

## Smart Connector

### Smart Transducer Connector for the 2422 and flightDAQ-TL

- **Smart connector technology which can be added to any transducer.**
- **Compatible with the 2422 and flightDAQ-TL.**
- **Pressure transducer and voltage options for the 2422.**
- **Thermocouple, RTD pressure transducer and voltage options for the flightDAQ-TL.**
- **On-board memory holds all identification and calibration information.**
- **User accessible memory locations.**
- **Enables 'plug-and-play' operation.**
- **Thermocouple version contains cold junction measurement.**
- **Thermocouple version has cold junction heating option to check polarity.**

The 2422 and flightDAQ-TL are advanced pressure, temperature and voltage scanners which have a digital bus connection for every channel. The Smart Connectors detailed here utilises this bus by communicating with the scanner and downloading identification and calibration information to the scanners. This enables all the data relevant to the transducer (be it pressure transducer, thermocouple, RTD or voltage signals) to be permanently connected to that transducer through its calibration and test cycle.

When the 2422 or flightDAQ-TL is powered up, all the relevant information is downloaded and used within the scanner. This could include the sensor type, name, location and the full calibration for that transducer. This turns the scanner into a 'plug-and-play' device and the transducer into a 'TEDS' type device.

Three distinct types or of Smart Connector are available; for pressure transducers (or voltage signals), thermocouples and RTD's. All plugs have internal EEPROMs (64K) so that the transducer information and calibration can be loaded into it. The calibration takes the form of easy to use look-up-table(s) which can vary in size from 2 to 448 pairs. For thermally compensated pressure transducers, polynomial calibrations are also supported.

For thermocouple measurements, the cold junction is made within the connector (by an TC alloy to copper crimp) and the temperature of this junction is measured with a high accuracy thermistor. The calibration of this thermistor can also be loaded into the Smart Connector if required (otherwise a standard calibration is applied).

The Smart Connectors have been comprehensively tested for vibration, altitude and temperature to deal with harsh environments.

All connector types can be programmed with useful features such as calibration date, transducer information and serial number in 256 bytes of user defined memory.

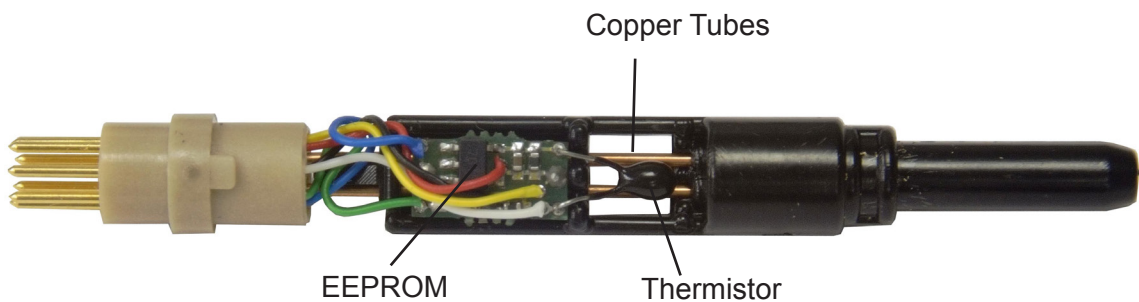
## Thermocouple Inputs

The Smart thermocouple connector is shown below. It features two copper tubes into which the thermocouple alloys are fitted, This is then crimped to form the cold junction. A thermistor is then closely bonded to the copper tubes to ensure an accurate measurement of the cold junction temperature.

The thermocouple connector is designed to take stainless steel sheathed fine wire thermocouples directly into the connector without the need for intermediate sheathing (although other types and size of thermocouple can be accommodated).

The EEPROM on the thermocouple connector can contain two look-up-tables, one for the thermocouple and one optional one for the thermistor. If the second look-up-table is not present, the FlightDaq-TL will use its own thermistor laws to derive the cold junction temperature.

The thermocouple connector also features a heating resistor which is closely bonded to the copper tubes. This can be activated on a per-channel basis and the corresponding heating of the cold junction monitored. The polarity of the thermocouple can then be measured.



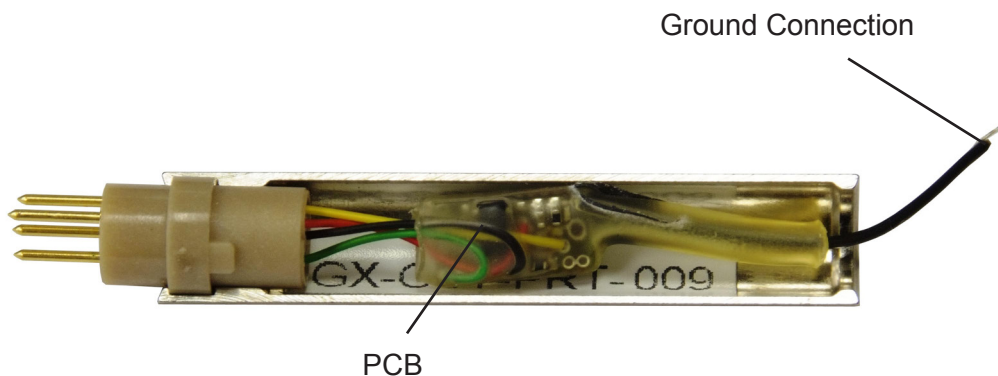
## Transducer / RTD / Voltage Input

The transducer, RTD and Dual voltage inputs use the same PCB and look identical. For RTD's only one connection is made to the PCB which is the ground, All others are made direct to the Lemo pins. For voltage inputs, all the connections are made to flying leads from the PCB. For transducers, the transducer output(s) are connected to the PCB and the excitation is derived directly from the connector pins

The dual voltage input facilitates two analogue voltages per channel therefore giving it the ability to acquire 32 voltage signals per scanner.

This connector also features an internal EEPROM and there is the option to use a look-up-table for each input.

The kit supplied contains all the parts necessary to make the connections and heat shrink the cable (to ensure sufficient strain relief).



## Smart Connector Specifications

<b>General</b>	
Types available	Thermocouple, transducer RTD (PT100) and voltage measurement.
Connector type	Lemo™ 1B or equivalent
<b>Transducer (via 2422 or flightDAQ-TL)</b>	
Types supported	Ratiometric and amplified
Input ranges	±78mV, ±300mV ±5V ±10V
Excitation voltage available	10 and 24 VDC
Excitation current	7 mA and 12mA MAX per channel respectively
NOTE	The 10V excitation is momentary. For best results, use 24V amplified transducers
NOTE	For 24V amplified transducers, it is possible to use the secondary channel for thermal compensation (uses polynomial compensation, please contact us for details).
<b>Voltage (via flightDAQ-TL)</b>	
Input ranges (2 per channel)	±78mV, ±300mV ±5V ±10V
Voltage input conductor size range	0.035 to 0.34mm <sup>2</sup> (32 to 22 AWG)
<b>Thermocouple (via flightDAQ-TL)</b>	
Types supported	B, E, J, K, N, R, S and T
Cold junction range	-40 to 90°C
Thermocouple conductor size range	0.08 to 0.19mm <sup>2</sup> (28 to 24 AWG)
<b>RTD (via flightDAQ-TL)</b>	
Type	4-wire PT100 (RTD-385)
PRT conductor size range	0.035 to 0.34mm <sup>2</sup> (32 to 22 AWG)
<b>Environment</b>	
Operating Temperature Range	-55 to +90°C
Storage Temperature Range	-55 to +90°C
Ambient Pressure	5 mbar abs to 2.5 bar abs
Vibration	Engine standard vibration test to DO160E category S, curve W with duration of 1 hr/axis. Fan blade (20 g 2 kHz)
Shock	Fan blade out to DO160F section 7 (40g 11 m/s)
Maximum relative humidity	95% at 50°C (non-condensing)
Radiated emissions	MIL standard 461-E: RE102
Conducted emissions	MIL standard 461-E/MIL standard 461-C

## Smart Connector Pin Functions

2422 Pin-out		2422 Functions		
Pin	Description	Amplified Pressure Transducer	Ratiometric Pressure Transducer	Voltage
1	+Vs (Secondary input)	+ Optional temperature input ( $\pm 78\text{mV}$ , $\pm 300\text{mV} \pm 5\text{V} \pm 10\text{V}$ )	+10V excitation (momentary)	+ Secondary input ( $\pm 78\text{mV}$ , $\pm 300\text{mV} \pm 5\text{V} \pm 10\text{V}$ )
2	24v	Excitation	N/C	N/C
3	-----Digital comms SDA-----			
4	+Vp (Primary input)	+Pressure input ( $\pm 78\text{mV}$ , $\pm 300\text{mV} \pm 5\text{V} \pm 10\text{V}$ )	+Pressure input ( $\pm 78\text{mV}$ , $\pm 300\text{mV} \pm 5\text{V} \pm 10\text{V}$ )	+ Primary input ( $\pm 78\text{mV}$ , $\pm 300\text{mV} \pm 5\text{V} \pm 10\text{V}$ )
5	-Vp (Primary input)	-Pressure input ( $\pm 78\text{mV}$ , $\pm 300\text{mV} \pm 5\text{V} \pm 10\text{V}$ )	-Pressure input ( $\pm 78\text{mV}$ , $\pm 300\text{mV} \pm 5\text{V} \pm 10\text{V}$ )	- Primary input ( $\pm 78\text{mV}$ , $\pm 300\text{mV} \pm 5\text{V} \pm 10\text{V}$ )
6	-----Digital comms SCL-----			
7	-----Digital 5V-----			
8	-Vs (Secondary input)	- Optional temperature input (GND)	-10V excitation (GND)	- Secondary input (GND)

flightDAQ-TL Pin-out		flightDAQ-TL Functions (in addition to above)	
Pin	Description	Thermocouple	RTD (PT100)
1	+Vs (Secondary input)	+ CJ measurement (thermistor) ( $\pm 5\text{V}$ )	i+ current excitation
2	24v	Optional CJ heater	N/C
3	-----Digital comms SDA-----		
4	+Vp (Primary input)	+ TC input ( $\pm 78\text{mV}$ )	m+ measurement ( $\pm 300\text{mV}$ )
5	-Vp (Primary input)	-TC input ( $\pm 78\text{mV}$ )	m- measurement ( $\pm 300\text{mV}$ )
6	-----Digital comms SCL-----		
7	-----Digital 5V-----		
8	-Vs (Secondary input)	- CJ measurement ( $\pm 5\text{V}$ ) - GND	i- current excitation (GND)

## Part Number: SML-A-BB-CC

### A = Smart connector type

T = Thermocouple

P = RTD

V = Dual voltage input

### BB= Cable entry diameter

01 = 4.2 to 5.2mm diameter

02 = 6.2 to 7.2mm diameter

### CC= Conductor size

01 = 0.08 to 0.19mm<sup>2</sup> for thermocouples (0.5mm diameter copper tube)

02 = 0.035 to 0.09mm<sup>2</sup> for Transducer, PRT and voltage inputs

03 = 0.14 to 0.34mm<sup>2</sup> for Transducer, PRT and voltage inputs

04 = 0.13 to 0.28mm<sup>2</sup> for thermocouples (0.6mm diameter copper tube)

### Notes

All connectors are supplied assembled, tested, serialised and programmed. The connectors are supplied in a kit with any necessary sleeving and ferrules to complete the connection. All connectors are supplied with a high temperature silicon strain relief. These are colour coded where Thermocouples are yellow, PRT's blue and voltage/transducer inputs green.

Please enquire about any alternative cable sizes or programming requirements.