



# flightDAQ-TL

## Voltage, temperature and pressure transducer acquisition system

- Configurable acquisition system for PRT's, thermocouples and external pressure transducers (amplified or ratiometric).
- 16 highly configurable inputs measuring resistance and voltage over a number of programmable ranges.
- With open-circuit-detect per channel
- 24 bit resolution
- User configurable outputs over Ethernet - iDDS, Chell Protocol, IENA & Netscanner compatibility.
- Configurable 5, 10 and 24V excitation.
- With IEEE 1588 PTP V2.
- 250Hz per channel measurement frequency.
- Compatible with Chell Smart Connectors.
- Power-over-Ethernet (PoE) or DC supply (user configurable).
- Fully configurable over Ethernet with embedded web server.

The Chell FlightDaq-TL is a complimentary product to our existing line of 2432, 2416, flightDAQ and microDAQ pressure scanner products.

Using the powerful architecture and interfaces enables the FlightDaq-TL to accurately measure a large variety of input types, convert the measurement to engineering units and then output the data over a number of configurable Ethernet interfaces. These interfaces can be the Chell protocol (TCP/IP or UDP), IENA, iDDS or Netscanner® simulation mode.

The FlightDaq-TL consists of 16 x 8-pin Lemo 1B series inputs each of which contain two inputs (one primary and one secondary), switchable excitation and a digital interface for the optional Smart Lemo plugs.

The two inputs can be individually configured to provide measurements for the following:

- Voltage
- Resistance
- Thermistor
- Thermocouple inputs (using external cold junction such as a Smart Lemo).
- RTD385
- Amplified pressure transducer
- Ratiometric pressure transducer

The FlightDaq-TL can be configured for any combination of channels without comprising speed or performance (with the exception of the 24V excitation which must be applied to all channels).

Configuration of the inputs and the output stream is carried out via an embedded web server, using commands over the selected protocol or via an iDDS configuration server or by XML file download.

The user can choose between a number of standard look-up-tables (RTD385, N-Type etc) or enter their own for conversion to engineering units of their choice (maximum size 448 lines - downloadable from a CSV file).

Alternative, if used with the compatible Smart Connectors, this look-up-table can be stored in the connector and therefore remains physically tied with the transducer.

## flightDAQ-TL Input Types

Input Type	Channels	Notes
Voltage	32	Ranges of $\pm 78\text{mV}$ , $\pm 300\text{mV}$ , $\pm 5\text{V}$ and $\pm 10\text{V}$ , primary and secondary inputs <sup>1</sup> .
Resistance	16	Ranges of $250\Omega$ , $500\Omega$ , $1\text{k}\Omega$ and $20\text{k}\Omega$
Thermistor	16	Type $10\text{k}\Omega$ $-40$ to $90^\circ\text{C}$
Thermocouple	16	Type B, E, J, K, N, R, S, T
RTD-385	16	PT100 - 4 wire $-200$ to $850^\circ\text{C}$
Pressure transducer - amplified	16	$\pm 78\text{mV}$ , $\pm 300\text{mV}$ , $\pm 5\text{V}$ and $\pm 10\text{V}$ input ranges, $10\text{V}$ or $24\text{V}$ excitation <sup>2</sup>
Pressure transducer - ratiometric	16	$\pm 78\text{mV}$ , $\pm 300\text{mV}$ , $\pm 5\text{V}$ and $\pm 10\text{V}$ input ranges, $10\text{V}$ excitation
Common mode Voltage		$\pm 78\text{mV}$ range : $14\text{V}$ , $\pm 300\text{mV}$ range : $14\text{V}$ , $\pm 5\text{V}$ range : $9\text{V}$ and $\pm 10\text{V}$ range : $4\text{V}$ $5\text{V}$ TTL

### NOTES:

1. Primary input is differential, secondary is single-ended. Both inputs are bi-directional.
2. All channels can be individually configured with the exception of the  $24\text{V}$  excitation which must be applied to all inputs when selected.

## flightDAQ-TL Input Specifications

Measurement type		
	Resolution	$\pm 0.0005\ \Omega$ or $0.001^\circ\text{C}$
RTD (4-wire, $-60$ to $400^\circ\text{C}$ )	Accuracy <sup>3</sup>	$< \pm 0.05\ \Omega$ or $0.1^\circ\text{C}$
	Noise <sup>1</sup>	$< 0.02^\circ\text{C}$
10 k Thermistor	Resolution	$\pm 0.1\ \Omega$ or $0.003^\circ\text{C}$
	Accuracy <sup>3</sup>	$< \pm 0.04\ \Omega$ or $0.1^\circ\text{C}$
Voltage ( $\pm 78\text{mV}$ FS)	Resolution	$\pm 0.02\ \mu\text{V}$ or $0.001^\circ\text{C}$ (K type)
	Accuracy <sup>3</sup>	$< \pm 10\ \mu\text{V}$ or $0.26^\circ\text{C}$ (K type) or $0.27^\circ\text{C}$ (N type) <sup>2</sup>
Voltage ( $\pm 300\text{mV}$ FS)	Noise <sup>1</sup>	$< 3\ \mu\text{V}$
	Resolution	$\pm 0.3\ \mu\text{V}$
	Accuracy <sup>3</sup>	$< \pm 15\ \mu\text{V}$ (0.005%FS)
Voltage ( $\pm 5\text{V}$ FS)	Noise <sup>1</sup>	$< 5.5\ \mu\text{V}$ primary input, $8\ \mu\text{V}$ secondary input
	Resolution	$\pm 0.076\ \text{mV}$
	Accuracy <sup>3</sup>	$< \pm 1.2\ \text{mV}$ (0.02%FS)
Voltage ( $\pm 10\text{V}$ FS)	Noise <sup>1</sup>	$< 70\ \mu\text{V}$ primary input, $90\ \mu\text{V}$ secondary input
	Resolution	$\pm 0.15\ \text{mV}$
	Accuracy <sup>3</sup>	$< \pm 2.5\ \text{mV}$ (0.025%FS)
	Noise <sup>1</sup>	$< 130\ \mu\text{V}$ primary input, $170\ \mu\text{V}$ secondary input

### NOTES:

1. Noise figures based on an acquisition frequency of  $250\text{Hz}$  and a running average setting of 16
2. Thermocouple temperature errors are for hot junction measurement only. This does not include cold junction thermal, transducer or measurement errors which will need to be considered.
3. All accuracy figures include all thermal errors between  $-40$  and  $90^\circ\text{C}$

### Excitation Supplies

5V	3% tolerance <sup>1</sup> , $30\text{mA}$ per channel maximum
10V	1% tolerance <sup>1</sup> , $7\text{mA}$ per channel maximum
24V	5% tolerance <sup>1</sup> , $12\text{mA}$ per channel maximum

1. All tolerance figures include all thermal errors between  $-40$  and  $90^\circ\text{C}$

## flightDAQ-TL Interface Types

Interface types	
Chell protocol	32-bit floating-point output (IEEE 754) via TCP or UDP max 250Hz (see manual 900204-X.X for details)
IENA	UDP max 250Hz (see manual 900204-X.X for details)
iDDS	Conforms to EIM 03869
Netscanner emulation	TCP / UDP max 250Hz, limited command set (please contact Chell for details)

### NOTES :

1. The interface type is user selectable via the embedded web server.
2. Configuration can be via embedded web server, using commands via one of the above protocols or, for iDDS applications via an appropriate iDDS configuration server or by XML file download.

## flightDAQ-TL System Specifications

System resolution	24 bit	
Dimensions	241.2 x 89 x 68mm (please contact us for a solid model)	
Weight (with DTC scanner)	1.53Kg	
Environmental sealing	IP67 / IP 54 for AA=02	
Measurement connector	Lemo 1B series	
Input supply	PoE	IEEE 802.3at
(user selectable with internal switches)	DC	24 to 50VDC (1.0A maximum at 24V)
Excitation Output	10V on Pin 1, 5V (digital grade) on Pin 7, +24 VDC (digital grade) Pin 2. Pin 1 is configurable (OFF/RT-D/10V)	
Electrical connector	M12 X-Coded TE2232331-1	
System timing	IEEE1588-2008 PTP V2 accurate to 1% of the acquisition frequency ( $\pm 40 \mu\text{s}$ at 250Hz)	
Operating temperature range.	-20 to +90°C (lower range can be extended if unit is powered first)	
Maximum relative humidity	95% at 50°C (non-condensing)	
Ethernet specification	Auto-negotiating 100Mbit TCP or UDP (fixed or DHCP)	

## flightDAQ-TL Environmental Specifications

Ambient altitude	100 mbar abs or nominally 52000 ft
Vibration	Engine standard vibration test to DO160E category S, curve W with duration of 1 hr/axis. Fan blade out case to DO160E category S, curve P.
	Fan blade out to DO160F section 7 (40g 11m/s)
	Engine load to +/- 40g per axis
Temperature	Engine temperature to DO160F section 4 cat D2 and section 5 cat A requirements
	General temperature -20 to +90°C
	Thermal transient : $\pm 10^\circ\text{C}/\text{min}$
Radiated emissions	MIL standard 461-E: RE102
Conducted emissions	MIL standard 461-E/MIL standard 461-C

NOTES: To monitor the health of the FlightDaq-TL, the excitation supplies, internal temperature and internal absolute pressure are available over the embedded web server

## Smart Connectors

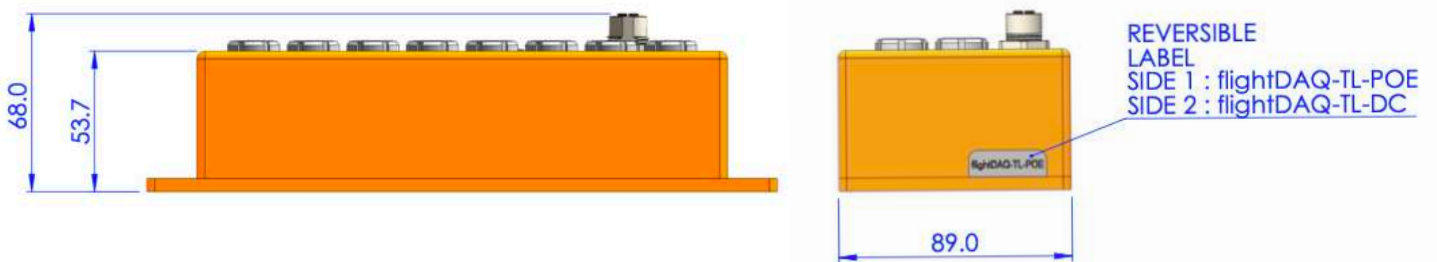
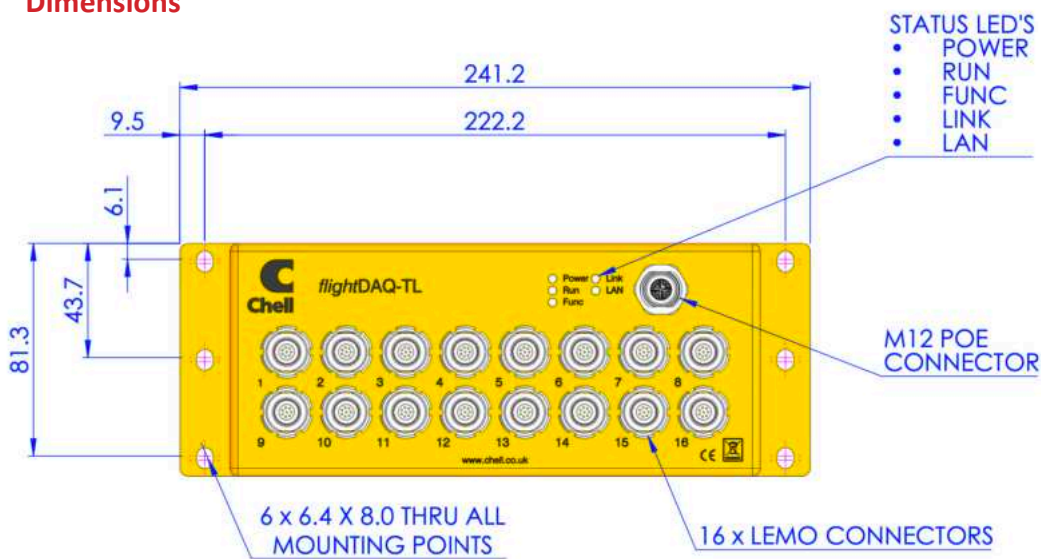
The flightDAQ-TL can be used with the Chell Smart Connectors with any of the input types listed. The advantage of a Smart Connector is that the transducer is mated with an intelligent connector that contains its identification, type and calibration together a useful range of additional information. The transducer would therefore travel with its calibration and remove the need for a particular transducer to be plugged into a particular port.

Smart Connectors are available in 3 types; thermocouple, PRT and voltage input (for use with pressure transducers etc).

The use of Smart Connectors is optional as all the calibration information can be contained within the flightDAQ-TL itself. However, with thermocouples, the cold junction is contained within the Smart Connector, they must be used for this transducer type.



## Dimensions



## Part Number:

FDTL-AABBCC — CC = Power Configuration (can be changed by user)

01 = PoE

02 = DC Power

### AA = Lemo Soket Type

01 = IP67 sealed sockets (when mated)

02 = Standard sokkets

### BB = Interface type

01 = Chell Interface and Netscanner Emulation

02 = Chell Interface and Netscanner Emulation and DDS

03 = Chell Interface and Netscanner Emulation and DDS (including DDS run time license).