Micro Air Data Computer Specifications

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

Milano	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						
	Milano	**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	Type K TC[2]	PT100 RTD	PT100 RTD	PT100 RTD	PT100 RTD	PT100 RTD
Quick Disconnect Pneumatic Connector		✓	✓	✓	✓	✓
Mounting Hardware		✓	✓	✓	✓	✓
Probe Heater Control		✓	✓	✓	✓	✓
Micro Purge System Control	✓	✓	✓	✓	✓	✓

[1]Supplied by user. Must be compatible with USB 2.0 specification. Limited to 32 GB and 8192 block formatting.
[2]Not 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 507.6, 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						
	Milano	**Pegasus**	**Endeavor**	**Destiny**	**Orion**	**Voyager**
Input Voltage Range, VDC	12 to 15	8 to 36			8 to 36	8 to 36
Current Draw at 12 VDC, mA	270	90			88	142
Power, W	3.2	1.1				1.7
Probe Heater Voltage Range, VDC	5-28					
Probe Heater Power at 28 VDC, W	-	56				
Thermocouple (Type K) Range, °C	-200 to 1250	-				
RTD (Class A or B) Range, °C	-	-200 to 600				
COMMUNICATION						
	Milano	**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						
	Milano	**Pegasus**	**Endeavor**	**Destiny**	**Orion**	**Voyager**
Size, mm (inches)	66 x 79 x 33 (2.6 x 3.1 x 1.3)	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	135	181[2]	202	181[2]	220	285[3]

[1]Serial 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).
[2]Standard velocity range. For extended velocity range option add 21 grams.
[3]Includes GPS antenna.

Table 4. Sensor Range Options (Properties at Sea Level, 15 °C)											
Pressure Range[1]		0.5 inH$_2$O	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[2,3]	±20°	14 m/s, Mach 0.04	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°	n/a	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[4]		2.7 m/s	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[5]		1.8 m/s	2.5 m/s	3.5 m/s	6.0 m/s	8.0 m/s	13 m/s	16 m/s	25 m/s	30 m/s	50 m/s
Maximum Safe Over-Pressure[6]		270 inH$_2$O (9.7 psi)	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

[1]Specified pressure range. Pressure inputs greater than this range may cause accuracy degradation. See Maximum Safe Over-Pressure.
[2]Endeavor and Milano models not available with 0.5 inH$_2$O sensor range.
[3]Endeavor model can achieve ±40° flow angle with a reduction in the maximum airspeed. Within ±20° the airspeed limit is increased.
[4]Indicated airspeed below which expected error in AoA could be greater than 6°. See Figures 1 & 2 for more detail.
[5]The minimum reported airspeed is dictated by the minimum dynamic pressure that can accurately be measured for the given sensor range at zero altitude.
[6]Pressures 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 70 (Milano) -40 to 85 (Pegasus, Endeavor, Destiny, Voyager, Orion)	°C

[1]See Figures 1 & 2 for expected errors for each sensor range.
[2]Does not include error due to local barometric pressure variance. See Figure 3 for more detail.
[3]Still air at sea level pressure.
[4]µADC 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 (1σ STD)	1.0	m
Vertical position (1σ STD)	2.0	m
Velocity accuracy (1σ RMS)	0.05	m/s
Output Rate	Up to 2000	Hz
Gyro Range	±450	°/s
Gyro Non-linearity	0.01	%FS
Gyro Noise Density	0.01	°/s/√Hz
Gyro G-sensitivity	0.003	°/s/g
Gyro In-run Bias Stability	10	°/hr
Gyro Bandwidth	415	Hz
Accelerometer Range	±20	G
Accelerometer Non-linearity	0.1	%FS
Accelerometer Noise Density	60	µg/√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	°/s
Gyro Non-linearity	0.1	%FS
Gyro Noise Density	0.01	°/s/√Hz
Gyro G-sensitivity	0.001	°/s/g
Gyro In-run Bias Stability	10	°/hr
Accelerometer Range	±16	g
Accelerometer Non-linearity	0.5	%FS
Accelerometer Noise Density	200	µg/√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	µG/√Hz
Magnetometer Non-linearity	0.2	%FS
Magnetometer Total RMS noise	0.5	mG

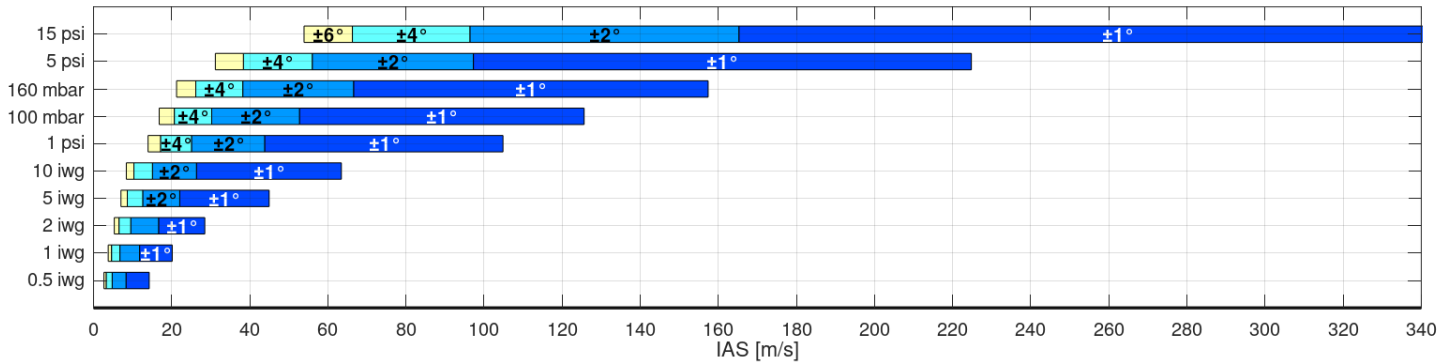# Expected Micro Air Data System Errors

Figure 1. Angle Error (2σ)

	IAS [m/s]
15 psi	±6° ±4° ±2° ±1°
5 psi	±4° ±2° ±1°
160 mbar	±4° ±2° ±1°
100 mbar	±4° ±2° ±1°
1 psi	±4° ±2° ±1°
10 iwg	±2° ±1°
5 iwg	±2° ±1°
2 iwg	±1°
1 iwg	±1°
0.5 iwg	

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

	IAS [m/s]
15 psi	±6 ±4 ±2
5 psi	±4 ±2 ±1
160 mbar	±4 ±2 ±1
100 mbar	±2 ±1
1 psi	±2 ±1
10 iwg	±2 ±1
5 iwg	±1
2 iwg	±1
1 iwg	±1
0.5 iwg	±1
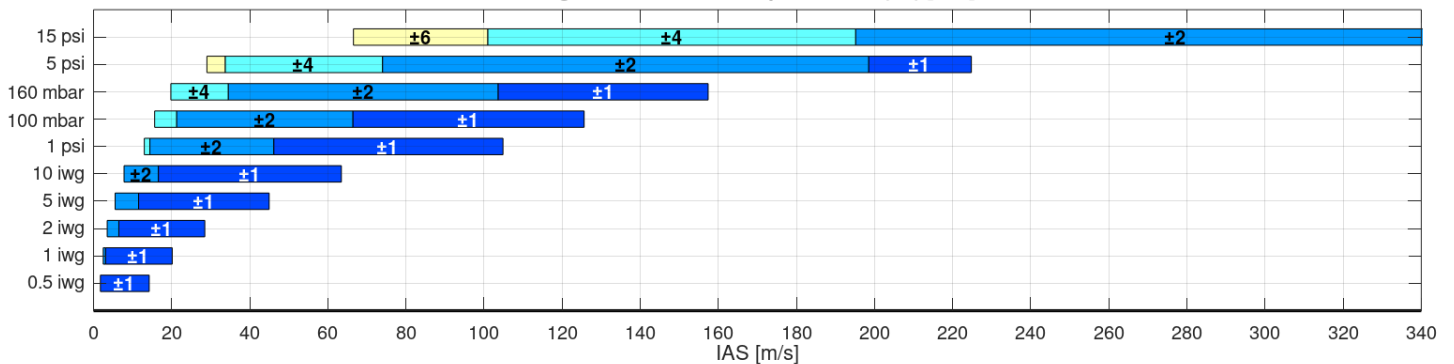
Figure 3. Barometric Altitude Error (2σ)
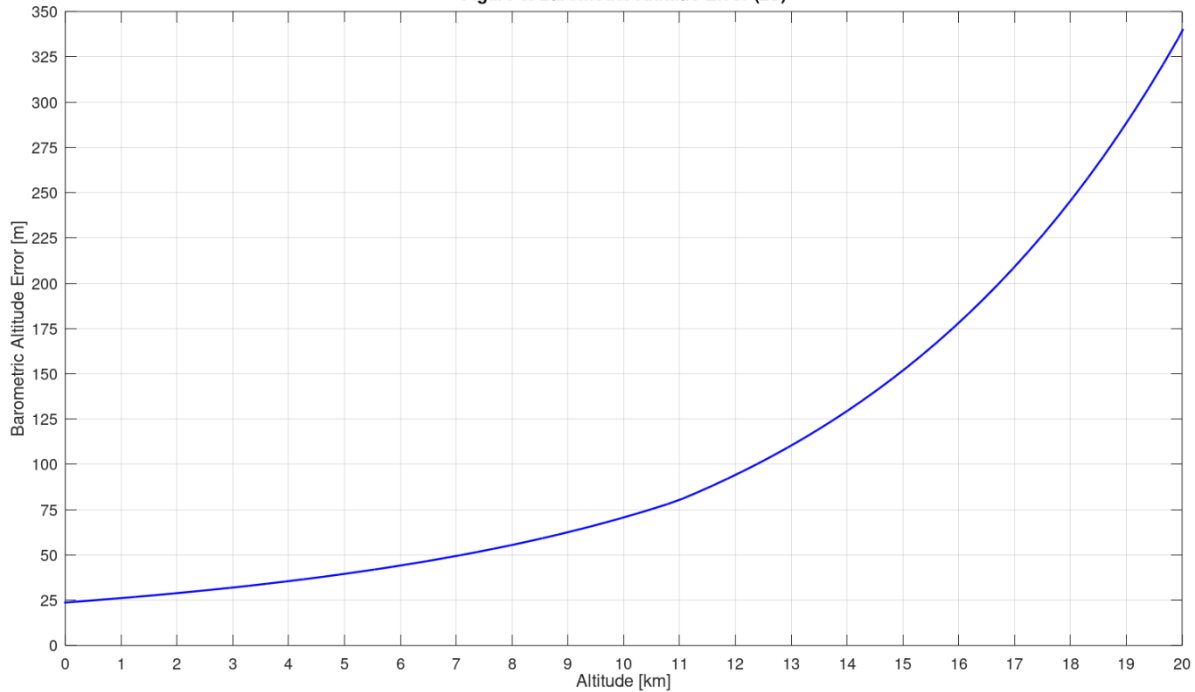
Mechanical Properties

NOTES:
1. ⌀0.063" PNEUMATIC TUBULATIONS
2. 15 POSITION (F) HIGH DENSITY D-SUB
3. MICRO USB CONNECTOR
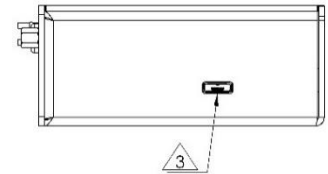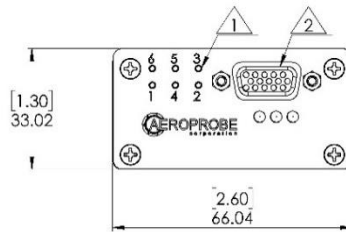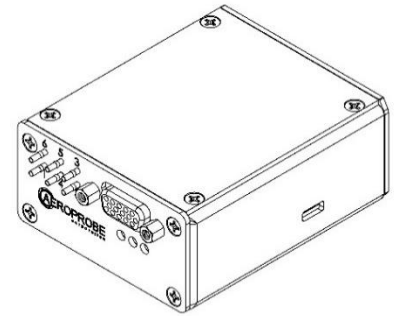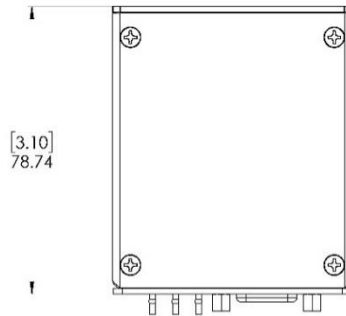
Milano

[3.10]
78.74

[1.30]
33.02

2.60
66.04

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

Pegasus, Endeavor, & Destiny

[3.84]
97.54

[3.44]
87.38

[.15]
3.81

[2.60]
66.04

[2.20]
55.88

[1.73]
43.82

[.20]
5.08

⌀ 3.80 [0.15]
MOUNTING HOLES
FOR #6 SCREWS

[3.10]
78.74

[1.60]
40.55

[.06]
1.50
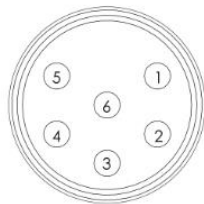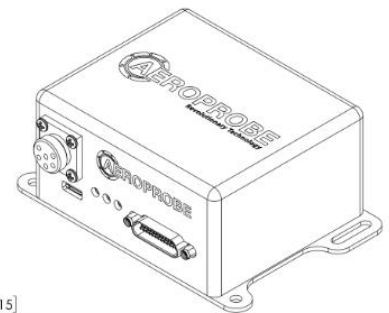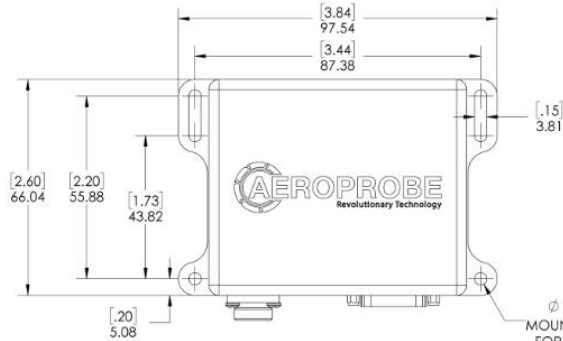
DETAIL A
SCALE 5 : 1
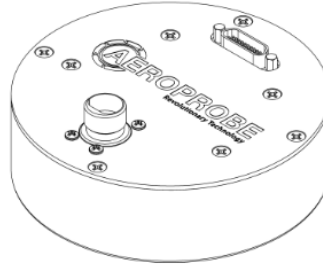PROBE PNEUMATIC CONNECTOR
PORT LOCATIONS
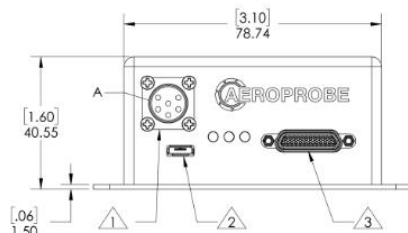
NOTES:

⚠️1 21 POSITION (F) MICRO "D" CONNECTOR

⚠️2 6 PORT PNEUMATIC QUICK-DISCONNECT
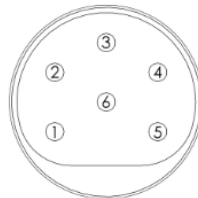
DETAIL A
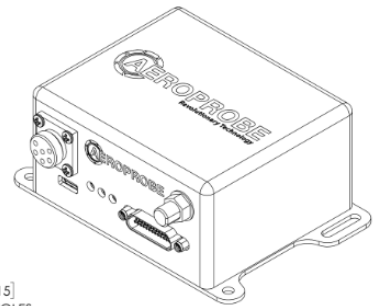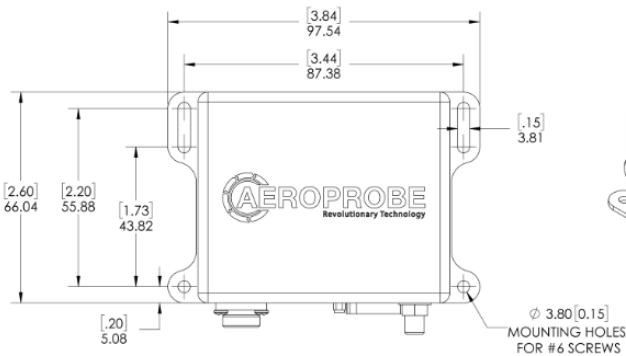SCALE 5 : 1
PROBE PNEUMATIC CONNECTOR
PORT LOCATIONS

Orion
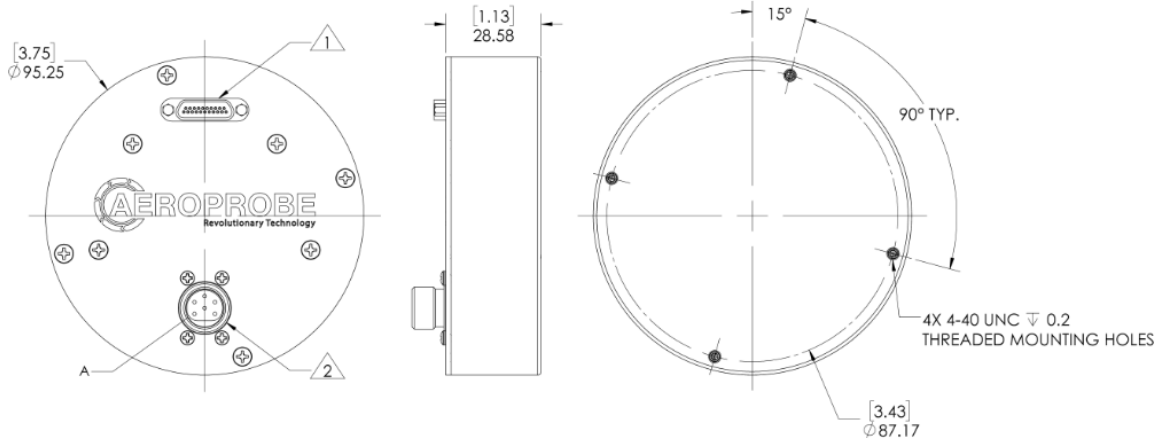
[3.75]
⌀95.25

[1.13]
28.58

15°

90° TYP.

4X 4-40 UNC ▽ 0.2
THREADED MOUNTING HOLES

[3.43]
⌀87.17

NOTES:

⚠️1 6 PORT PNEUMATIC QUICK-DISCONNECT

⚠️2 MICRO USB CONNECTOR

⚠️3 25 POSITION (F) CANNON MICRO "D" CONNECTOR

⚠️4 SMA (F) CONNECTOR

[3.84]
97.54

[3.44]
87.38

[.15]
3.81

[2.60]
66.04

[2.20]
55.88

[1.73]
43.82

Voyager

[.20]
5.08

⌀ 3.80 [0.15]
MOUNTING HOLES
FOR #6 SCREWS

[3.10]
78.74

[1.60]
40.55

[.06]
1.50

DETAIL A
SCALE 5 : 1
PROBE PNEUMATIC CONNECTOR
PORT LOCATIONS