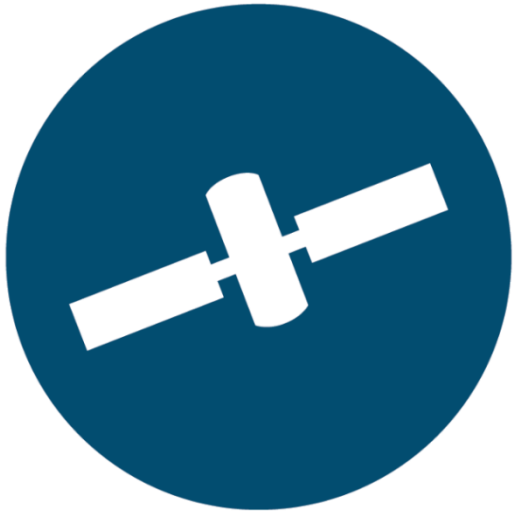


HYPERION TECHNOLOGIES

UNISEC WORKSHOP, JULY 2015

Introduction

Hyperion Technologies B.V.

Founded August 2013

Started activities in 2011

Founders:

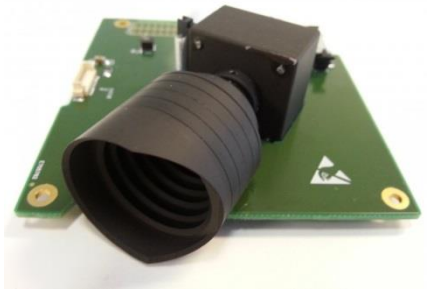
- Bert Monna
- Cor in ‘t Veld
- Steven Engelen

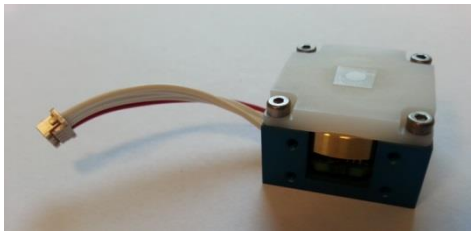
Currently with 7 people

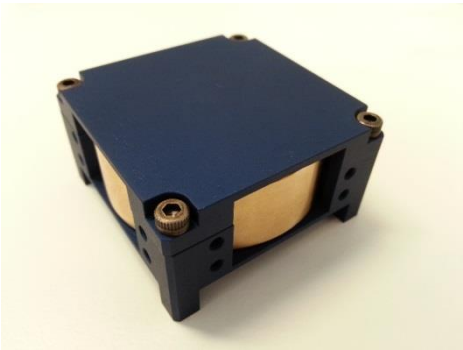
Main activities

- Development of subsystems and components for small satellites
- Consulting on small satellites and missions
- Customer specific development of hardware and software, mainly for small satellites and other high-tech applications

Subsystems and components







Already developed

- Star trackers
- ADCS (including reaction wheels, magnetorquers)
- Power and Interface Control Units (data acquisition)

In development (on the horizon)

- OBC & payload processing platforms
- Transmitters and receivers
- Antennas and antenna systems
- Payloads

Vision

- Develop high-performance, best-in-class systems for small satellites
- Use of COTS components when available and possible
- Extensive testing
  - Thermal vacuum
  - Vibration
  - Radiation
- High Performance and High Reliability
  - Robust
  - Failure tolerant
  - Similar to professional systems

Currently available systems

Star tracker

ST200 (CubeSat version):

World’s smallest star tracker

Stand alone device

< 30 arcseconds accuracy(3-sigma)

Magnitude 6 stars

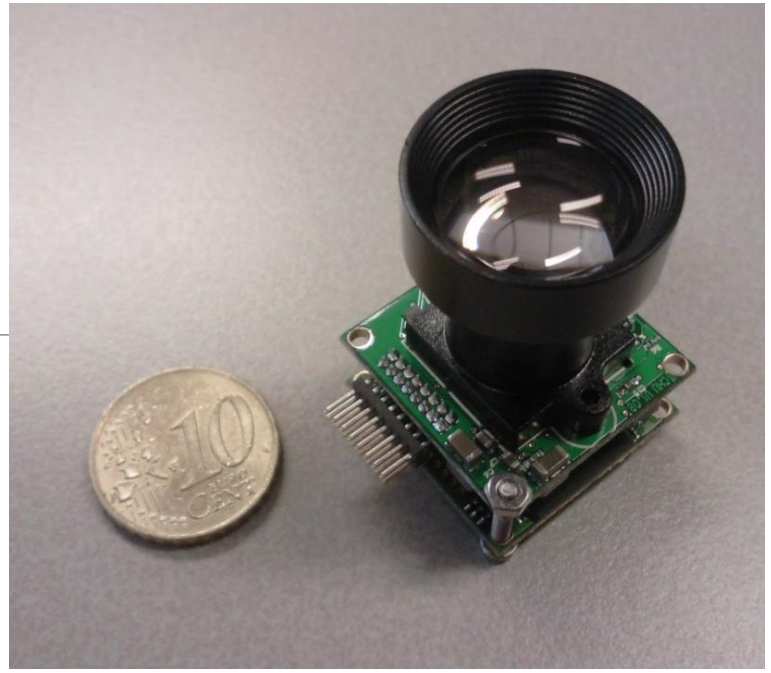
600 mW average power consumption

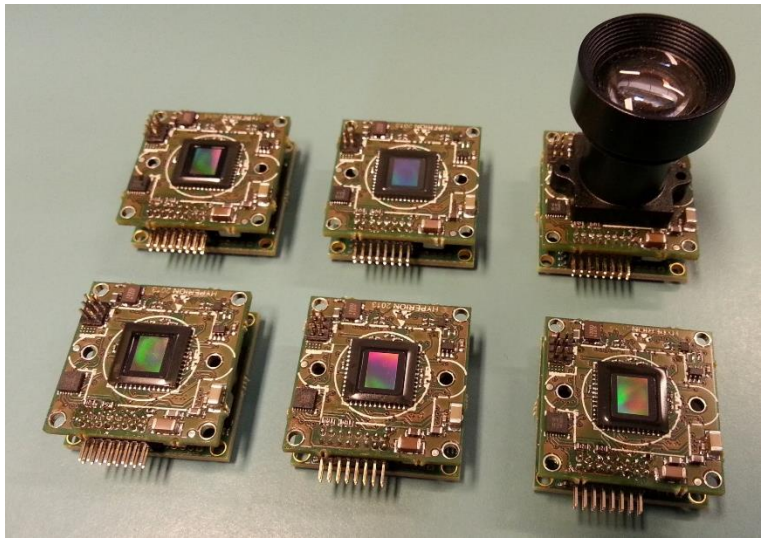
5 Hz update rate

Optional integrated IMU

Also available as microsatellite version

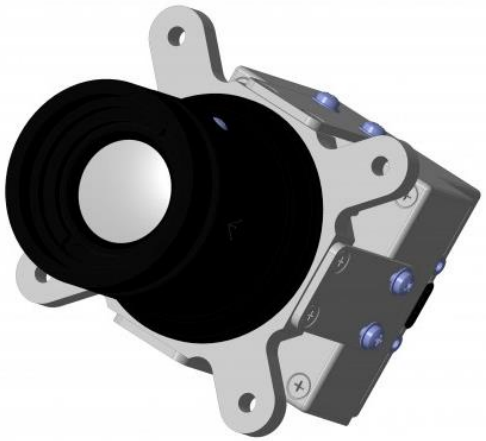
Market readiness: Currently available





Star tracker

ST400 (Microsatellite version):



Stand alone device

< 15 arcseconds accuracy(3-sigma)

Magnitude 6 stars

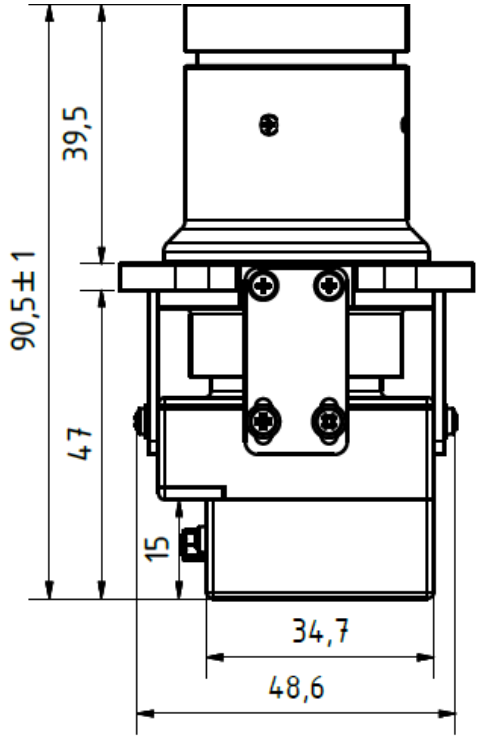
< 700 mW average power consumption

5 Hz update rate

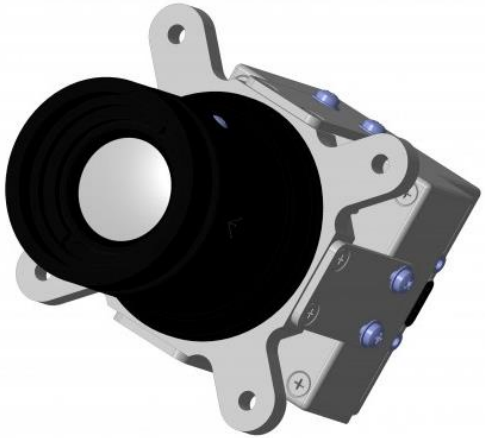
Radiation tolerant

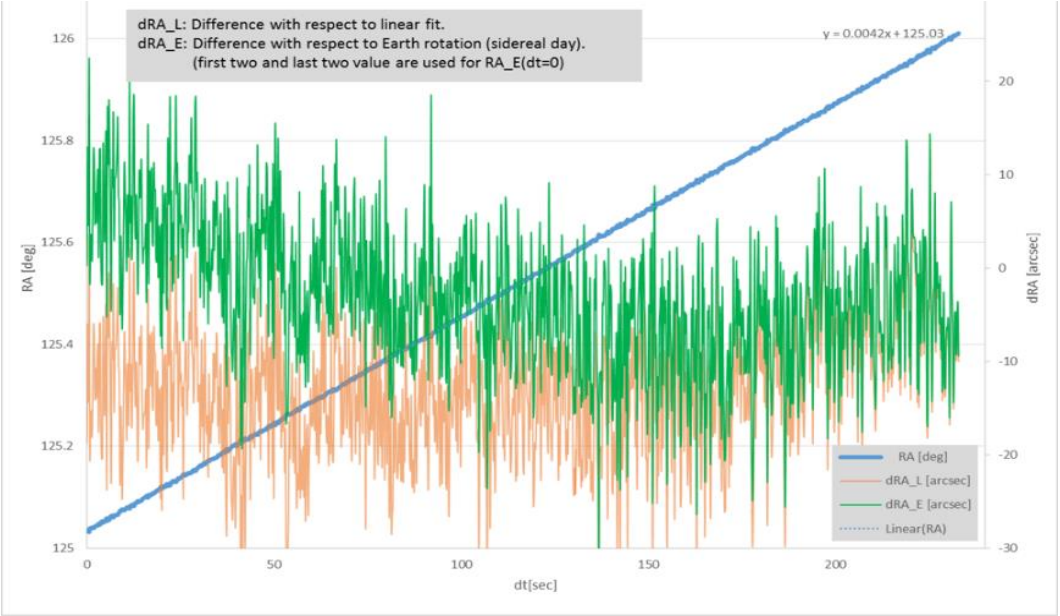
Larger baffles available

Modified version of star trackers developed for application on an ISS payload



Star tracker





Data Sheet Value 10 arcsec RMS
Measured at delivered devices: 7-8 arcsec RMS

BST has tested the iADCS star tracker at real sky

Power and Interface Control Unit

Redundant RS422-interface to spacecraft

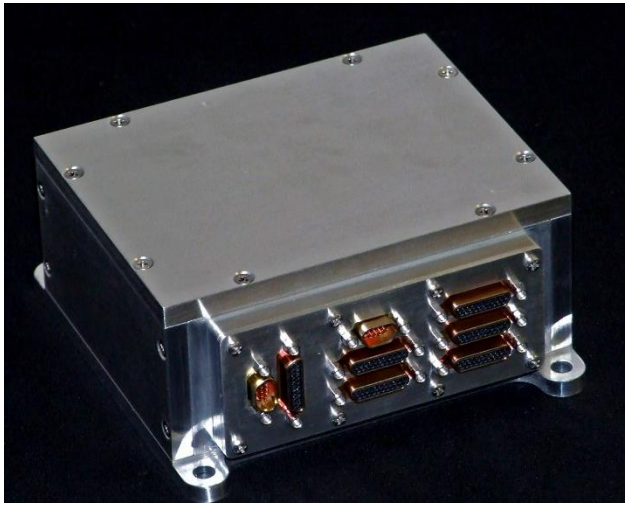
8 slave devices

- 6 gyroscopes (fibre optic, space grade, non-Hyperion Technologies)
- 2 star trackers
- Heaters for all devices

Synchronous sampling and time stamping

Isolated power supply

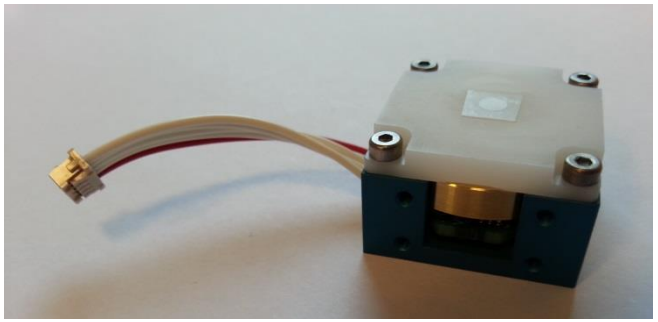
Radiation tolerance (qualified, ISS certified)



Reaction Wheels

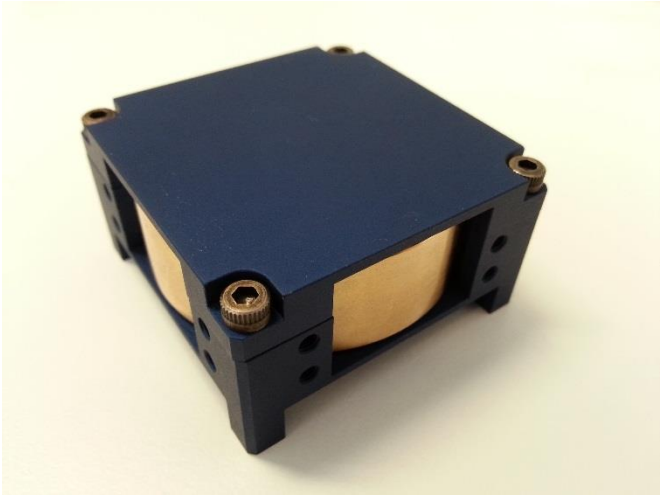
HT-RW200/RW210 Series

- 25x25x15 mm^3
- Intended for small (up 4U) CubeSats
- Three models:
  - HT-RW200.15: 1.5 mNms, available now
  - HT-RW210.30: 3.0 mNms, available August 2015
  - HT-RW210.60: 6.0 mNms, available August 2015



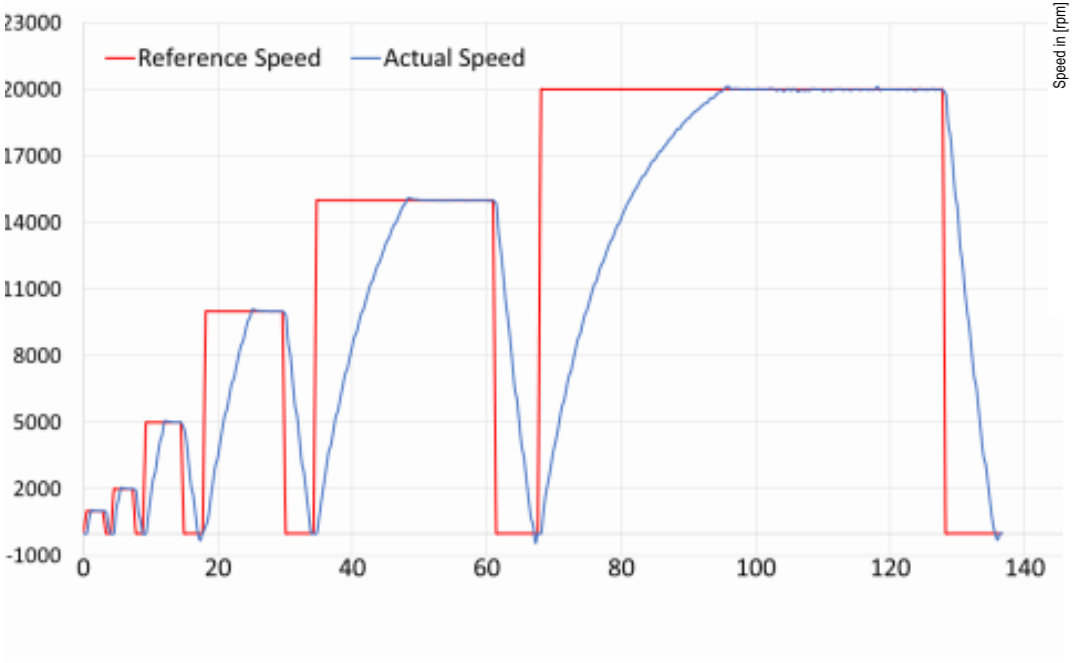
HT-RW400 Series

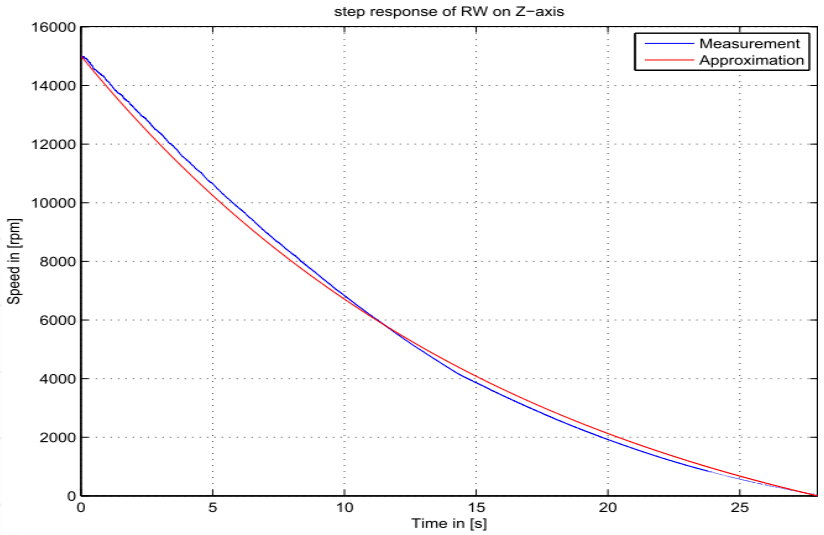
- 50x50x27.5 mm^3
- Intended for 6-12U CubeSats
- Three models planned:
  - HT-RW400.30: 30 mNms, lower cost
  - HT-RW400.30P: 30 mNms, higher torque, reduced vibration
  - HT-RW400.60: 60 mNms
- Under development. RW400.30 is expected to be market ready by July/August 2015.

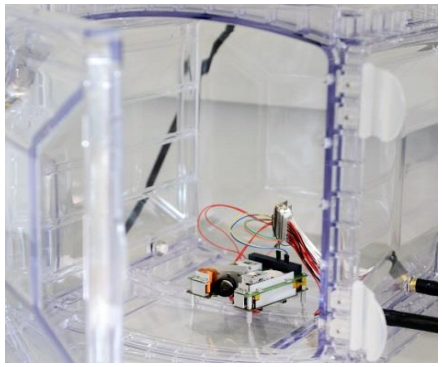


Reaction Wheels

HT-RW200.15 run-down and step-response tests in vacuum







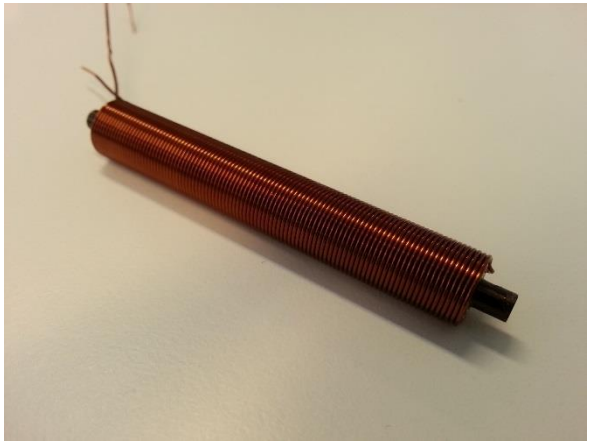
Magnetorquers

HT-MTQ200 Series

- 80x11x11 / 25x19x19 mm^3
- Intended for small (up 4U) CubeSats
- Highly efficient
- Two models:
  - HT-MTQ200.20: 0.2 Am^2 , 100 mW, boost to 1 Am^2
  - HT-MTQ200.15: 0.15 Am^2, 300 mW, boost to 0.25 Am^2

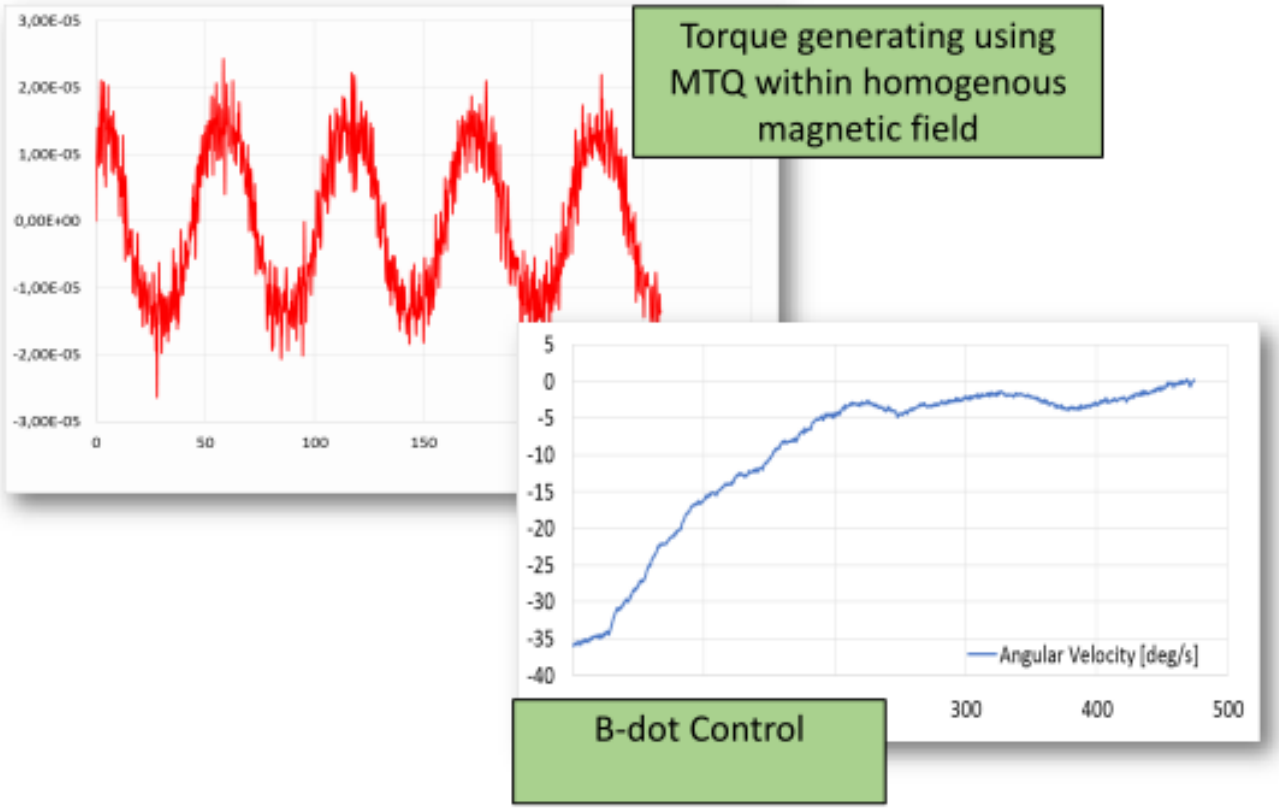
HT-MTQ400 Series

- 80x12x12 / 65x16x16 mm^3
- Intended for 6-12U CubeSats
- Highly efficient
- Two models:
  - HT-MTQ400.50: 0.5 Am^2, 300 mW, boost to 2 Am^2
  - HT-MTQ400.40: 0.4 Am^2, 500 mW, boost to 1.5 Am^2



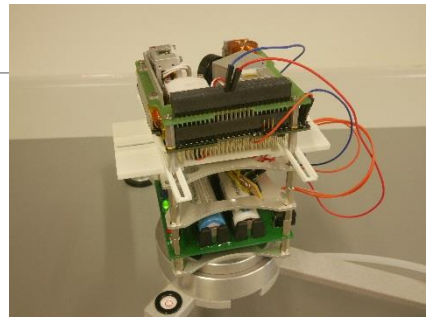
Magnetorquers

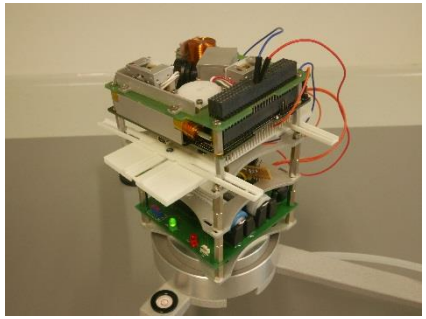
Test using Helmholtz cage and air-bearing

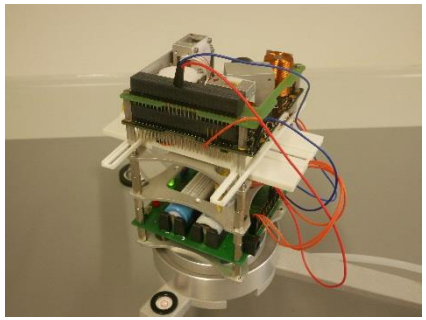


Torque generating using MTQ within homogenous magnetic field

B-dot Control







iADCS-100

¼ unit CubeSat compatible

Pointing knowledge < 30 arcseconds

Pointing accuracy << 1 degree

< 1.8 W power consumption (< 3W peak power)

Fully autonomous modes:

- Target tracking
- Sun pointing
- De-tumbling
- Nadir pointing

3 axes stabilization for up to 3U CubeSats

- Reaction wheels
- Magnetorquers

First FM units scheduled to be delivered Dec 2014.

iADCS-400

0.7 unit, CubeSat compatible, based on iADCS100

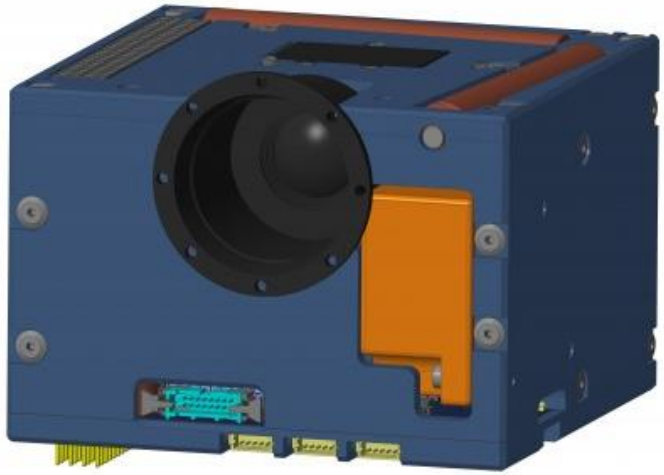
Pointing knowledge < 30 arcseconds

Pointing accuracy << 1 degree

< 6 W power consumption (peak power)

Fully autonomous modes:

- Target tracking
- Sun pointing
- De-tumbling
- Nadir pointing



3 axes stabilization for 6-12U CubeSats

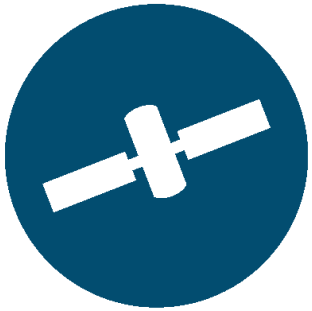
- Reaction wheels (30 mNms, 2 mNm torque. 5 mNm is optional)
- Magnetorquers (0.5 Am^2)

Market readiness expected September 2015

Upcoming systems
(preliminary data)

- ADCS (CubeSats and small sats)
  - iADCS 600: 1U, aimed at 12-24U CubeSats and small sats
  - iADCS 800: 1.5U, 2x ST200, aimed at 24-36U CubeSats and small sats
- Reaction wheels (CubeSats and small sats)
  - HT-RW600: 75x75x20 mm, >125 mNms
  - HT-RW800: 95x95x20 mm, >300 mNms
- Magnetorquers (CubeSats and small sats)

Contact information



HYPERION TECHNOLOGIES

Hyperion Technologies B.V.

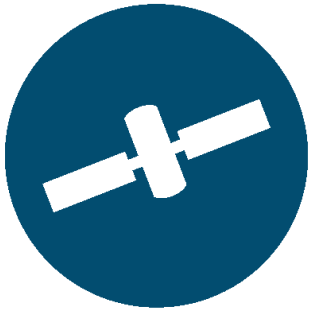
Motorenweg 5h

2623 CR Delft

The Netherlands

www.hyperiontechnologies.nl

Backup slides



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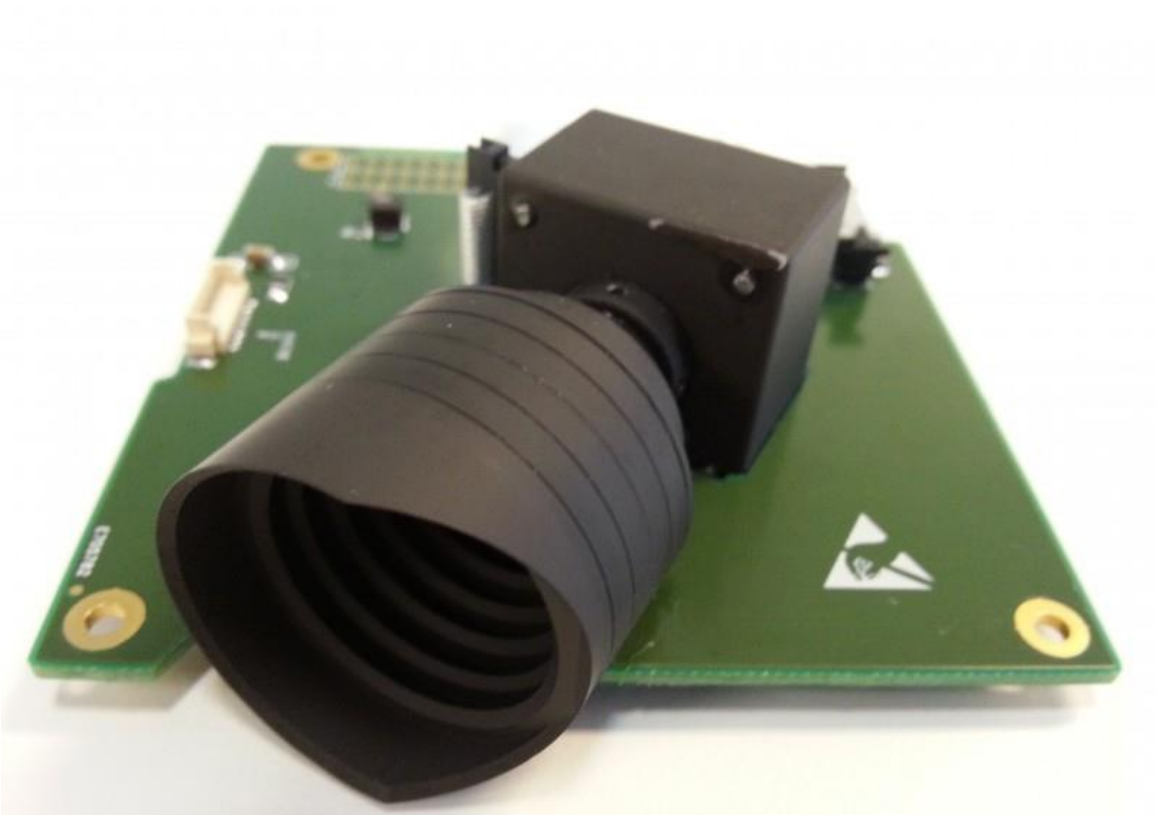
Backup slides



ST200 with 85 degree baffle on PFM carrier PCB