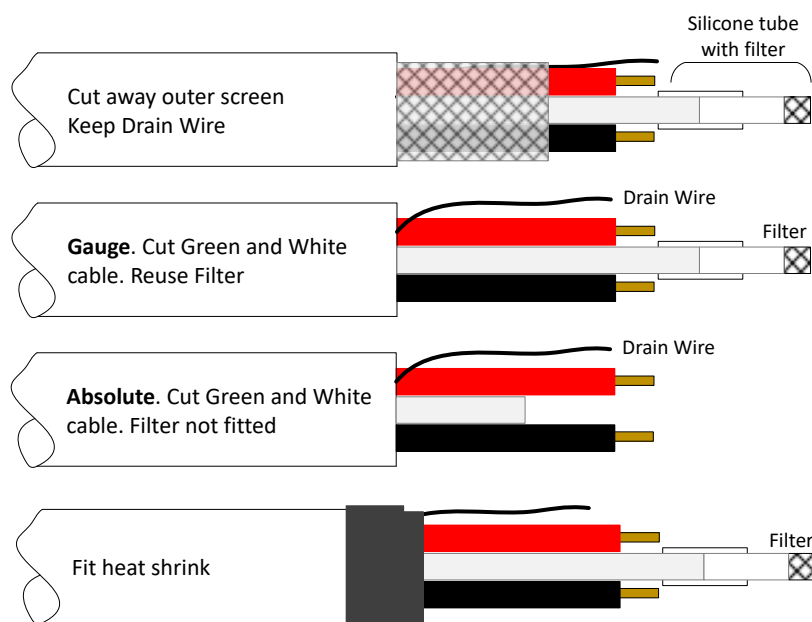


Figure 4.

6.5. Vent Tube Termination (Gauge Transmitter)

Gauge versions incorporate a vent tube inside the cable that provides atmospheric reference to the sensing cell. The vent terminates in a sintered hydrophobic filter at the cable end, which must remain open to air.

CAUTION: Do not block or submerge the vent filter. Obstruction will cause measurement drift and can invalidate calibration.

If the cable is shortened, transfer the filter to the new cable end and make sure it remains dry and clean. The filter must be inspected periodically and replaced if contaminated.

The nylon vent tube inside the cable must be trimmed to leave a free length of approximately 20 mm within the enclosure. Make sure that the tube remains open and unrestricted and always re-fit the silicone tube and sintered filter to the new cable end after shortening.

For termination inside enclosure, these must be vented to true atmospheric pressure. If the enclosure is located in an area that is not at atmospheric pressure (for example, within a pressurized space), measurement errors will occur because the transmitter reference cannot compensate correctly.

In such cases, install a separate vent tube from the termination enclosure to an area with genuine atmospheric pressure.

Route the vent tube so that water or condensation cannot enter the enclosure. A downward loop or drip-point is recommended to prevent moisture ingress.

6.6. Loop Verification and Start-Up Check

Apply known pressure or level and observe corresponding current output (typically 4 mA at zero, 20 mA at full scale).

After wiring is completed:

- Verify supply voltage between 13 V and 28 V DC.
- Confirm correct polarity.
- Check loop continuity and grounding.

7. Intrinsically Safe Installation

WARNING: Incorrect installation can compromise intrinsic-safety protection and can result in ignition of explosive atmospheres. Only qualified Ex-certified personnel can perform installation or inspection.

The APT590 transmitters can be installed in Zone 0 hazardous areas when connected in accordance with the entity parameters defined in chapter "8.5. Electrical and Entity Parameters" on page 21. All work must comply with IEC 60079-14, EN 60079-14, and any applicable national regulations for equipment in explosive atmospheres.

7.1. Intrinsic Safety Concept

The transmitter uses intrinsic safety type "ia" protection.

Energy in the circuit is limited so that sparks or thermal effects cannot ignite flammable gases when correctly installed. All associated equipment, such as barriers, isolators, and power supplies must carry matching approvals and entity parameters.

7.2. Barriers vs Galvanic Isolators

The transmitter (in the hazardous area) must be connected to the control or monitoring system (in the safe area) through an approved intrinsically safe interface:

WARNING: A reliable IS earth connection is mandatory for Zener Barrier. If the barrier is not properly earthed, protection is lost.

1. Zener Barrier (Shunt-diode type)
Provides current and voltage limitation via resistors and Zener diodes tied to a high-integrity earth.
2. Galvanic Isolator
Provides the same current and voltage limitation but uses transformer or opto-isolation.
No direct earth connection is required between safe and hazardous sides, which helps prevent ground loops.

Both interface types are acceptable if their electrical parameters (U_i , I_i , P_i , C_i , L_i) are equal to or less than those stated for the transmitter.

7.3. Cable L/C Considerations & Routing Limits

Use twisted pair, shielded instrumentation cable with a minimum conductor size of 0.5 mm² (20 AWG). Maximum cable capacitance and inductance must not exceed the certified limits of the IS interface (transmitter and barrier).

Cables must be routed separately from power and control wiring. Where crossing is unavoidable, maintain a 90-degree intersection to minimize coupling.

7.4. Verification & Documentation

After installation, the following must be verified and recorded:

- Correct barrier type and wiring per the entity parameters.
- Continuity of protective earth connections.
- Polarity and insulation resistance of the 4-20 mA loop.
- Identification of equipment on the Ex-register or loop diagram.

All test results must be stored with the vessel or plant's hazardous-area dossier for audit purposes.

8. Technical Data & Certifications

The APT590 transmitters are built and tested to meet harsh conditions for marine use and with accuracy, electrical safety, and explosion protection. All instruments are individually calibrated, pressure-tested, and inspected before dispatch.

8.1. Performance

Parameter	Specification
Measurement ranges	0.5, 1.0, 2.5, 4.0, 10, 25, 40, 60 bar (others on request) Minimum range for absolute is 2.5 bar
Measurement type	Vented gauge or absolute
Overload tolerance	2 x nominal range without effect
Accuracy	±0.2% of full scale
Zero / span setting accuracy	±0.2% within compensated range
Thermal effect	±0.0075% of full scale / °C (zero and span)
Long-term stability	≤ ±0.1% per annum
Output signal	4-20 mA, 2-wire loop-powered
Response time	< 1 s
Supply voltage	13-28 V DC (isolated source required)
Load resistance	(Vs - 13) / 0.02 Ω

8.2. Environmental Conditions

NOTE: For installations exposed to temperature cycling or direct process heating, make sure that thermal gradients are minimized by using appropriate fittings or isolation standoffs.

Parameter	Specification
Temperature-compensated range	-20 °C to +70 °C
Operating temperature	-30 °C to +85 °C
Process temperature (internal mount)	-40 °C to +85 °C
Process temperature (external mount)	-40 °C to +125 °C
Storage temperature	-35 °C to +85 °C
Ingress protection	IP68, suitable for continuous immersion
Vibration resistance	10 g, 10-2000 Hz
Shock resistance	100 g, 11 ms half-sine pulse
EMC compliance	EN 61000-6-2 / EN 61000-6-4 (industrial environment)

8.3. Ingress Protection

The APT590 transmitter series is available in different mechanical configurations, each with a defined ingress protection rating depending on construction and intended installation.

Submersible transmitter version (cable-mounted)

Transmitters supplied in fully submersible construction with an integral potted cable are rated IP68 and are suitable for continuous immersion in liquid, such as installation inside tanks or wells. The transmitter body and cable entry are fully sealed, and the cable construction is designed for long-term immersion.

Submersible versions are type-tested in accordance with EN 60529 (IPX8) to verify enclosure integrity under extended immersion. This test does not define a maximum installation depth unless otherwise specified.

Terminal head transmitter versions

Transmitters supplied with a DIN plug or stainless steel terminal head are intended for external installation only. These versions are rated IP65 (DIN plug) or IP67 (stainless steel terminal head) and are not suitable for continuous immersion.

8.4. Materials and Construction

NOTE: If replacement seals or other assemblies are required, order only genuine parts corresponding to the model code.

Component	Material Options
Transmitter body	316L Stainless Steel / Titanium / Hastelloy C276
Diaphragm	316L Stainless Steel / Titanium / Tantalum
Seals	FKM (equivalent to Viton) or others on request
Cable	Marine-grade, halogen-free cable with good resistance to water, fuels, and oils.
Process connections	G $\frac{1}{2}$ ", G1" BSP male, or ANSI 150 lb flange
Accessories	Mounting adapters, stilling-well clamps, Pressure Spike Reducer

8.5. Electrical and Entity Parameters

CAUTION: The transmitter must be powered through an approved intrinsically safe barrier or galvanic isolator conforming to the entity parameters above. Installation must follow IEC 60079-14 and local Ex regulations.

Parameter	APT590	Units
Ui	28	V DC
Ii	93	mA
Pi	0.7	W
Ci	27.5	nF
Li	705	μ H

8.6. Certifications

Notified Body	Standard	Certificate	Marking	Ambient Temperature Range
	 ATEX	ITS18ATEX203153X	II 1G Ex ia IIC T4 Ga	-30 °C ≤ Ta ≤ +85 °C
	 IECEx	IECEX ITS 18.0012X	Ex ia IIC T4 Ga	-30 °C ≤ Ta ≤ +85 °C
	 UKCA	ITS23UKEX0620X	II 1G Ex ia IIC T4 Ga	-30 °C ≤ Ta ≤ +85 °C
 Marine Approvals DNV Mutual Recognition MRA000001R For marine and offshore use				

8.7. Main Label APT590

PSM INSTRUMENTATION LTD BURRELL ROAD HAYWARDS HEATH WEST SUSSEX RH16 1TW WWW.PSMMARINE.COM	MODEL CODE: ???? S/N: ???? RANGE: ???? CABLE: ???? DATE OF MANUFACTURE: ??????????	CONNECTION RED: (+) BLACK: (-) SCREEN: -
SPECIFICATION T AMB: -30 ~+85°C SUPPLY INPUT: 10-28VDC OUTPUT: 4-20mA CONSTRUCTION: ??	  II 1G Ex ia IIC T4 Ga Ui = 28VDC Pi = 0.7W Ii = 93mA Ci = 27.5nF Li = 705μH ITS18ATEX203153X APT590/I IECEX ITS 18.0012X APT590/X	
WARNING: NON-METALLIC PARTS MAY PRESENT ELECTROSTATIC HAZARD. REFER TO MANUFACTURER INSTRUCTIONS.		

Figure 5.

8.8. Main Label UKCA APT590

PSM INSTRUMENTATION LTD BURRELL ROAD HAYWARDS HEATH WEST SUSSEX RH16 1TW WWW.PSMMARINE.COM	MODEL CODE: ???? S/N: ???? RANGE: ???? CABLE: ???? DATE OF MANUFACTURE: ??????????	CONNECTION RED: (+) BLACK: (-) SCREEN: -
SPECIFICATION T AMB: -30 ~+85°C SUPPLY INPUT: 10-28VDC OUTPUT: 4-20mA CONSTRUCTION: ??	UKCA XXXX  II 1G Ex ia IIC T4 Ga Ui = 28VDC Pi = 0.7W ITS23UKEX0620X APT590/U  li = 93mA Ci = 27.5nF Li = 705µH	
WARNING: NON-METALLIC PARTS MAY PRESENT ELECTROSTATIC HAZARD. REFER TO MANUFACTURER INSTRUCTIONS.		

Figure 6.

8.9. Dimensions

The transmitter is available in three principal configurations: submersible cable type, DIN plug type, and terminal head type. All versions share the same sensing assembly and internal electronics, with differences limited to housing style and process connection.

Version	Process Connection	Overall Length	Hex Size	Weight	Notes
Submersible (Cable Type)	G½" Male	90 mm	28 mm AF	~0.3 kg + 0.1 kg/m cable	Fully sealed, IP68 rated
DIN Plug Version	G½" Male	100 mm	28 mm AF	~0.35 kg	IP65 plug connector
Terminal Head Version	G½" Male	150 mm	28 mm AF	~0.5 kg	IP67 stainless steel head

9. Operation & Maintenance

NOTE: The transmitter must not be opened or modified. Internal components form part of the certified explosion-protection concept, any alteration will void the approval and warranty.

The APT590 transmitter is factory-calibrated, sealed, and ready for service. No internal adjustments or configuration are required during normal use.

9.1. Initial Start-Up

NOTE : If no signal is detected, check polarity and barrier orientation.

Before energising the loop, verify all mechanical and electrical connections, refer to chapter "4. Installation Requirements" on page 12.

1. Confirm that the installation area is safe and free of explosive atmosphere if the loop is to be energized without barriers during testing.
2. Apply the 13-28 V DC supply to the loop.
3. Observe the current output:
 - a. 4 mA $\approx$ zero or reference level
 - b. 20 mA $\approx$ full-scale pressure or level
4. Compare the indicated value on the monitoring system with the expected process condition.

9.2. Normal Operation

CAUTION: Do not expose the transmitter to mechanical impact, too much vibration, or continuous process pulsation. For highly dynamic systems, fit a Pressure Spike Reducer to prevent diaphragm stress and maintain long-term stability.

During normal service the transmitter operates continuously, converting process pressure into a linear 4-20 mA signal. No user intervention is required. The unit is protected against reverse polarity, transient surges, and short-term over-pressure up to twice the nominal range.

9.3. Maintenance in Hazardous Areas

NOTE: If replacement is required, isolate the loop, remove the unit, and install a new transmitter of the same model and certification. Record the serial numbers of both the removed and the replacement transmitter.

Routine maintenance such as cleaning or inspection must be performed only when the system is de-energised. No modifications or field repairs are permitted within the hazardous area.

9.4. Routine Inspection & Cleaning

NOTE: Replace any contaminated or damaged vent filter. If process deposits are observed, rinse the diaphragm area gently with fresh water or a mild solvent. Never use metal tools or pressurized air directly on the diaphragm.

To maintain accuracy and reliability, perform a visual and functional inspection at intervals suited to the operating environment. Typical items include:

- Cable entry and gland integrity.
- Condition of vent filter (for vented-gauge versions).
- Signs of corrosion, contamination, or mechanical damage.
- Verification that the 4-20 mA output responds smoothly to known process changes.

9.5. Verification / Re-Calibration

The APT590 is a fixed-calibration device.

If verification is required:

- Compare the transmitter output with a reference pressure calibrator traceable to national standards.
- Acceptable deviation is within the accuracy and long-term drift specified in the technical data. Where required, small deviations can typically be compensated by a zero adjustment in the connected control or monitoring system.
- For any deviation beyond tolerance, return the unit to the distributor for evaluation.

9.6. Fault Isolation Guide

NOTE: If the fault persists after these checks, isolate the transmitter and contact our representative with the serial number and a description of the observed behaviour.

Symptom	Possible Cause	Corrective Action
No output current	Incorrect polarity or barrier wiring	Verify wiring; check power supply and barrier terminals
Output fixed at 4 mA	Process pressure below range or vent tube blocked	Inspect process line and vent filter
Output fixed at 20 mA	Process pressure above range or diaphragm obstructed	Check for blockage or mechanical damage
Erratic or noisy signal	Poor grounding or EMC interference	Verify shield termination and cable routing
Gradual drift	Vent contamination or thermal cycling	Clean vent filter, review installation temperature

9.7. Removal from Service & RMA

CAUTION: Do not immerse terminal-head versions beyond their specified ingress rating. Make sure that the vent tube and filter remain dry and unobstructed after cleaning.

Before removing the transmitter:

- Depressurise and drain the process connection.
- Isolate the 4-20 mA loop at the control system.
- Disconnect wiring and protective earth connections.

Dispose of the instrument according to local regulations for electronic and metallic waste.

When removal from service is required for cleaning:

1. Isolate and depressurize the process line or tank.
2. Disconnect the transmitter from the electrical circuit.
3. Rinse the sensing end carefully with water or an appropriate solvent.
4. Dry with a lint-free cloth and examine the diaphragm surface.
5. Reinstall and make sure the seals are clean and correctly seated.

9.8. Service Assistance

For technical support, calibration, or replacement, contact the nearest authorised representative of PSM Instrumentation Ltd. Provide the model code, serial number, and a description of the issue.

Return shipments must include a completed RMA (Return Material Authorisation) form and a signed COSHH (Control of Substances Hazardous to Health) declaration confirming that the transmitter is free from process contamination.

Transmitters received without a completed COSHH declaration will not be handled and can be disposed of without further notice.

9.9. Disposal

Give the instrument to a specialised recycling company and do not use the municipal collecting points. If possible, remove all batteries from the device and dispose of the batteries independently. If personal data is stored on the old device to be disposed of, delete the personal data before disposal. If it is not possible to dispose the old instrument correctly, contact PSM for return and disposal.

10. Document Control & Contact Information

10.1. Document Revision

Document No.	Title	Revision	Date	Approved By
scanjet_psm-apt590-im_01	APT590 Installation, Operation & Maintenance Manual	01	2026-04-10	Daniel Johansson, James Spenceley, Mikael Sander
scanjet_psm-apt590-im_02	APT590 Installation, Operation & Maintenance Manual	02	2026-07-08	James Spenceley

10.2. Contact Information

For technical assistance, product returns, or documentation updates refer to contact information on page 2.

For local support or spare-parts supply, contact the nearest PSM service representative listed on the respective website.

10.3. Declaration

This document has been prepared to reflect the design, performance, and certification status of the APT590 transmitters at the time of publication. The manufacturer reserves the right to implement product improvements that can not be immediately reflected herein. Such changes do not affect safety or basic function unless otherwise stated.

11. Drawings & Appendices

11.1. Model Code Structure and Decoding Guide

NOTE: The full Model Selection Drawing (MSD), including option availability and validation logic, is maintained separately and is not part of this manual.

Each APT590 transmitter is identified by a unique model code that defines its configuration, materials, and certification. The model code appears on the rating label and in the delivery documentation.

Code Segment	Description	Example	Notes
Type	Transmitter version (submersible, DIN plug, terminal head)	590S / 590D / 590H	See drawings
Certification	ATEX, IECEx, UKEx, or dual-certified IS version	I / X / IX	Intrinsically Safe Ex ia IIC T4 Ga
Measurement Type	Gauge (G) or Absolute (A)	G	Gauge includes vented cable
Nominal Range	Pressure or level range (0.5-60 bar)	F = 10 bar	See technical data
Process Connection	Thread or flange type	8 = G ¾ Female	Other options available
Cable Length	For submersible version only	10 m / 20 m	Add 0.08 kg per metre
Body Material	Wetted parts material	SS / TI / HT	Stainless / Titanium (Tantalum diaphragm) / Hastelloy
Orientation	Mounting position	H / V / U	Horizontal, Vertical down or up
Calibration	Factory calibration note	N / Y	Nominal or User-specified range

Example:

590S/IX/A/D/8/10/SS/V/N → Submersible, Dual Certified ATEX/IECEx, Absolute Sensor, 2.5 bar Range, G ¾ Female Connection, 10 m Cable, Stainless Steel Body, Vertical Mount, Nominal Calibration.

11.2. APT General Installation Drawing

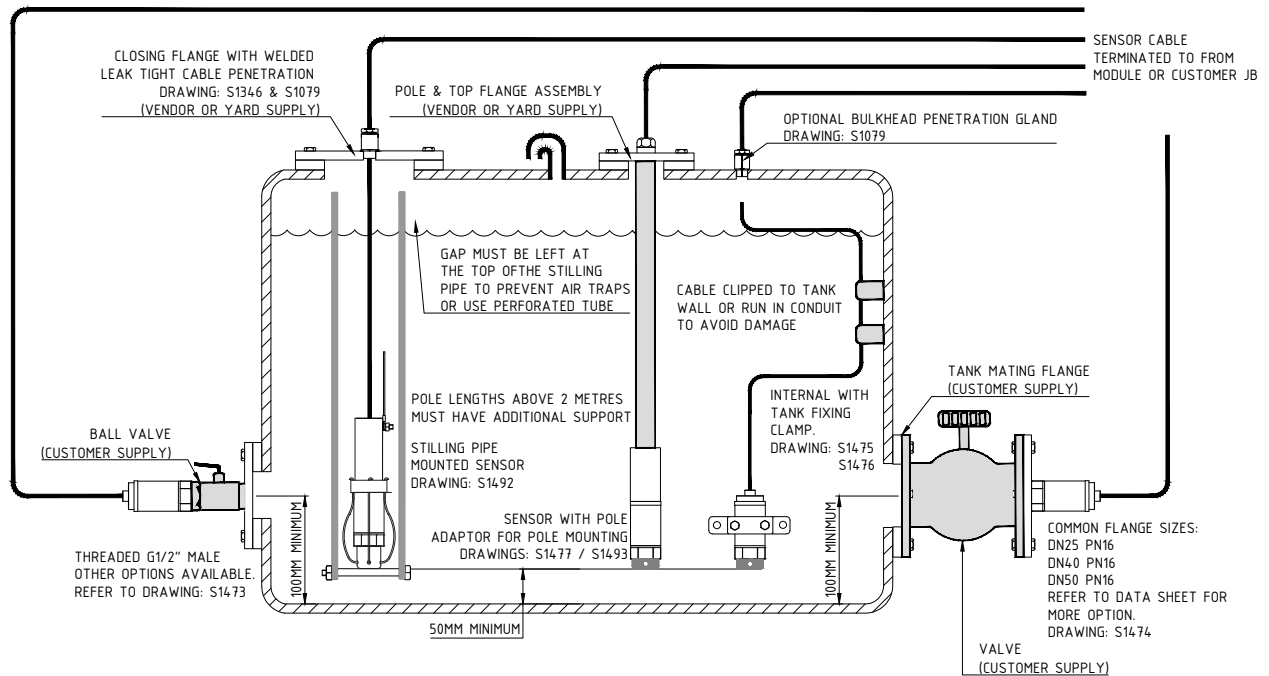


Figure 7.

11.3. Standard Submersible Transmitter

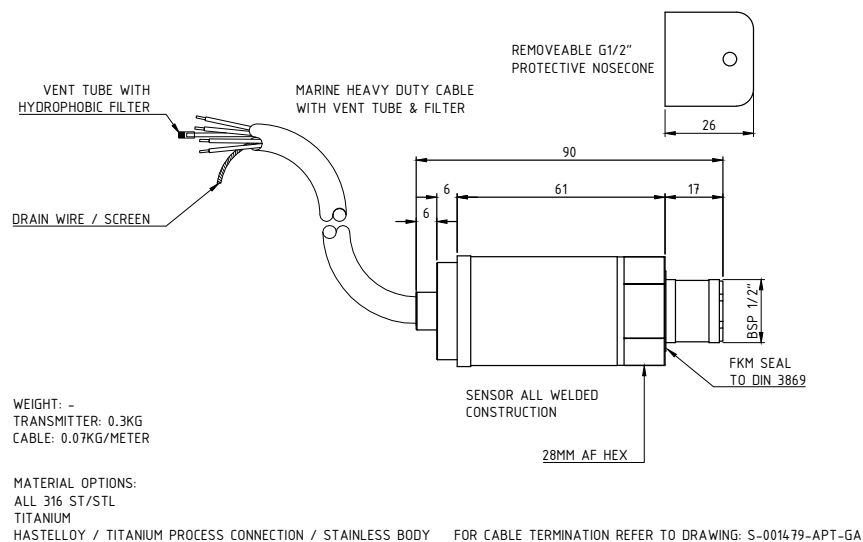


Figure 8.

11.4. Flange Mount

FLANGE (RAISED FACE)	HOLES	PCD (MM)	BOLD SIZE	A (MM)	B (MM)	MATERIAL
DN20 PN16	4	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"	114	18	316SS
1" ANSI 300LB	4	89	5/8"	125	18	316SS
2" ANSI 150LB	4	121	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.

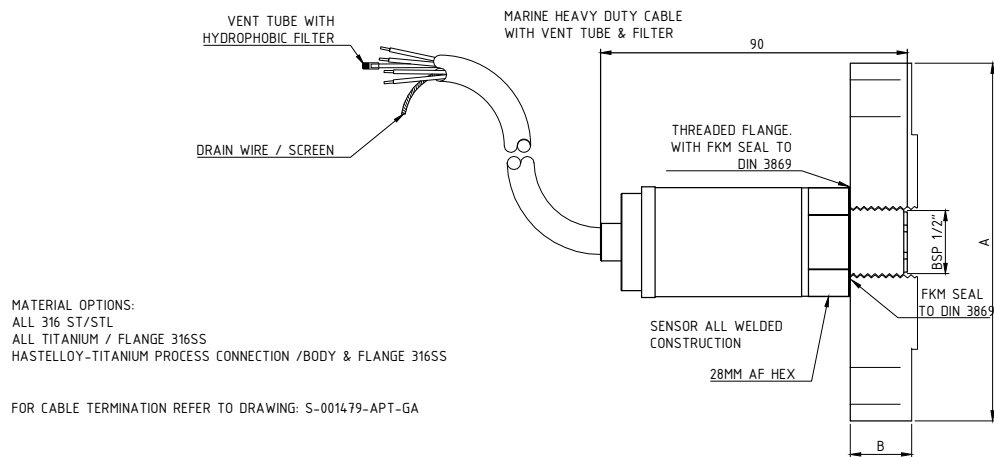


Figure 9.

11.5. Internal Clamp Sensor

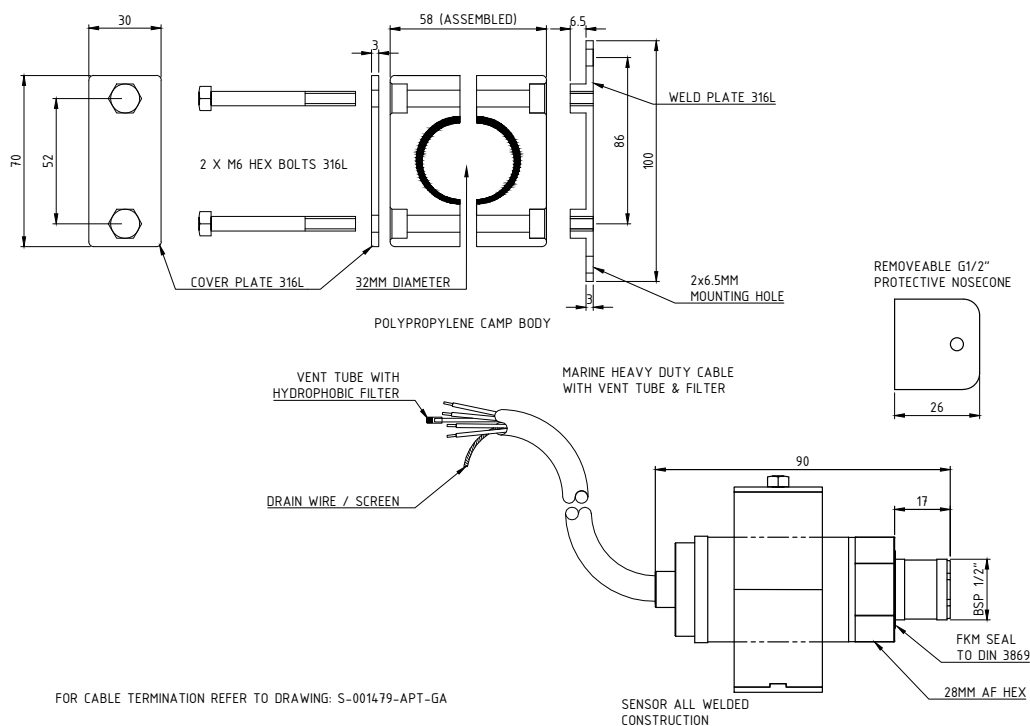


Figure 10.

11.6. Pole Adapter

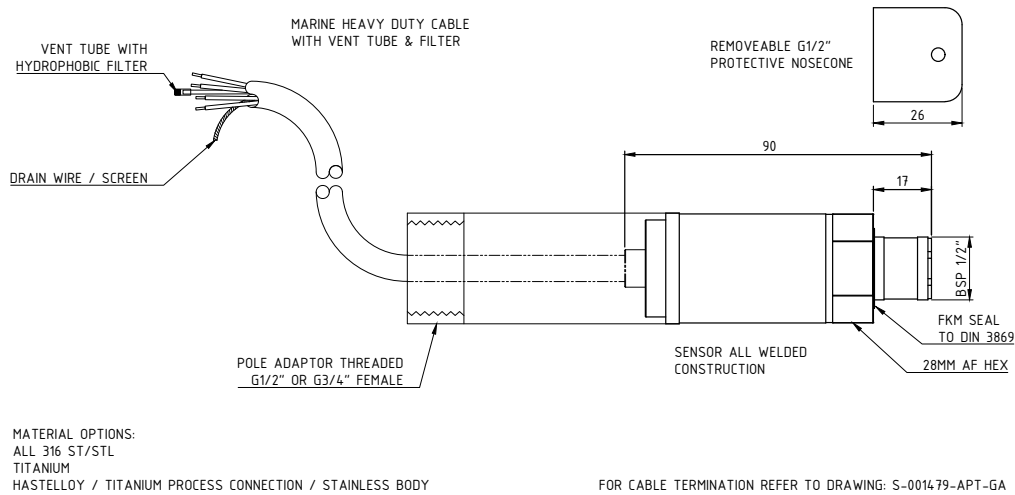


Figure 11.

11.7. 1" Male Process Connection

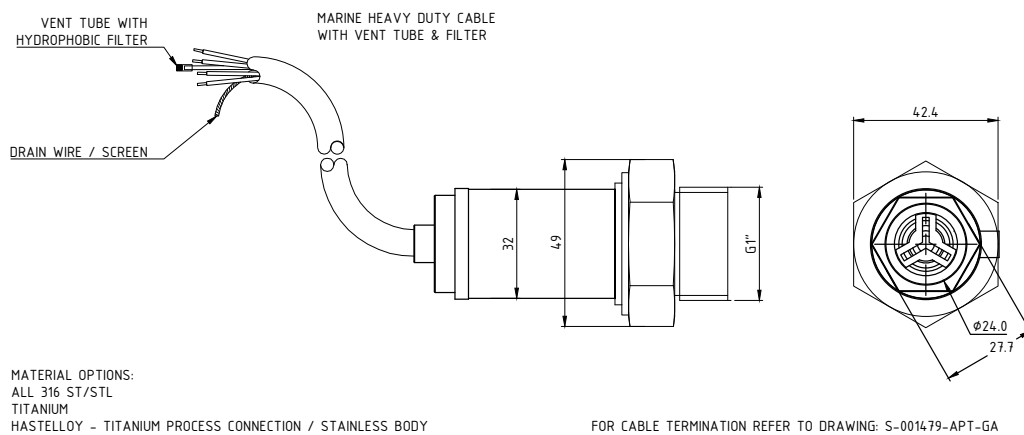


Figure 12.

11.8. Drain Wire Adapter

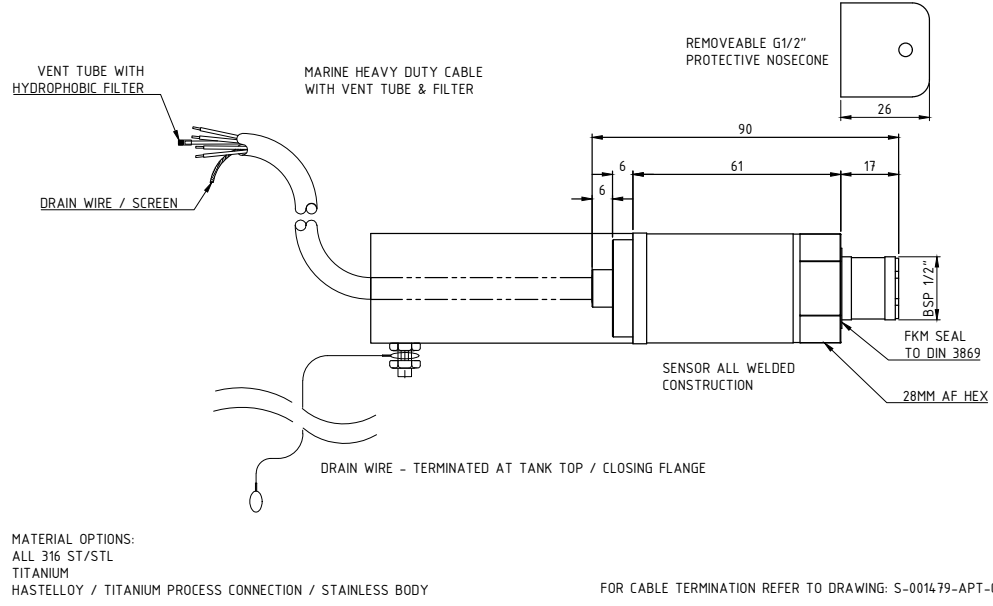


Figure 13.

11.9. Transmitter with Din Plug

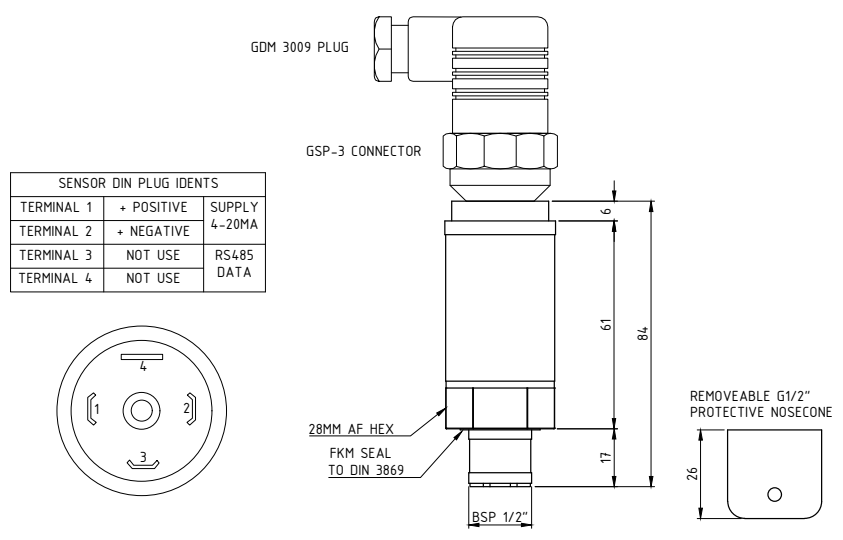


Figure 14.

11.10. Transmitter with Terminal Head

SENSOR CONNECTIONS		
+	POSITIVE	SUPPLY 4-20MA
-	NEGATIVE	
⏏	CABLE SCREEN	

*GROUND WIRE TO REMAIN FITTED IF SENSOR IS GROUNDED VIA ITS MOUNTING THREAD AND REMOVED IF THE SIGNAL CABLE SCREEN IS USED FOR GROUND CONNECTION.

OPTIONAL MOUNTING FLANGE						
FLANGE (RAISED FACE)	HOLES	PCD (MM)	BOLD SIZE	A (MM)	B (MM)	MATERIAL
DN20 PN16	4	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"	114	18	316SS
1" ANSI 300LB	4	89	5/8"	125	18	316SS
2" ANSI 150LB	4	121	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.

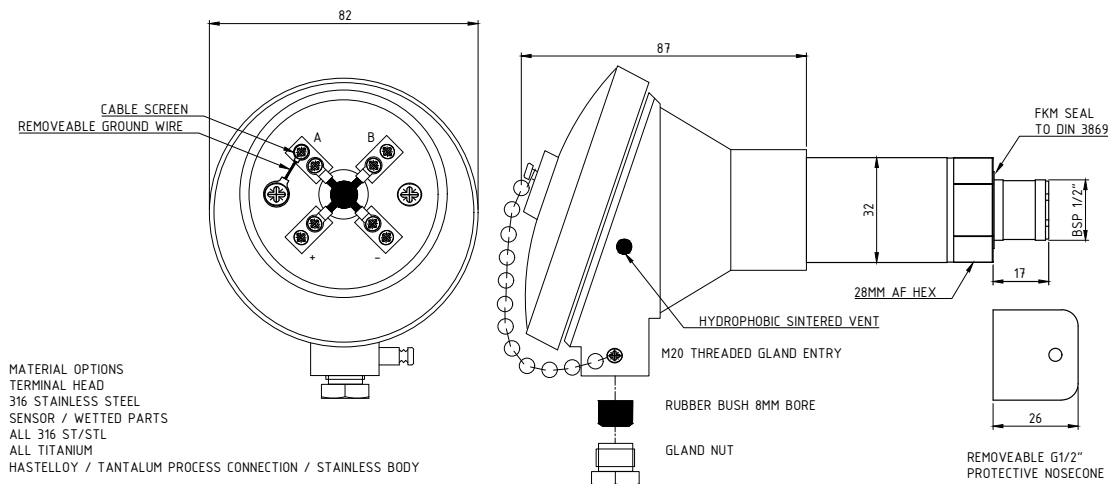


Figure 15.

11.11. Submersible Transmitter with Male Pole Adaptor

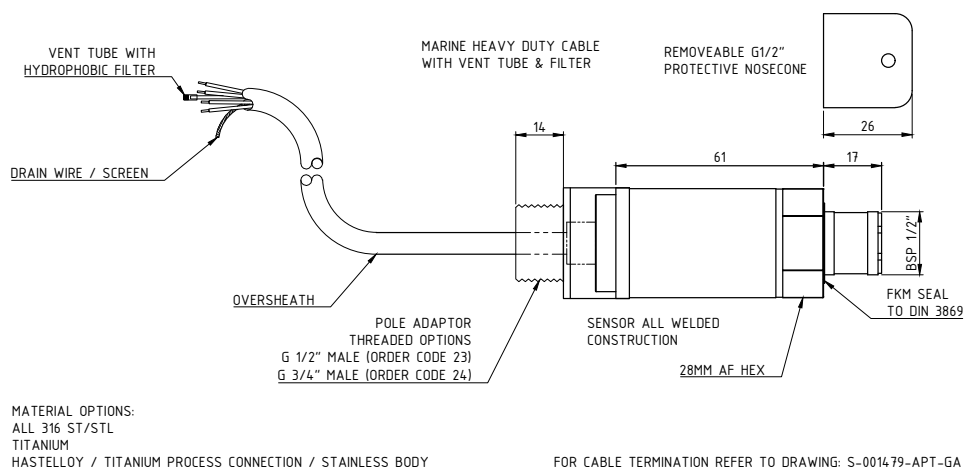


Figure 16.

11.12. Submersible Transmitter with G1" OD PA tube for Compression Fitting

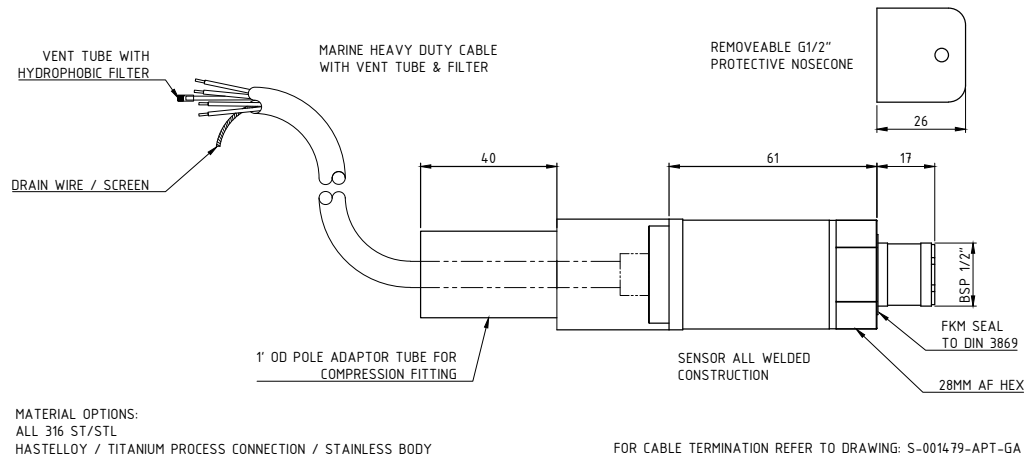


Figure 17.

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For over 50 years, Scanjet PSM is a specialist in advanced marine instrumentation, software systems and application solutions for vessels of all classes. Working with naval architects, ship designers, ship builders and owners to deliver an optimised solution, Scanjet PSM's marine systems and sensors allow vessels to operate efficiently, reliably and comply with safety and environmental regulations.

Designed and constructed for marine tank gauging, Scanjet PSM sensors deliver the highest possible standards in terms of permanence, versatility, functionality and reliability, both for newbuild and retrofit projects.