

Micro Air Data Computer Specifications



**YOUR AIR DATA SOLUTIONS
JUST GOT A LOT SMALLER**
(AND LIGHTER)

Pegasus



Endeavor



Destiny



Orion



Voyager



The Micro Air Data System (μADS)

The Aeroprobe μADS is a complete solution for in flight measurement of air data at an unprecedented combination of size and accuracy. The μADS consists of two primary components: a multi-hole Air Data Probe (ADP) and a Micro Air Data Computer (μADC). These components provide direct measurements of **airspeed, flow angles (angle-of-attack and sideslip angle), static and total pressure, and barometric altitude**. There are five models of μADC that provide a range of features to meet mission requirements. With its internal Attitude Heading Reference System (AHRS), Destiny can also provide direct measurements of **roll, pitch, heading, roll rate, angular rates, and 3-axis accelerations**. With its GPS aided Inertial Navigation System, Voyager can provide additional measurements of **latitude, longitude, altitude, 3-axis velocities, and time or UTC time**.

Table 1. Product Highlights

	Pegasus	Endeavor	Destiny	Orion	Voyager
					
User Configurable Operational Modes	✓	✓	✓	✓	✓
Command Line Interface	✓	✓	✓	✓	✓
Field Upgradeable Firmware	✓	✓	✓	✓	✓
Battery-backed Real Time Clock/Calendar	✓	✓	✓	✓	✓
Start-up Sync Signal (TTL Trigger)	✓	✓	✓	✓	✓
Rugged Aluminum Enclosure	✓	✓	✓	✓	✓
LED Indicator Lights	✓	✓	✓		✓
Data Logging (Standard 8GB)	✓	✓	✓	External ¹	✓
GPS Aided inertial Navigation System (GPS/INS)					✓
Attitude Heading Reference System (AHRS)			✓		
External GPS Synchronization	✓	✓			
Extended Velocity Range	Option		Option	✓	
Extended Angle Range		✓			
Temperature Measurement	PT100 RTD	PT100 RTD	PT100 RTD	PT100 RTD	PT100 RTD
Quick Disconnect Pneumatic Connector	✓	✓	✓	✓	✓
Mounting Hardware	✓	✓	✓	✓	✓
Probe Heater Control	✓	✓	✓	✓	✓
Micro Purge System Control	✓	✓	✓	✓	✓

¹Supplied by user. Must be compatible with USB 2.0 specification. Limited to 32 GB and 8192 block formatting.

²Not for use in high EMI/RF interference environment.

Certifications Available

Certain models of the Micro Air Data Computer have been tested and certified compliant with the following military and commercial standards:

Table 2. Military and Commercial Standards			
Test Standard	Method/Procedure/Section	Title	μADC Model
MIL-STD 810G	Method 501.5, Proc. I, II, & III	High Temperature	Pegasus, Destiny
MIL-STD 810G	Method 502.5, Proc. I & II	Low Temperature	Pegasus, Destiny
MIL-STD 810G	Method 513.5, Proc. II	Acceleration (Operational)	Pegasus, Destiny
MIL-STD 810G	Method 514.6, Proc. I	General Vibration (Category 12)	Pegasus, Destiny
MIL-STD 810G	Method 516.6, Proc. I	Functional Shock (Operational)	Pegasus, Destiny
MIL-STD 810G	Method 520.3	Combined Environments	Pegasus, Destiny
MIL-STD 461G	RS103	Radiated Susceptibility, Electric Field, 2 MHz – 18 GHz Air Force Requirements (Table XI RS103 Limits)	Pegasus, Destiny
DO-160F	Sections 4.5.1 & 4.5.2	Storage & Operational Low Temperature	Pegasus, Destiny
DO-160F	Sections 4.5.3 & 4.5.4	Storage & Operational High Temperature	Pegasus, Destiny
DO-160F	Section 4.6.1	Altitude	Pegasus, Destiny
DO-160F	Section 7.2.1	Shock	Pegasus, Destiny
DO-160F	Section 8.5	Vibration	Pegasus, Destiny
MIL-STD 810G (with Change 1)	Method 507.5, Proc. I	Humidity - 15 Days (Induced Cycle B1 & Natural Cycle B2)	Orion
MIL-STD 810G (with Change 1)	Method 514.7, Proc. I	General Vibration (Category 24)	Orion
MIL-STD 810G (with Change 1)	Method 516.7, Proc. I and II	Functional Shock (Operational & Transportation)	Orion
MIL-STD 810G (with Change 1)	Method 520.4, Proc. III	Combined Environments	Orion

Table 3. Operational Specifications

ELECTRICAL					
	Pegasus	Endeavor	Destiny	Orion	Voyager
Input Voltage Range, VDC	8 to 36			8 to 36	8 to 36
Current Draw at 12 VDC, mA	90			88	142
Power, W	1.1				1.7
Probe Heater Voltage Range, VDC	5-28				
Probe Heater Power at 28 VDC, W	56				
RTD (Class A or B) Range, °C	-200 to 600				
COMMUNICATION					
	Pegasus	Endeavor	Destiny	Orion	Voyager
Sampling Data Rate Options, Hz ¹	10, 20,50,100				
Serial Specification Options	RS232, RS422				
Serial Data Output Streaming Rate Options, bps ¹	460800, 230400, 115200, 57600, 38400, 19200				
Analog to Digital Resolution, bits	16				
MECHANICAL					
	Pegasus	Endeavor	Destiny	Orion	Voyager
Size, mm (inches)	66 x 79 x 41 (2.6 x 3.1 x 1.6)			Ø95 x 28 (Ø3.8 x 1.1)	66 x 79 x 41 (2.6 x 3.1 x 1.6)
Mounting Flange Footprint, mm (inches)	66 x 97 x 1.5 (2.6 x 3.8 x 0.06)			-	66 x 97 x 1.5 (2.6 x 3.8 x 0.06)
Weight, grams	181 ²	202	181 ²	220	285 ³

¹Serial streaming data rate and sample rate are interrelated. All combinations are not available. Refer to the Aeroprobe Micro Air Data Interface Document (Document No. 90001-14-ICD-03).

²Standard velocity range. For extended velocity range option add 21 grams.

³Includes GPS antenna.

Table 4. Sensor Range Options (Properties at Sea Level, 15 °C)

Pressure Range ¹		1 inH ₂ O	2 inH ₂ O	5 inH ₂ O	10 inH ₂ O	1 psi	100 mbar	160 mbar	5 psi	15 psi
Maximum Indicated Airspeed ²	±20°	20 m/s, Mach 0.06	28 m/s, Mach 0.08	45 m/s, Mach 0.13	63 m/s, Mach 0.19	105 m/s, Mach 0.31	126 m/s, Mach 0.37	157 m/s, Mach 0.46	225 m/s, Mach 0.66	323 m/s, Mach 0.95
	±40°	17 m/s, Mach 0.05	24 m/s, Mach 0.07	39 m/s, Mach 0.11	55 m/s, Mach 0.16	92 m/s, Mach 0.27	110 m/s, Mach 0.32	138 m/s, Mach 0.41	199 m/s, Mach 0.59	323 m/s, Mach 0.95
Recommended Minimum Airspeed ³		4.0 m/s	5.5 m/s	7.0 m/s	8.5 m/s	14 m/s	17 m/s	22 m/s	31 m/s	54 m/s
Minimum Reported Airspeed ⁴		2.5 m/s	3.5 m/s	6.0 m/s	8.0 m/s	13 m/s	16 m/s	20 m/s	30 m/s	50 m/s
Maximum Safe Over-Pressure ⁵		270 inH ₂ O (9.7 psi)	270 inH ₂ O (9.7 psi)	300 inH ₂ O (10.8 psi)	350 inH ₂ O (12.6 psi)	10 psi	1400 mbar (20.3 psi)	1400 mbar (20.3 psi)	30 psi	30 psi

¹Specified pressure range. Pressure inputs greater than this range may cause accuracy degradation. See Maximum Safe Over-Pressure.

²Endeavor model can achieve ±40° flow angle with a reduction in the maximum airspeed. Within ±20° the airspeed limit is increased.

³Indicated airspeed below which expected error in AoA could be greater than 6°. See Figures 1 & 2 for more detail.

⁴The minimum reported airspeed is dictated by the minimum dynamic pressure that can accurately be measured for the given sensor range at zero altitude.

⁵Pressures above the specified maximum safe over-pressure will cause damage to the internal pressure sensors.

Table 5. Micro Air Data System Specifications

Parameter	Typical	Unit
Indicated Airspeed Error ¹	±1m/s or ±1%	-
Angle of Attack Range	±20 (±40 Endeavor)	deg
Angle of Sideslip Range	±20 (±40 Endeavor)	deg
Flow Angle Error ¹	±1	deg
Barometric Altitude Range	-298 to 20000	m
Barometric Altitude Resolution	1	m
Barometric Altitude Error at Sea Level ²	±24	m
Operating Temperature Range ^{3,4}	-40 to 85	°C
Storage Temperature Range	-55 to 85	°C

¹See Figures 1 & 2 for expected errors for each sensor range.

²Does not include error due to local barometric pressure variance. See Figure 3 for more detail.

³Still air at sea level pressure.

⁴µADC specification only. Check Air Data Probe Technical drawings for operating temperatures.

Table 6. GPS Aided Inertial Navigation System (GPS/INS) Specifications (Voyager)

Parameter	Typical	Unit
Roll/Pitch	0.2 (static), 0.3 (dynamic)	deg
Heading	0.8	deg
Horizontal Position (1 σ STD)	1.0	m
Vertical position (1 σ STD)	2.0	m
Velocity accuracy (1 σ RMS)	0.05	m/s
Output Rate	Up to 2000	Hz
Gyro Range	± 450	$^{\circ}/s$
Gyro Non-linearity	0.01	%FS
Gyro Noise Density	0.01	$^{\circ}/s/\sqrt{Hz}$
Gyro G-sensitivity	0.003	$^{\circ}/s/g$
Gyro In-run Bias Stability	10	$^{\circ}/hr$
Gyro Bandwidth	415	Hz
Accelerometer Range	± 20	G
Accelerometer Non-linearity	0.1	%FS
Accelerometer Noise Density	60	$\mu g/\sqrt{Hz}$
Accelerometer Zero g-output	± 5	Mg
Accelerometer In-run Bias Stability	15	μg
Accelerometer Bandwidth	375	Hz
Magnetometer Range	± 8	Gauss
Magnetometer Non-linearity	0.2	%FS
Magnetometer Total RMS noise	0.5	mG

Table 7. Attitude Heading Reference System (AHRs) Specifications (Destiny)

Parameter	Typical	Unit
Roll/Pitch	0.75 (static), 1.0 (dynamic)	deg
Heading	2.0	deg
Output Rate	100	Hz
Gyro Range	± 2000	$^{\circ}/s$
Gyro Non-linearity	0.1	%FS
Gyro Noise Density	0.01	$^{\circ}/s/\sqrt{Hz}$
Gyro G-sensitivity	0.001	$^{\circ}/s/g$
Gyro In-run Bias Stability	10	$^{\circ}/hr$
Accelerometer Range	± 16	g
Accelerometer Non-linearity	0.5	%FS
Accelerometer Noise Density	200	$\mu g/\sqrt{Hz}$
Accelerometer Zero g-output	± 2	mg
Accelerometer In-run Bias Stability	0.1	mg
Bandwidth	180	Hz
Magnetometer Range	± 0.8	Gauss
Magnetometer Non-linearity	0.1	%FS
Magnetometer Noise Density	200	$\mu G/\sqrt{Hz}$
Magnetometer Non-linearity	0.2	%FS
Magnetometer Total RMS noise	0.5	mG

Expected Micro Air Data System Errors

Figure 1. Angle Error (2σ)

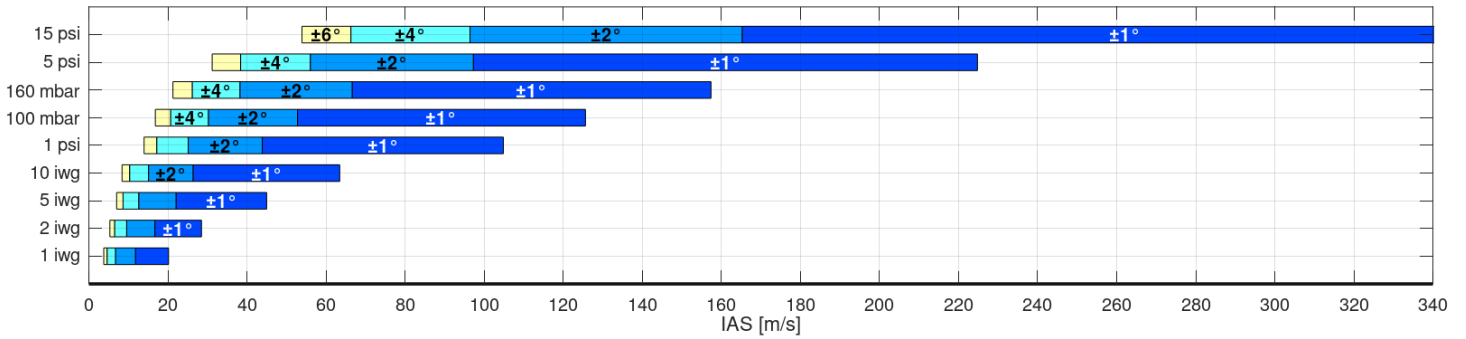


Figure 2. Indicated Airspeed Error (2σ) [m/s]

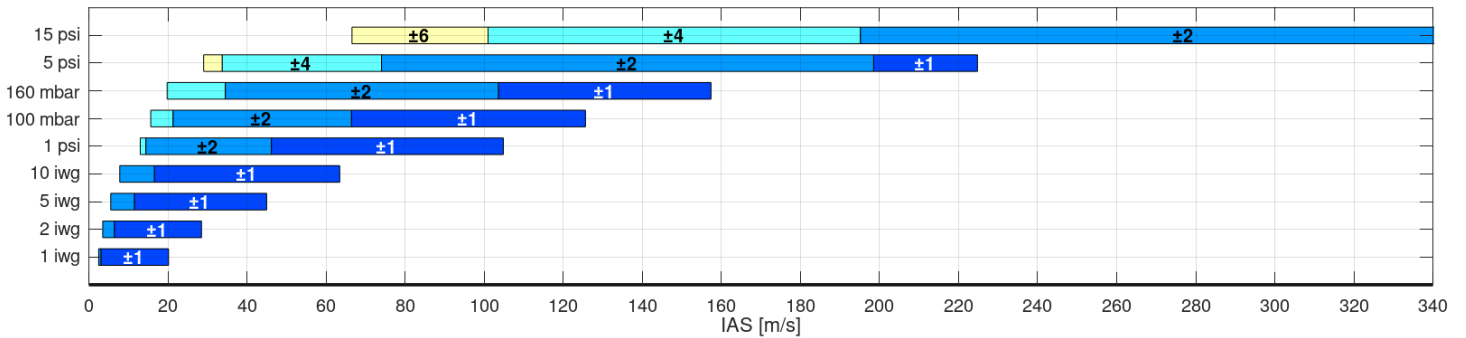
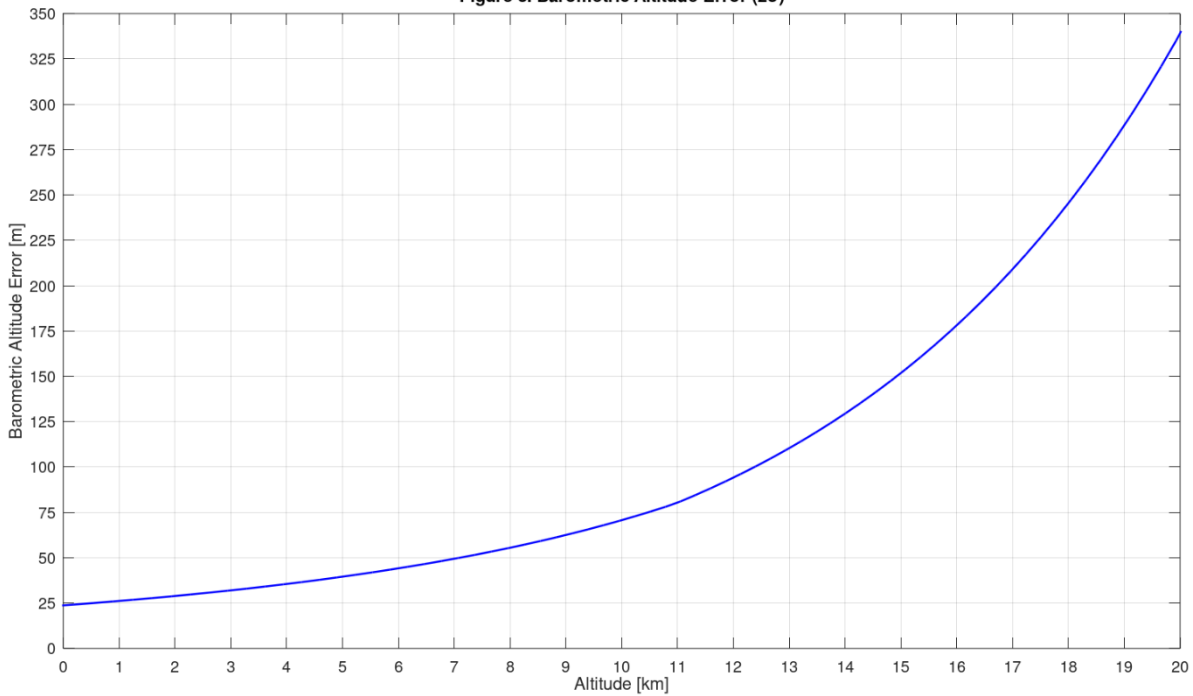


Figure 3. Barometric Altitude Error (2σ)

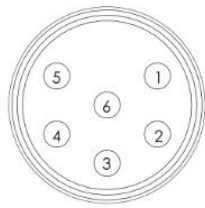
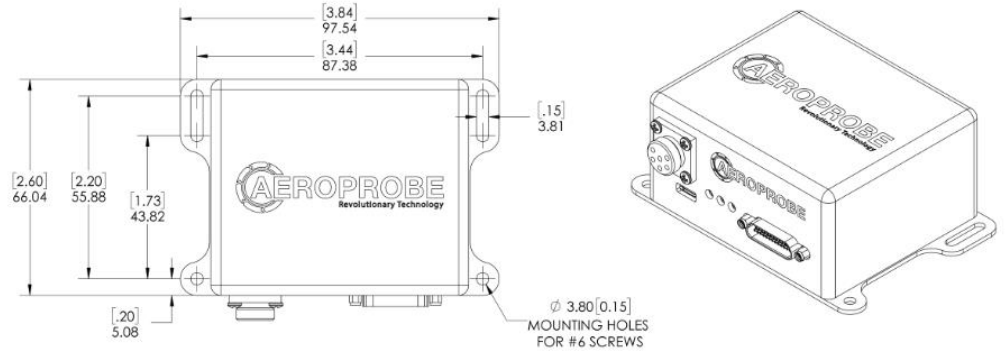


Mechanical Properties

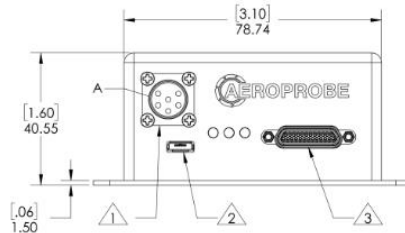
**Pegasus,
Endeavor,
& Destiny**

NOTES:

- ① 6 PORT PNEUMATIC QUICK-DISCONNECT
- ② MICRO USB CONNECTOR
- ③ 25 POSITION (F) CANNON MICRO "D" CONNECTOR

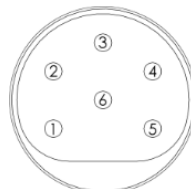


DETAIL A
SCALE 5 : 1
PROBE PNEUMATIC CONNECTOR
PORT LOCATIONS

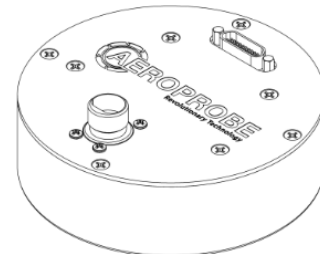


NOTES:

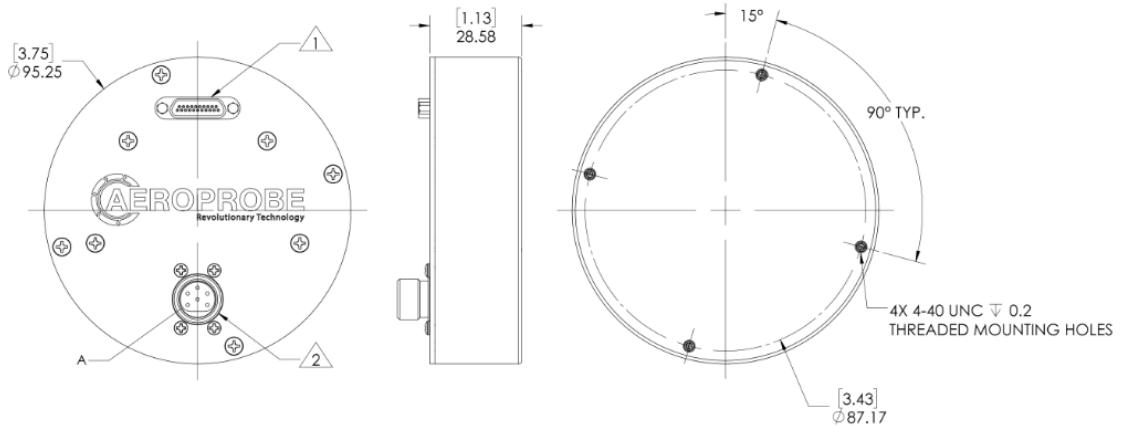
- ① 21 POSITION (F) MICRO "D" CONNECTOR
- ② 6 PORT PNEUMATIC QUICK-DISCONNECT



DETAIL A
SCALE 5 : 1
PROBE PNEUMATIC CONNECTOR
PORT LOCATIONS

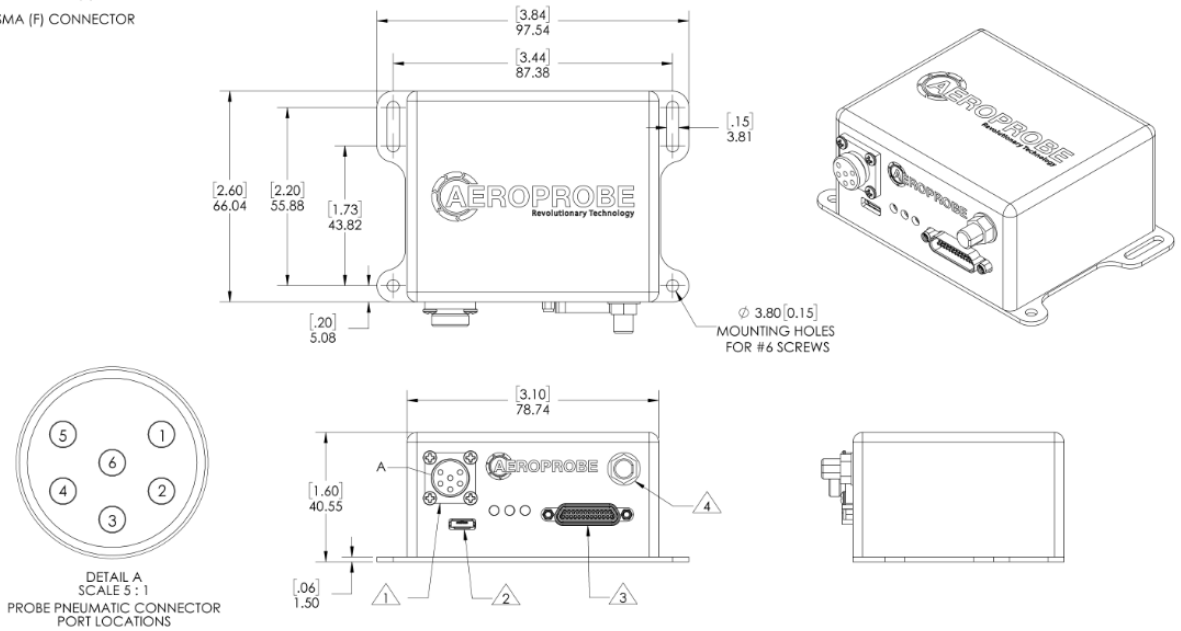


Orion



- NOTES:
- 1 6 PORT PNEUMATIC QUICK-DISCONNECT
 - 2 MICRO USB CONNECTOR
 - 3 25 POSITION (F) CANNON MICRO "D" CONNECTOR
 - 4 SMA (F) CONNECTOR

Voyager



Optional Accessory: Quick Start Cable 36"

(Pegasus, Endeavor, Destiny, and Voyager)

The Quick Start Cable allows for simple connection between the μ ADC and a PC to facilitate easy access to the Command Line Interface (CLI). It is intended to be used in bench top applications and is not recommended for flight. No separate power supply is required as power is provided via a USB connection. Streaming data is accessed via RS232 or RS422 connection. Terminal emulator and RS232/422 to USB adapter not provided.

