

# Instrumentel PTS

## Piston Telemetry System

Real-time monitoring of engine pistons



Strain and temperature data from piston crowns during operation

Ideal for piston head development, testing and diagnostics

Ultra-Compact, High-Temperature electronics fit within piston crown

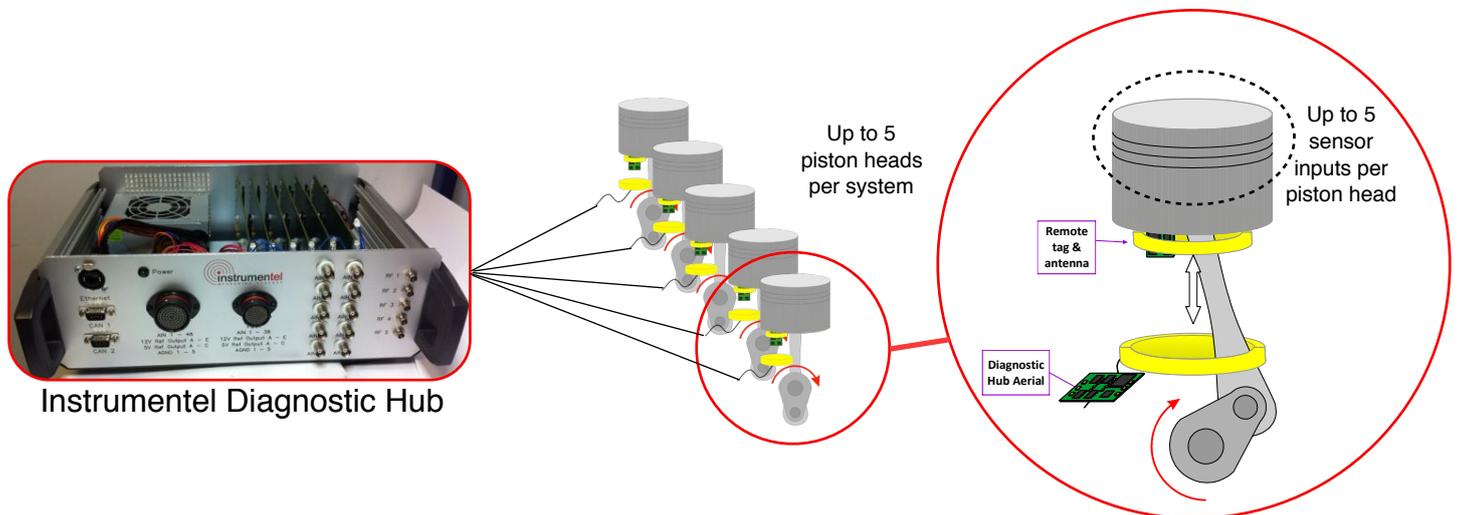
Wire-free, inductively coupled power and data transmission

High Performance Data Processing and Comms

The **Instrumentel PTS** is a cost-effective electronic data acquisition and processing unit designed specifically for the testing and diagnostics of moving pistons in internal combustion engines.

The system acquires and processes real-time, critical operating data such as temperature and strain from components within the piston head, usually from the back surface of the piston crown, during operation. Variations of the PTS have to date been successfully applied to monitoring piston head and valve head temperatures in high performance motorsport engines, but it is equally applicable to commercial and consumer diesel and petrol engines.

At the heart of the PTS is a wireless inductively coupled system that delivers operational data from compact, high temperature data transceivers or tags mounted to the component being monitored. This is typically a piston head or valve, but can include other moving parts such as turbos. The wire-free inductively-coupled system removes the need for batteries and allows the sensor tags to move freely during operation and to transmit data continuously through over a range of up to 10cm, usually sufficient for the whole piston stroke.



The PTS, shown above with additional GPIO capability, can simultaneously collect data, normally temperature, although strain and other parameters can also be measured, from up to five sensors on up to 5 pistons or valves. The unit includes a high performance diagnostic hub that is capable of receiving and processing data acquired through both wireless and wired inputs, and can additionally be configured with a 48 channel GPIO unit. Instrumentel supply the ETS with a range of configurable sensor units covering many standard applications, and can design bespoke data acquisition tags and sensors to fit different engine geometries or to meet new customer applications.

Instrumentel Ltd - leaders in data acquisition systems for extreme environments

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## Real-time monitoring of engine pistons

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### Customer Benefits

The Instrumentel PTS delivers high quality data from in-operation engines, providing a unique insight into critical operating parameters such as strain or temperature from pistons, valves and turbos.

The PTS features high temperature, compact electronics plus wireless power and communications, delivering data directly from normally inaccessible engine parts during operation.

Such engine diagnostics provide essential feedback on critical engine parts during normal operation, providing development engineers with important information to improve reliability and performance of the engine.

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### Sensor Options

The PTS is designed to interface seamlessly with Instrumentel's advanced battery-free wireless sensor units. These high temperature, compact units take up to five sensor inputs and are capable of operating continuously at up to 200°C, allowing them to be mounted directly to piston heads.

Other standard configurations include systems suitable for valves and turbos, but the system can be used to monitor other engine parts such as camshafts, flywheels and clutch baskets.

Instrumentel sensor units are designed to accept inputs from most sensor types including thermocouples, pressure transducers and strain gauges. Instrumentel also routinely design and deliver bespoke sensor and transducer configurations to meet the most demanding of customer applications - please contact us to discuss your requirements.

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### Data Processing and Communications

The Instrumentel PTS incorporates high speed processing as standard, to enable raw data to be collected and analysed on-board prior to being distributed to a customer network.

This power and flexibility provides the user with the ability to distill operational data into simple traffic light health indicators, whilst storing raw data for later in-depth analysis if required.

Importantly, by analysing raw data on board the PTS, the volume of data to be transmitted can be significantly reduced, allowing the machine health to be constantly communicated even over low bandwidth networks.

The PTS can be upgraded with the Instrumentel GPIO Option to add an additional 48 analogue I/O channels. This enables the system to also act as a central data logging and processing unit for all engine test data, removing the need for multiple data loggers. The modular GPIO Hub can be further expanded with digital I/O capability if required.

The MDS can be configured to transmit data over any standard network such as CAN, Ethernet, ZigBee and WiFi, or Instrumentel can adapt the system to interface to proprietary customer systems.

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### Specifications:

<b>Data tag dimensions:</b>	10mm x 10mm x 3mm	(different sizes by request)
<b>Data channels:</b>	25 channels:	(Up to 5 data tags with 5 data inputs per tag)
<b>Bandwidth:</b>	1kHz per channel	
<b>Operating Frequency:</b>	13.56MHz	
<b>Operating Temperature:</b>	-25°C to 200°C continuous	
<b>Readable Engine Stroke:</b>	Up to 12cm	
<b>Noise Immunity:</b>	Magnetically isolated, floating ground, high EM noise immunity	