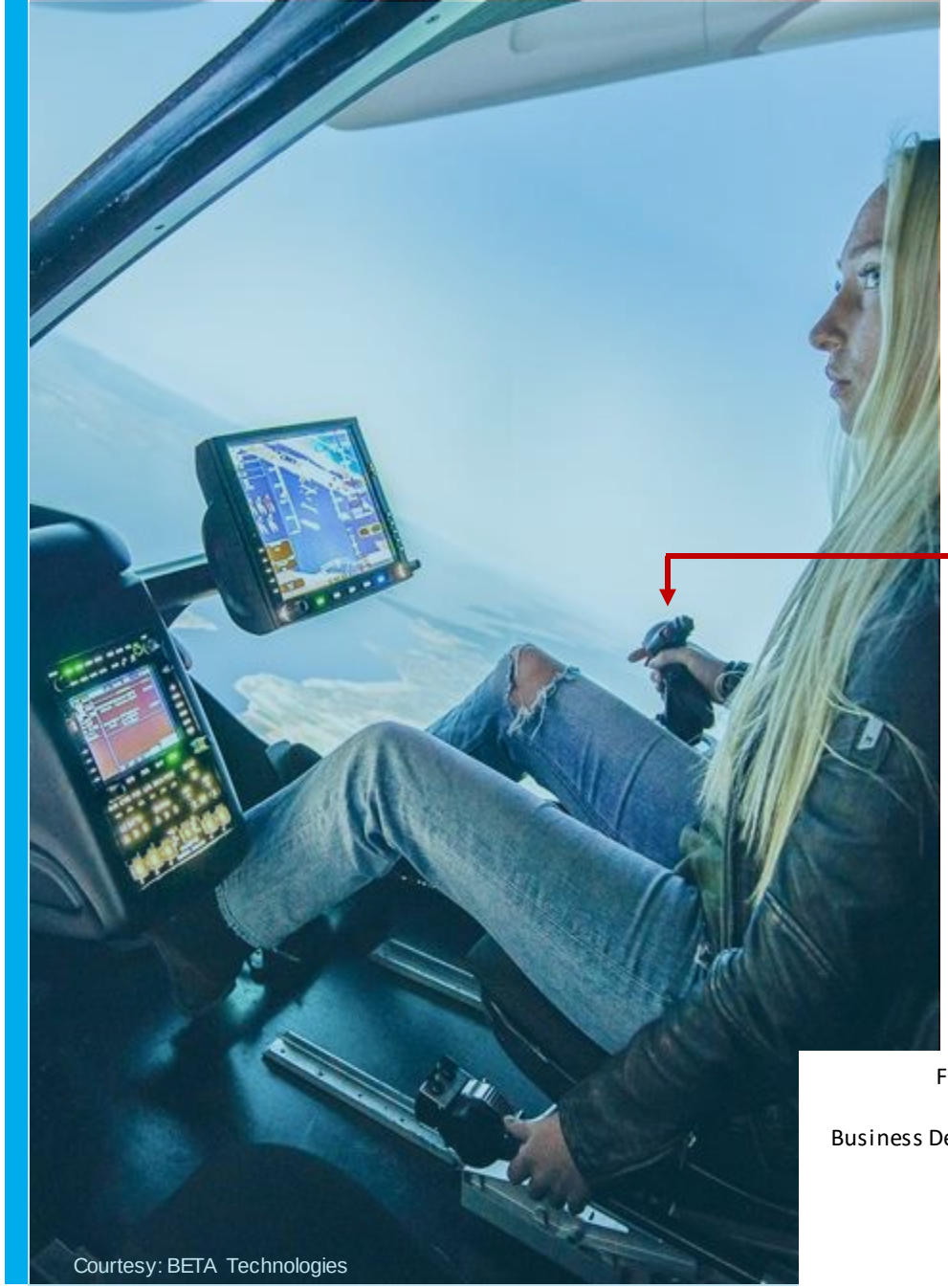
Passive Inceptor (Side stick)

Typical Product Specification	Performance Parameters
General Requirements Specification	SAE ARP6001B; EASA MOC-SC-VTOLL, Issue 2
Features	Self centering, Independent three-axis device for Pitch, Roll and Yaw control Plug and Play Design Available in single and two axis configurations Option available for autopilot breakout
Mechanical Range	Customizable Travel Up to ± 20 Degrees for each Axis
Operating Force	Customizable operating force for each axis with built in redundancy
Sensing Technology	Up to 4-channel RVDTs for each axis
Grip	Customizable design and switch functionality (Multiple switches can be provided)
Damping Force	Included in each Axis
Tactile Indication Function	Included within Grip (when specified)
Accuracy	+/- 2% of Full Scale for each Axis
FOD Protection	Protective Boot Around Bottom of Grip
Signal Output	Analog, ARINC429, CANBUS
Weight	7.0 lbs Max
Operating Temperature	-15°C To +55°C (5°F To +131°F)
MTBF	> 40,000 Flight Hours
Qualification Spec. (Planned)	RTCA/DO-160G



Courtesy: BETA Technologies

Three-axis inceptor, analog output

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Sensata Technologies

Inceptor Development Focus

- Performance and Innovation
  - Compactness to fit in Small Cockpit environment
    - Smallest, and most light weight design in its application class (single Seat, 3 or 4 axis, Flyable unit)
  - Customizable features for optimum human factors, and performance needs
    - Travels, operating forces (Including asymmetric forces), grip, and switches, number of position sensors per axis
  - Modularized Sub assemblies within Inceptor
  - Plug and Play design
- Safety
  - Meets single point failure requirements
    - Dual path design elements from Grip to sensors
    - Redundant sensors and springs in each axis
    - Mechanical components with multi-surfaces to resist crack propagation
  - Jam mitigation measures
    - Bearing installation fits allow operation under jam conditions
    - Internal FOD Protection
    - External FOD protection using Aesthetically design boot
  - Designed to withstand up to 300 lbs load applied at the GRP (Grip reference point)

General Inceptor Development Progress

- Piece part FMEA analysis complete for 3 axis type inceptor
- Design Reviewed by DERs and FAA East Coast Certification Branch (Formerly ACO)
- 3 Axis Inceptor successfully completed following Safety of Flight (SOF) testing
  - Temperature testing per section 4 of DO-160G
  - Operational Shock and Crash safety impulse tests per section 7 of DO 160G
  - Vibration test per section 8, cat R: Type 1(Helicopter), Zone 2, Curve G, sine on random per DO 160G
  - Endurance testing (as part of SOF) 10,000 cycles per axis
- Flight test campaign in progress
- Qualification testing per DO 160G planned in Q2, 2024

Sensata Inceptor Safety Features

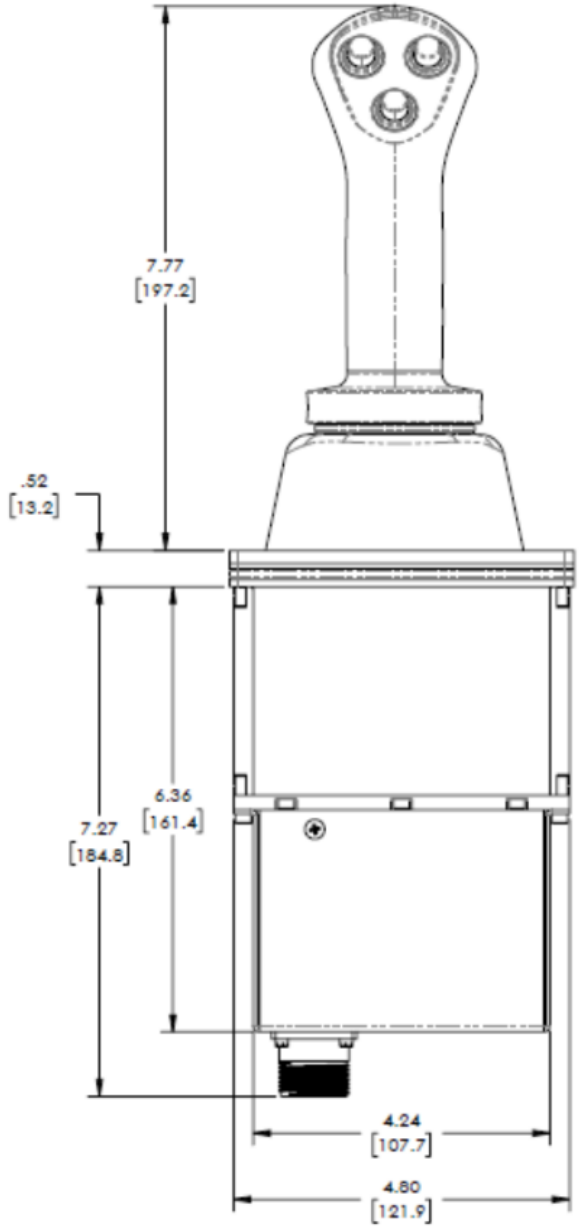
The safety features described herein were subjected to multiple reviews with DERs and familiarization review with the FAA (Inceptor design is a platform that is used in other similar eVTOL applications).

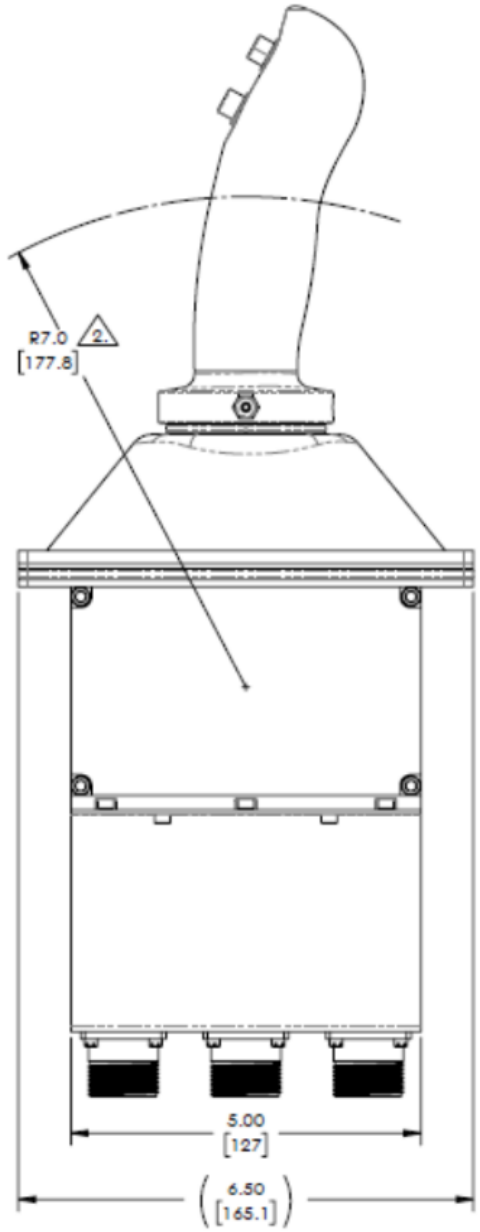
Results of the reviews were favorable and complimentary to the level of detailed thought and considerations for the safety elements of the design. These considerations include:

- Dual Paths from Grip to position Sensors
- Anti-Jam provisions
- Redundant feel and centering design
- Multi-channel sensors for each axis
- Electrical Separation at Interface Connectors
- Internal and external FOD Protection

RH Inceptor 3-Axis Design Envelope Dimensions

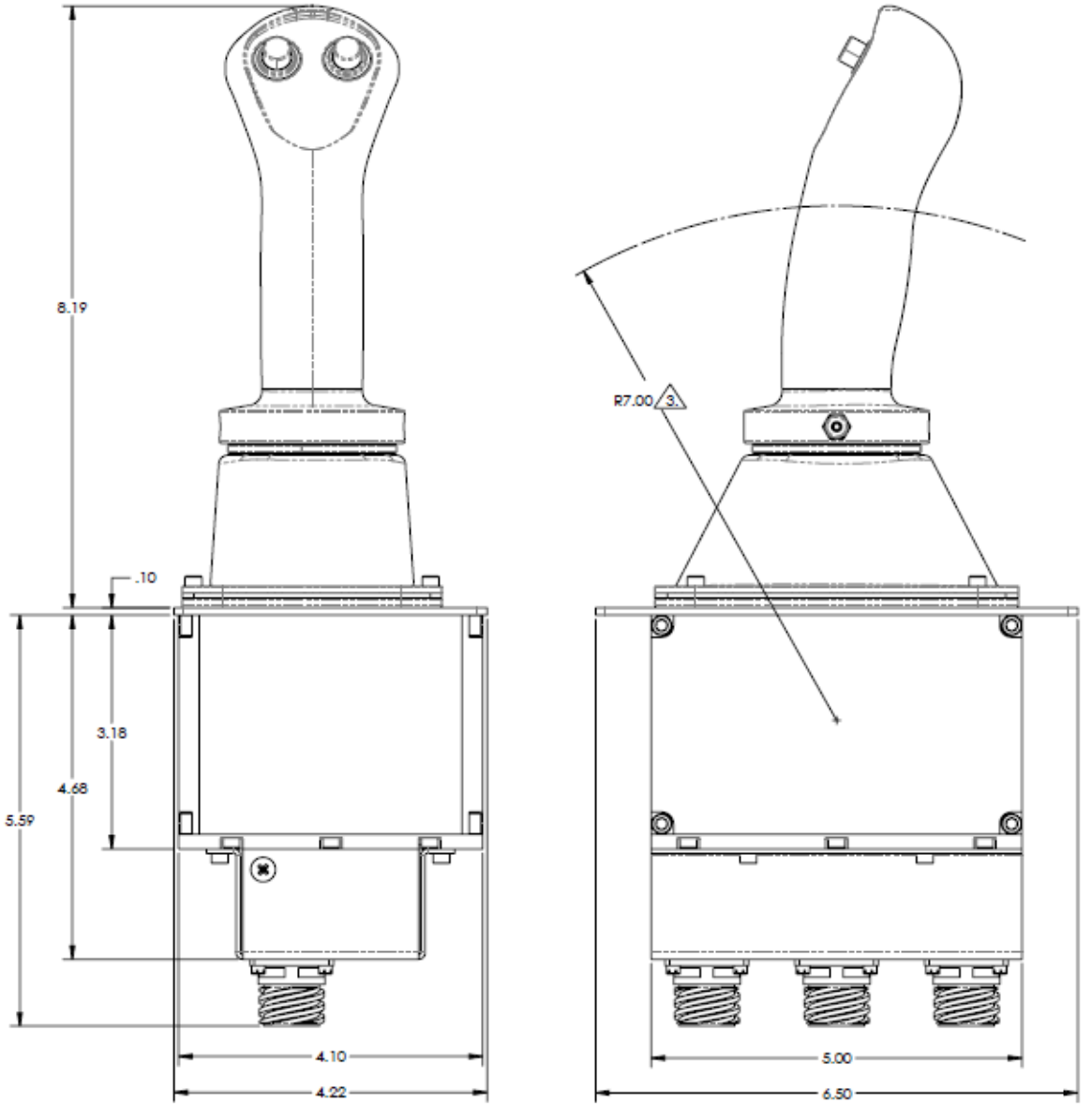
- Three-Channel RVDT Output
  - Expandable to 4 channels
- Feel and Centering Springs
  - customizable force and Travel
- Damping
- Grip LRU
  - customizable design
- Estimated Weight: 7 lbs





RH Inceptor 2-Axis Design Envelope Dimensions

- Three-Channel RVDT Output
  - Expandable to 4 channels
- Feel and Centering Springs
  - Customizable force and Travel
- Damping
- Grip LRU
  - Customizable design
- Estimated Weight: 5.5 lbs



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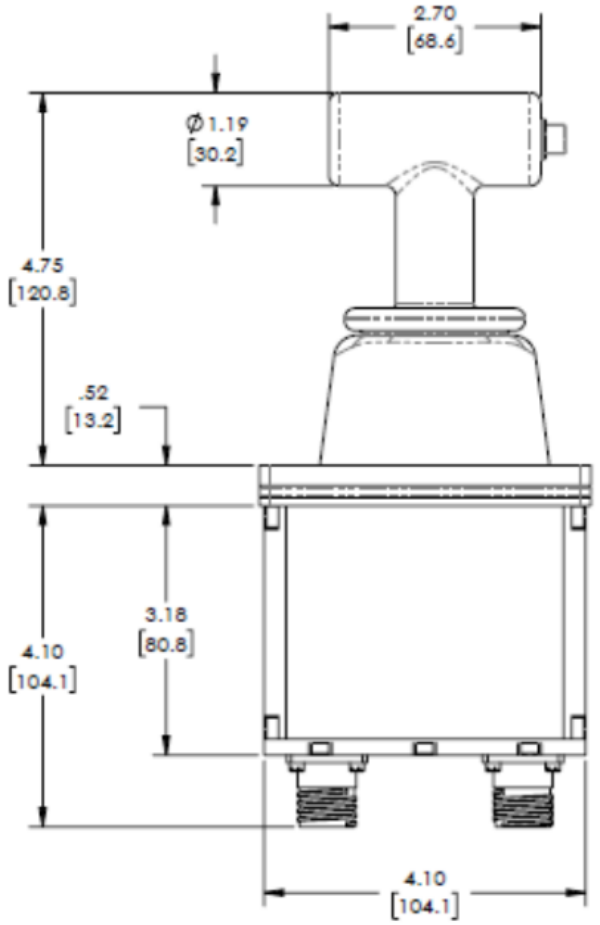
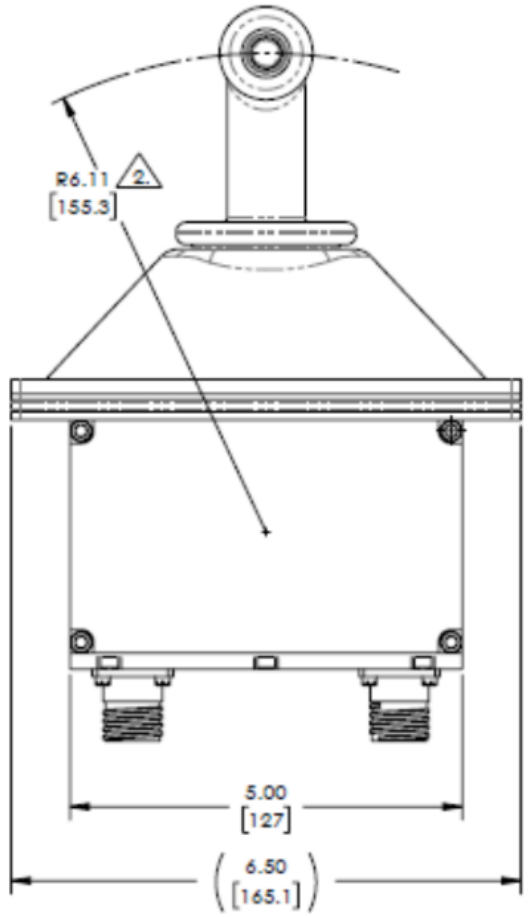
LH Inceptor Single Axis Envelope Dimensions

- Same building blocks as 3 axis Inceptor
  - Roll/ Yaw axes removed.
- Three-Channel RVDT Output
- Feel and Centering Springs
- Damping
- Grip LRU
- Estimated Weight: 4.0 lbs





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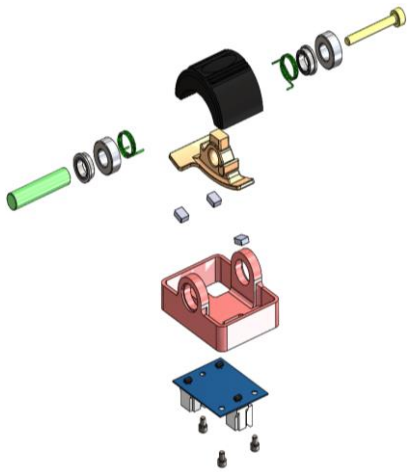
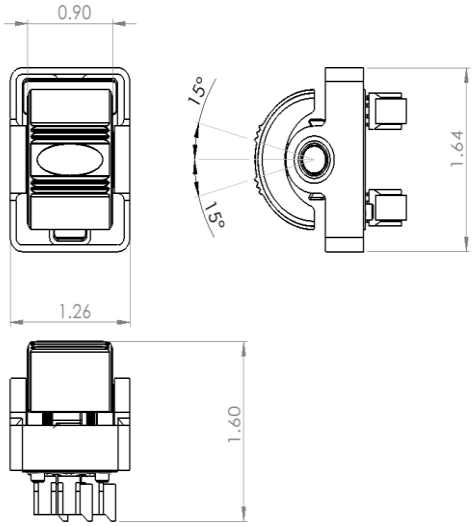
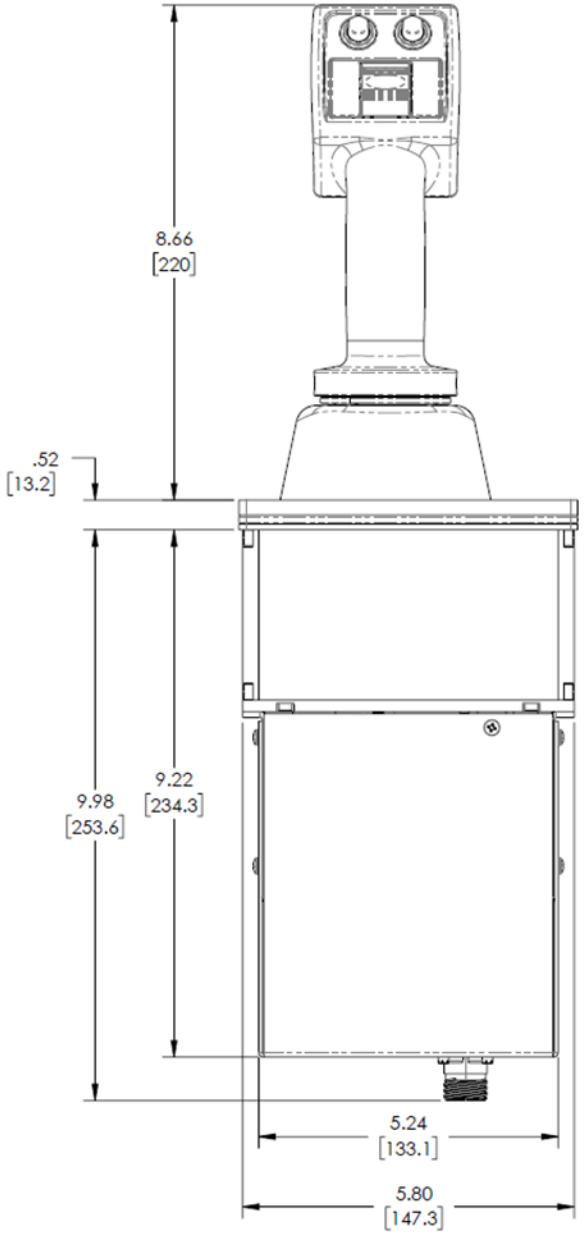
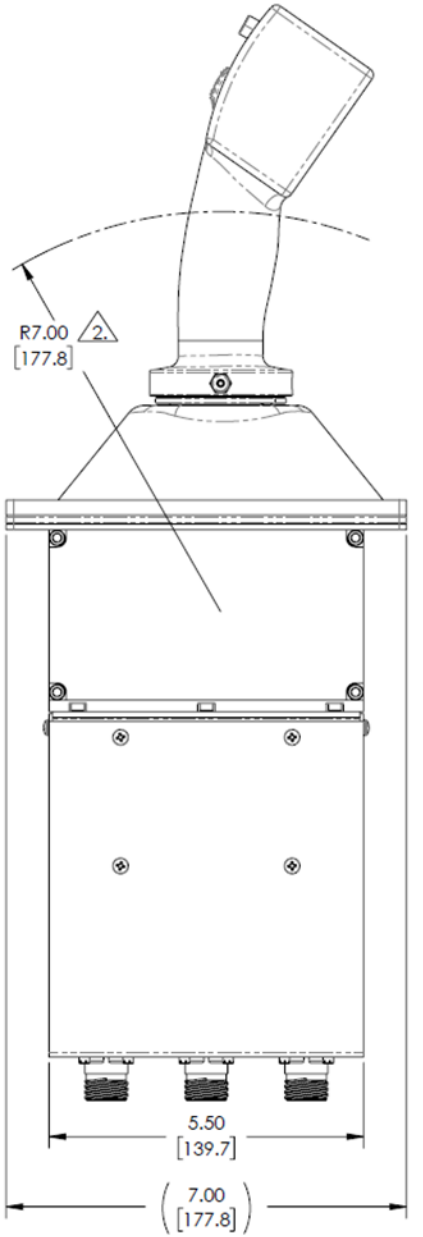
RH Inceptor 4-axis with Digital Output Envelope Dimensions

- 3 channels in each axis
  - Expandable to 4 channels
  - Sensata is developing 3/4 channel Thumbwheel design Based on exiting single channel unit
- Digital output for all axes - ARINC 429 based
- Includes Asymmetric force operation
- Available in Analog output (smaller Envelope)
- Estimated weight: 10 lbs









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