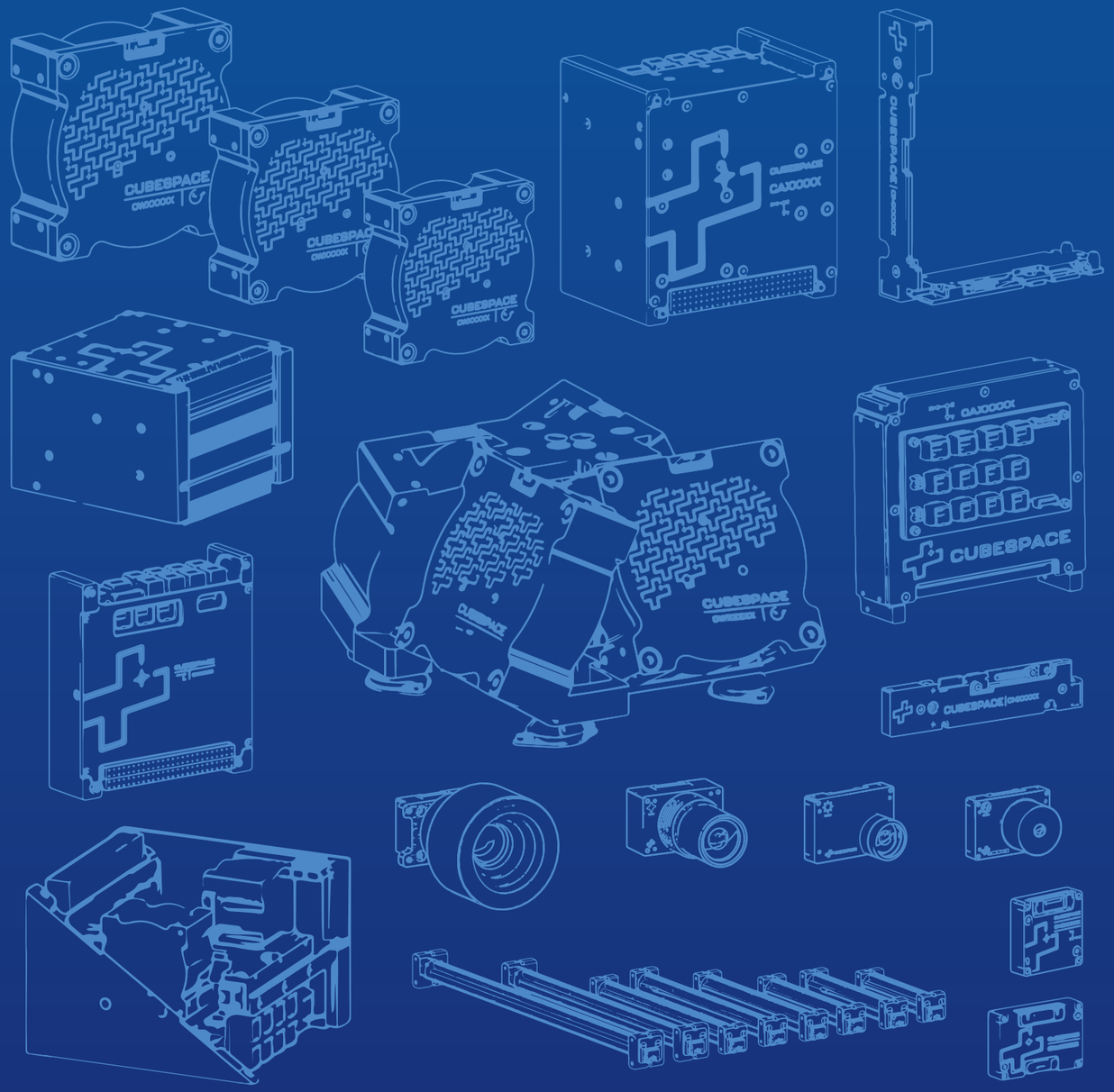
CUBESPACE

PRODUCT CATALOGUE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YOUR MISSION IS OUR INSPIRATION

YOUR GLOBAL ADCS PARTNER

CubeSpace (CS) specialises in class-leading Attitude Determination and Control Systems (ADCS) for small satellites, backed by a decade of flight heritage. Our customer-centric approach means that customers can expect high-quality, space-proven solutions, that are scalable across mission type and size, easy to use, and comes with reliable and comprehensive support from sale through to commissioning.

Furthermore, in response to the industry's growing demand for larger volumes on short lead times, we have more than doubled our production capacity over the past year. By leveraging our modular design philosophy, strategic and distributed supply chain, and advanced production and test automation, we are uniquely positioned to meet the needs of recurrent and constellation customers. Because ultimately, we don't believe that customers should settle.

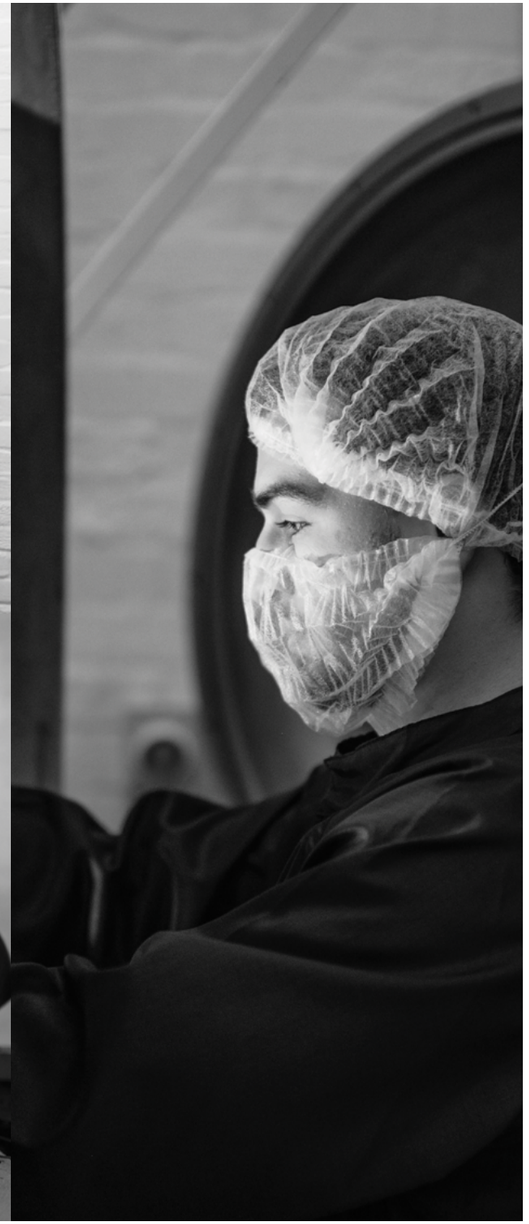
In CS, you have access to a partner offering tailored solutions, on short lead times, at an unparalleled price, which further solidifies our position as the preferred global ADCS partners for spacecraft up to 1 ton.

4600+
COMPONENTS IN ORBIT

470+
ADCS SYSTEMS DEPLOYED

290+
SATISFIED CUSTOMERS

1,750 m² SPACE FACILITY
80 m² CLEAN ROOM



QUALITY CONTROL & ENVIRONMENTAL CONDITIONS RISK MITIGATION

Our satellite subsystems' manufacturing, assembly, integration, and testing adhere to international space standards. We design these subsystems with carefully selected components and subject them to rigorous testing under ESA's ECSS and NASA's GEVS standards, including radiation, vibration, shock, and thermal vacuum tests. Utilising in-house test equipment enables us to validate product performance efficiently and cost-effectively, ensuring reliable and high-quality products and services for our ambitious partners.

CLOSED-LOOP ADCS SOLUTIONS

The ADCS of a satellite is a sophisticated and self-contained system. It demands precise timing and synchronisation, robust fault detection, isolation, and recovery (FDIR) mechanisms, comprehensive power monitoring and switching, meticulous logging and telemetry handling, as well as accurate configuration and calibration of sensors.

Additionally, it relies on complex mathematical models and algorithms. Over the past decade, our team has meticulously refined our ADCS solution to execute these tasks flawlessly; simplifying a complex subsystem into a customisable and scalable plug-and-play solution. The result is a user-friendly, flexible, and modular ADCS solution, that comes with a comprehensive manual and includes both integration and commissioning support.

FEATURES

Proven Estimator And Control Algorithms For All Common Mission Scenarios

Including detumbling, sun-spin, earth target tracking, TDI Imaging with FMC, inter-satellite tracking, and many others.

Integration Of 3rd Party Sensors/ Actuators Where Required

Including reaction wheels, torquers, gyros, and star trackers, including the Sodern Auriga.

Custom Mechanical And Electrical Interfaces

Enabling the ADCS to be adapted to any satellite bus architecture.

GNSS Integration, Orbit Propagation And PPS Synchronisation

GNSS position and velocity through comms interface, with option for direct GNSS or adaptive SGP4.
Timing synchronisation over either IO or differential (LVDS) PPS.

Optional On-Board Power Regulation

Requiring only a single V-BAT supply.

On-Board Bootloader For In-Orbit Re-Programmability

Including ADCS computer and all sensors and actuators.

Modular Design, With Either Integrated Or Distributed Sensors/ Actuators

Compact integrated systems for 3-6U, and distributed systems for flexible, larger satellite architectures including SmallSats.

Optional Integrated Damping On Reaction Wheels

Reducing reaction wheel micro-vibrations and reducing jitter for high-accuracy EO applications.

Built-In FDIR Mechanisms For Robust Operations

Including power monitoring and switching of sensors/actuators.

TLM Logging In Non-Volatile Memory

On-board TLM logging for later download by OBC.

API Library For OBC Operating System

Full autogenerated software API library for easy integration with OBC software.

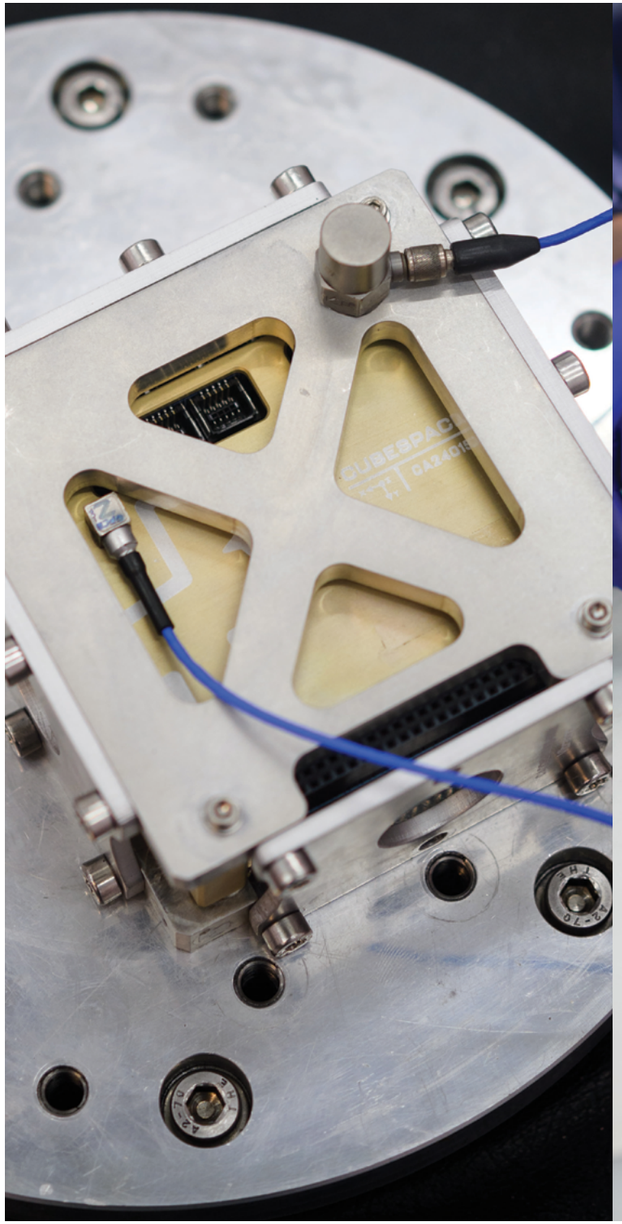
User-Defined Mounting Configuration For Sensors/Actuators

Software configurable sensor and actuator orientation for flexible mounting in satellite.

SIMULATION & HIL FUNCTIONALITY

CubeSpace (CS) offers customers the option of purchasing our graphical satellite simulator, D2S2, with ADCS plug-in, available as an annual subscription. This software empowers customers to build their own unique mission scenarios, test con-ops, and obtain accurate pointing and power budgets.

Additionally, when utilised in conjunction with the ADCS solution FM or DM (development model) core, in hardware in the loop (HIL) mode, it can be a fully representative EM FlatSat without the need for physical actuators and sensors. In this instance, D2S2 will emulate space conditions to convincingly simulate the ADCS hardware in orbit. Customers can also utilise the ADCS solution DM core to develop their own OBC<>ADCS software interface.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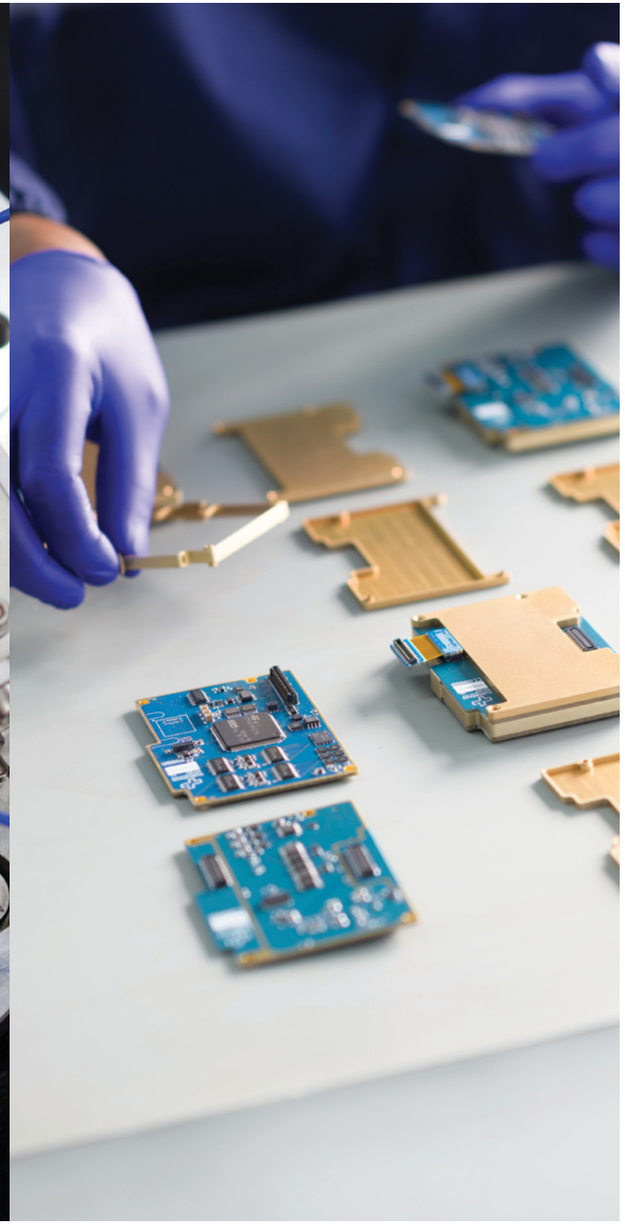
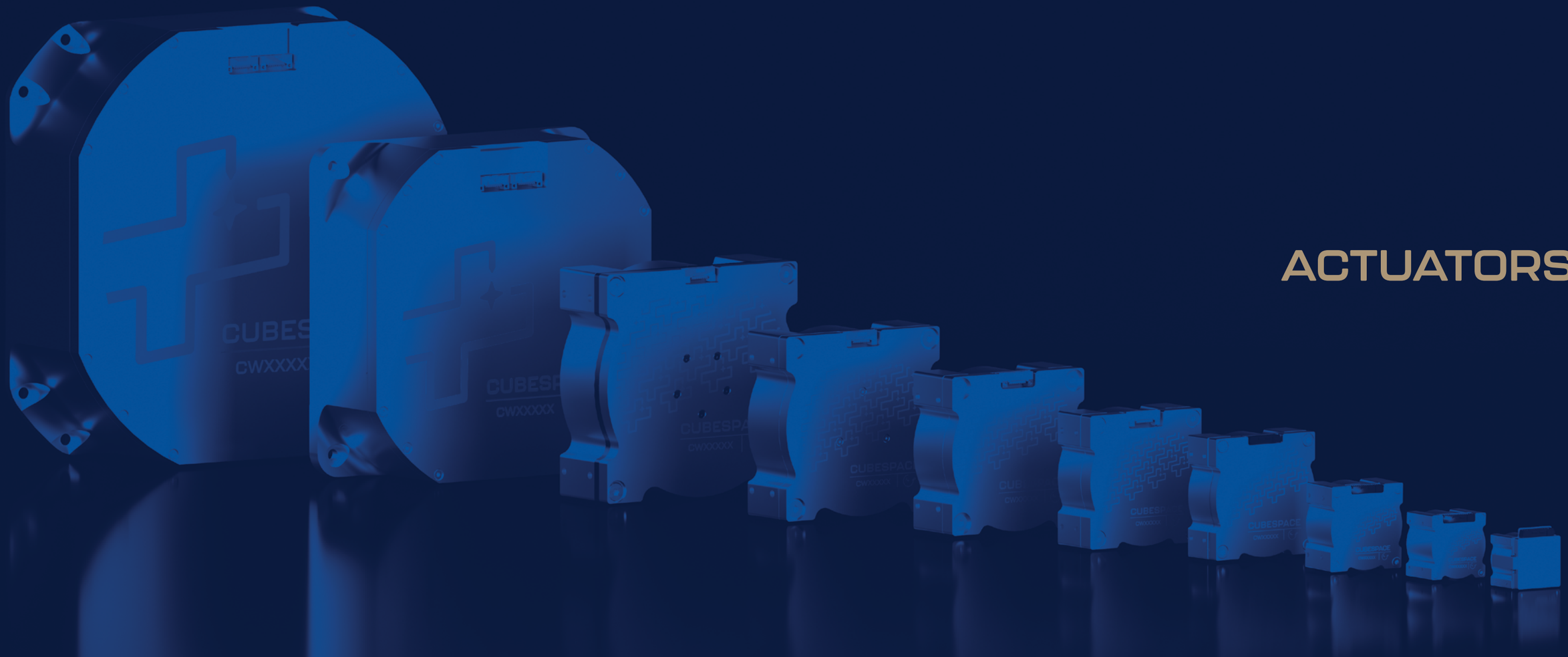
GARAGE





ACTUATORS

REACTION WHEEL

12 WEEKS LEAD TIME | 5+ YEARS LIFETIME | 24kRad RADIATION | 14.16 g RMS RANDOM VIBRATION

Robust, Reliable, High-Performance Reaction Wheel

CubeSpace (CS) offers a wide range of robust reaction wheels perfect for CubeSats and SmallSats. Our reaction wheel range is designed for precision performance, reliability, ease of use, and manufacturability. Featuring a modular, space-proven design with in-house designed motors, high-load space-rated bearings, and advanced lubrication, our wheels can be easily optimised to meet the requirements of all high-performance missions.

Additionally, our wheels are meticulously balanced using our state-of-the-art automated laser balancing machines. After balancing, micro-vibration performance is measured and verified using precision micro-vibration testing. Our wheels' ultra-low vibration, with the option of adding damping, makes our reaction wheels the ideal choice for missions requiring high precision and stability. With a distributed supply chain and automated production processes, the CS reaction wheel range offers robust, customisable, high-precision wheels that can be rapidly manufactured at high volumes and competitive pricing.

FEATURES

IN-HOUSE MOTOR DESIGN FROM CW0500

Offering fully optimised motor design, bearing and lubricant selection, and enabling mass manufacturing

PYRAMID MOUNTING CONFIGURATION AVAILABLE WITH OPTION OF DAMPERS

Enables increased momentum storage and 3-axis redundancy with reduction in micro-vibrations

COMMON NODE DESIGN

Standardised interfaces and functionality shared between all Gen 2 products

MAGNETICALLY SHIELDED WITH INTERNAL MU-METAL SHIELDING

Reduced magnetic interference and more compact design

INTEGRATED DRIVE ELECTRONICS

Radiation-tolerant electronic drive circuit and speed controller

ROBUST MOUNTING OPTIONS

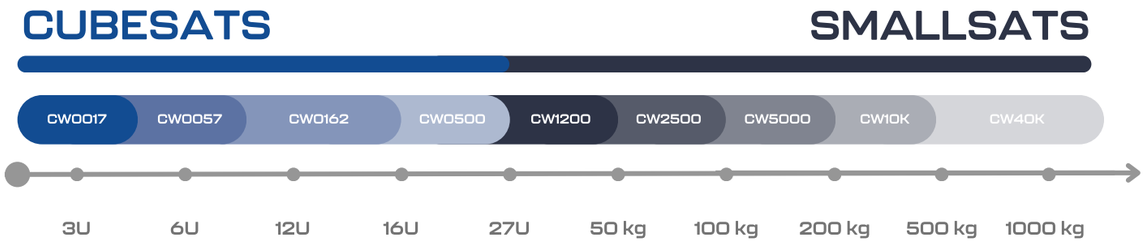
Provides flexibility in satellite design and layout

ROBUST MECHANICS

A robust design with increased vibrational load capacity

REACTION WHEEL RANGE AT A GLANCE

Rooted in a decade of flight heritage, the Reaction Wheel product range offers robust, high-precision wheels with standardised interfaces, which allow for their seamless integration with any satellite architecture. Additionally, given their modular design, and extensive qualification testing, they are ideal for missions of any size, including those with extended lifetime requirements.



*PRELIMINARY SPECIFICATIONS

REACTION WHEEL	CW0017	CW0057	CW0162	CW0500
PERFORMANCE				
Nominal Motor Supply Voltage [V]	6.4	11	11	12
Max Speed @ Nominal Voltage [RPM]	10 000	10 000	10 000	10 000
Rated Momentum [mNms]	1.77	5.7	16.2	50
Speed @ Rated Momentum [RPM]	8 000	6 000	6 000	5 810
Torque @ Rated Momentum [mNm]	0.23	2	7	10
Imbalance	All reaction wheels are balanced according to IS0-1940 G0.4 (High-PrecisionSystems) or better.			
PHYSICAL				
Mass [g]	60	115	144	322
Dimensions [mm]	28x28x26	35x35x24.2	46x46x24.2	66x66x26
POWER & DATA				
Data Bus	CAN/UART/I2C/RS-485			CAN/UART/RS-485
Connector	Molex Micro-Lock Plus			
Digital Supply Voltage [V]	3.3	3.3	3.3	3.3
Motor Supply Voltage Range [V]	6.4-16.8	6.4-16.8	6.4-16.8	12-24
Nominal Steady-state Power: at rated momentum [W] (Includes digital power)	<0.3	<0.8	<0.8	<3.4
Peak Power: Accelerating at nominal torque, at rated momentum [W] (Includes digital power, excludes Inrush at start-up)	0.9	2.7	7.2	15
QUALIFICATION LEVEL				
Radiation (TID)	24 kRad			
Vibration	14 g RMS (NASA GEVS)			
Shock	1500 g			
Thermal (Vacuum) [°C]	-20 to 80 °C			
Thermal (Hot & Cold Start) [°C]	-35 to 70 °C			

	CW1200	CW2500	CW5000	CW10K*	CW40K*	CW100K*
Nominal Motor Supply Voltage [V]	12	24	24	24	24	TBD
Max Speed @ Nominal Voltage [RPM]	10 000	8 000	8 000	7 000	6 000	TBD
Rated Momentum [mNms]	0.12	0.25	0.5	1.0	4.0	10.0
Speed @ Rated Momentum [RPM]	5890	5246	5090	5200	3450	TBD
Torque @ Rated Momentum [mNm]	20	27	37	40	120	TBD
Imbalance	All reaction wheels are balanced according to IS0-1940 G0.4 (High-Precision Systems) or better.					TBD
Mass [g]	490	750	1 140	1460	3850	TBD
Dimensions [mm]	73x73x31.8	86x86x36.4	100x100x37.5	124x124x46	180x180x64	TBD
Data Bus	CAN/UART/RS-485					TBD
Connector	Harwin Gecko SL					TBD
Digital Supply Voltage [V]	3.3	3.3	3.3	3.3	3.3	TBD
Motor Supply Voltage Range [V]	12-24	16-36	16-36	16-36	16-36	TBD
Nominal Steady-state Power: at rated momentum [W] (Includes digital power)	<4	<11	<9	TBD	<16	TBD
Peak Power: Accelerating at nominal torque, at rated momentum [W] (Includes digital power, excludes Inrush at start-up)	32	33	50	TBD	100	TBD
Radiation (TID)	24 kRad					
Vibration	14 g RMS (NASA GEVS)					
Shock	1500 g					
Thermal (Vacuum) [°C]	-20 to 80 °C					
Thermal (Hot & Cold Start) [°C]	-35 to 70 °C					

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8 WEEKS LEAD TIME

5+ YEARS LIFETIME

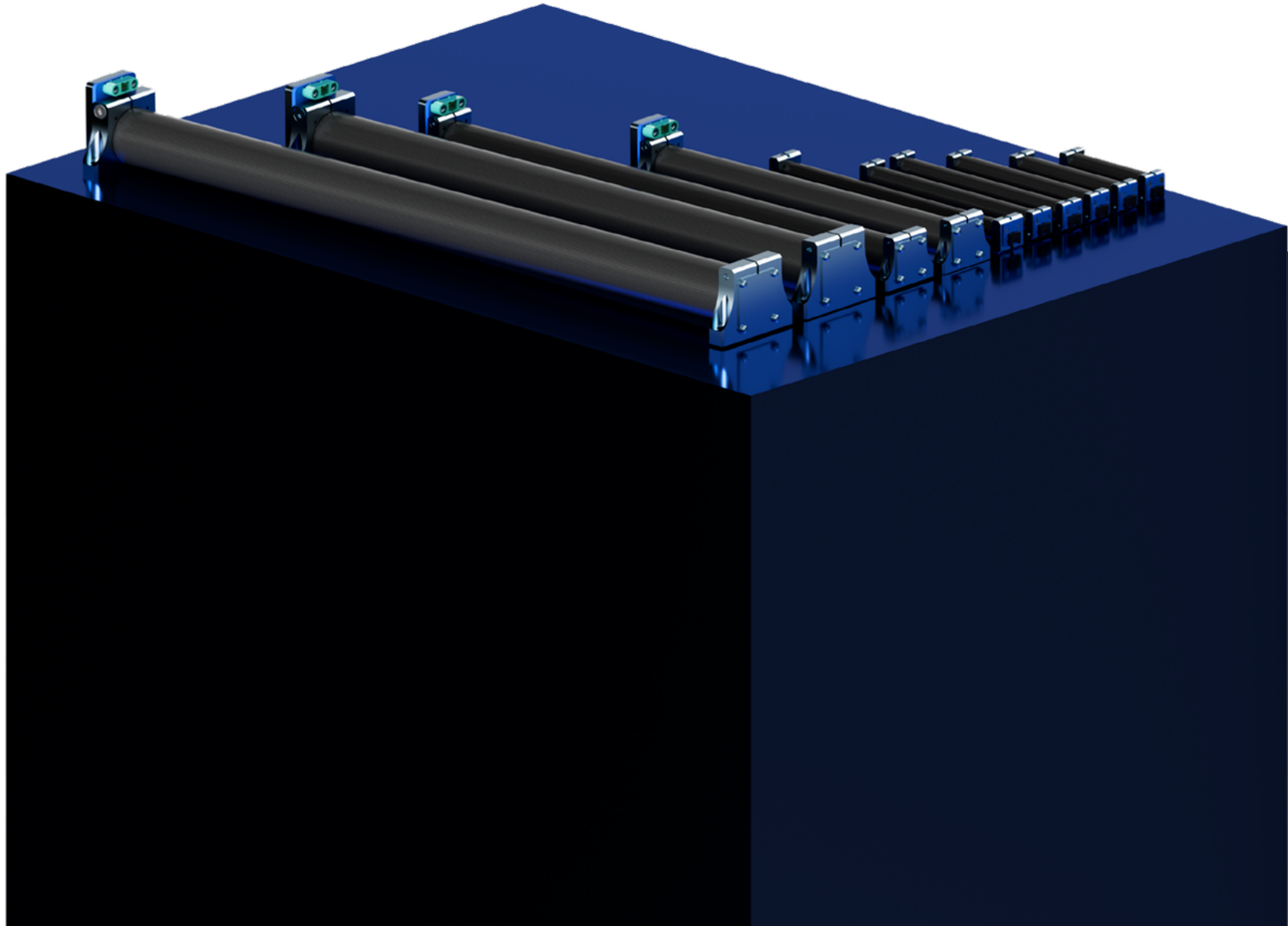
>95% HIGH LINEARITY

14.16 g RMS RANDOM VIBRATION

MAGNETORQUERS

Robust, Compact and Customisable Magnetic Torquers

At CubeSpace (CS) our extensive range of space-proven magnetic torquers are built using automated machinery and go through rigorous testing, ensuring absolute repeatability, and enabling high volumes at low cost. With their compact design, low-profile connectors, and robust mounting options, they are perfectly suited for satellites where space and mass are of high priority. Our new microsatellite magnetorquer range delivers dipole moments from 5 to 20 Am², extending the performance and reliability trusted in our Nanosat magnetorquers to larger platforms.



FEATURES

EXTENDED PRODUCT LINE

Wider range, 0.2 to 20 Am²

ROBUST MOUNTING

Versatile mounting options for ease of integration

HIGH MAGNETIC GAIN

Optimised core and windings for performance

HEAT TREATED CORE

For low remanence and high linearity

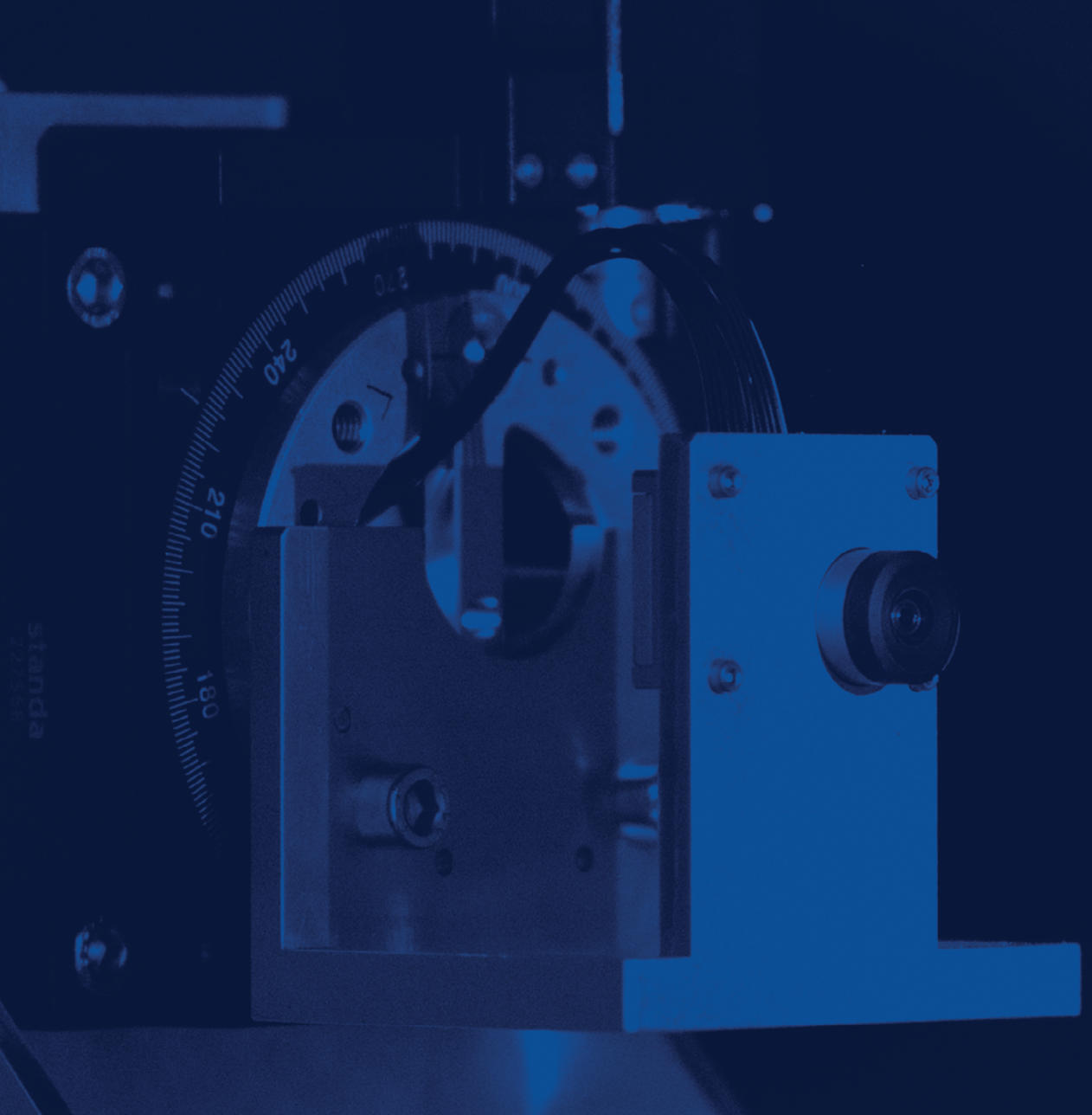
STANDARDISED CONNECTOR

Molex Micro-lock across Gen2 product range

CARBON FIBRE SLEEVE

For lightweight, robust and sleek finish

MAGNETORQUER	CR0002	CR0004	CR0006	CR0010	CR0012	CR0020	CR0050	CR0100	CR0150	CR0200
PERFORMANCE										
Linear Voltage Range [V] * High voltage version can be made on request	±5									
Dipole Moment [Am²] at 5V, 20°C	0.2	0.4	0.6	1.0	1.2	2.0	5.0	10.0	15.0	20.0
Magnetic Gain [Am²/A]	2.3	3.3	5.6	7.6	10.1	13.9	22.0	46.0	63.0	74.5
Linearity Error [0-5V]	< 2.0 %									
Residual Dipole [% of Max Dipole]	< 0.1 %									
Nominal Resistance [Ω] at 20°C	51.0	39.5	45.0	37.5	36.5	32.5	20.9	21.8	19.9	17.7
PHYSICAL										
Mass [g]	16	23	31	37	45	54	166	249	619	748
Dimensions [mm]	10.5x10.5x47	10.5x10.5x59	10.5x10.5x77	10.5x10.5x92	13x13x122	13x13x152	26x27.4x168	26x27.4x248	35x41x278	35x41x338
POWER & DATA										
Connector	Molex Pico-Lock						Harwin Gecko SL			
QUALIFICATION TEST										
Radiation (TID)	24 kRad									
Vibration	14 g RMS (NASA GEVS)									
Shock	1500 g									
Thermal (Vacuum) [°C]	-20 to 80 °C									
Thermal (Hot & Cold Start) [°C]	-35 to 70 °C									



SENSORS

At CubeSpace (CS), we pride ourselves on building robust, low-power, high-performance sensors that are available as either standalone components or as part of our integrated ADCS solution. Designed with a compact form factor and standardised interfaces, CS's sensors can be easily integrated into any satellite bus architecture. Backed by a decade of flight heritage, extensive testing, and the advantage of in-orbit reprogrammability, our sensors are the ideal choice for missions requiring reliability and extended lifetimes.

12 WEEKS LEAD TIME

5+ YEARS LIFETIME

24kRad RADIATION

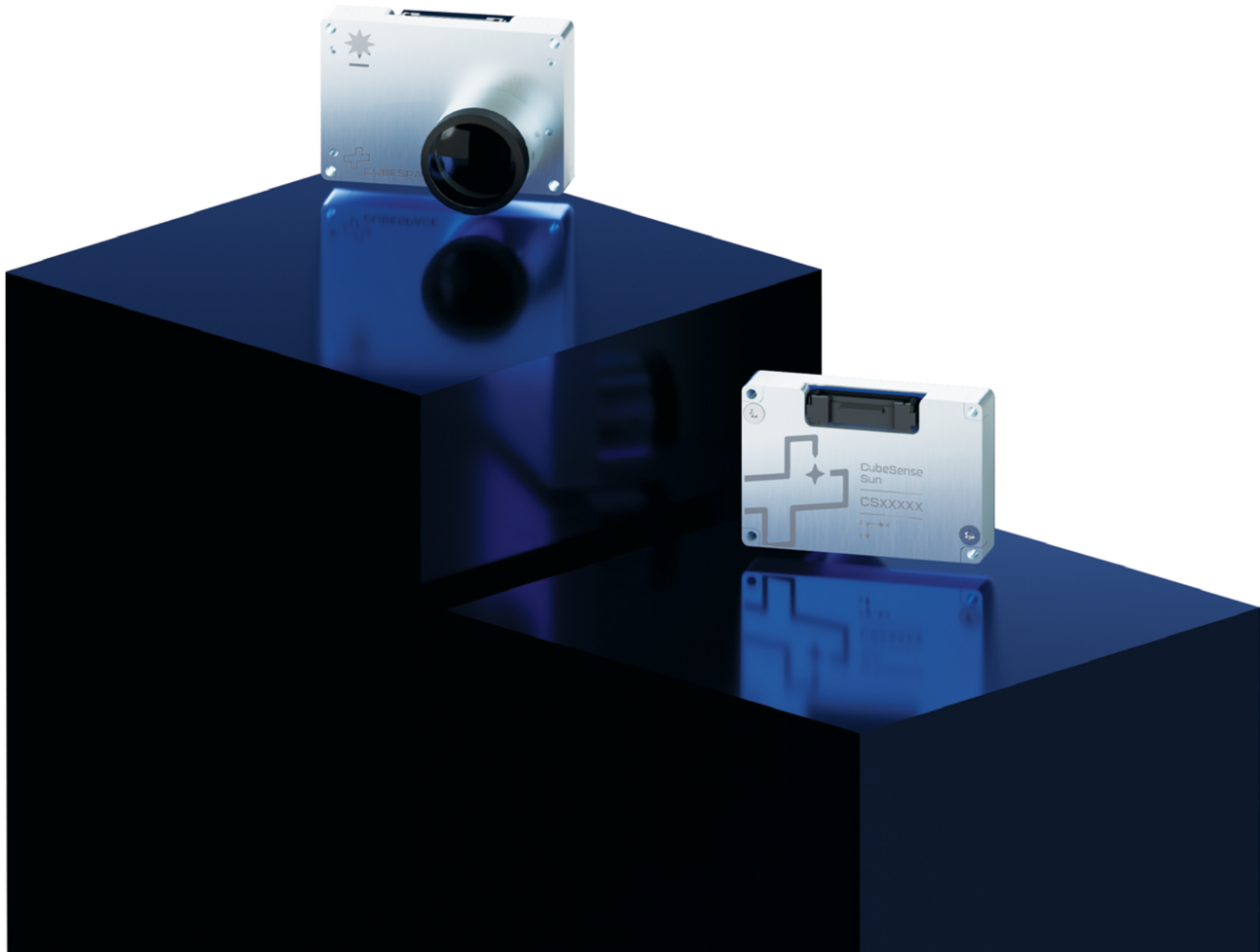
14.16 g RMS RANDOM VIBRATION

OPTICAL SENSORS

FINE SUN SENSOR

Compact, High Accuracy Fine Sun Sensor

A high accuracy fine sun sensor with a wide field of view (FOV). It is optimised for low power consumption, features a pre-calibrated distortion model, integrated processor, and has immunity to albedo effects. Its housing is designed to allow for easy and robust mounting, while providing improved EMI mitigation. Additionally, to support the high-volume production of these sensors and reduce lead times, CubeSpace (CS) has novel in-house designed and built dark optics tunnels, which allows for the concurrent calibration of multiple fine sun sensors. The modular design of these tunnels makes them easily scalable based on production demands.



FEATURES

COMMON NODE DESIGN
Standardised interfaces and functionality shared between all Gen 2 products

INTEGRATED PROCESSOR
Reduced ADCS computer processing demand

FLIGHT-PROVEN ALGORITHMS
Confidence in performance due to flight heritage

CMOS-BASED OPTICAL SENSOR
For low power consumption with high accuracy

FULL ALBEDO IMMUNITY
Guaranteed performance when manoeuvring during sunlit portions

170° FOV LENS
Greater potential for obtaining vectors during sunlit part of orbit

PRE-CALIBRATED DISTORTION MODEL
Improved performance throughout sunlit part of orbit

12 WEEKS LEAD TIME

5+ YEARS LIFETIME

24kRad RADIATION

14.16 g RMS RANDOM VIBRATION

OPTICAL SENSORS

EARTH HORIZON SENSOR

Infrared Earth Horizon Sensor

A compact and reliable infrared earth horizon sensor that provides high accuracy nadir determination throughout the entire orbit. This allows for accurate satellite control in eclipse without the need for a star tracker, making it a less expensive alternative. Each earth horizon sensor is verified with our infrared lens calibration and earth emulator jig, which is an innovative in-house test set-up designed and built by CubeSpace (CS) engineers.

FEATURES

INFRARED HORIZON SENSOR

Can determine attitude during eclipse and sunlit portions of the orbit

INTEGRATED PROCESSOR

Reduced ADCS computer processing demand

COMMON NODE DESIGN

Standardised interfaces and functionality shared between all Gen 2 products

FLIGHT-PROVEN ALGORITHMS

Confidence in performance due to flight heritage

PRE-CALIBRATED DISTORTION MODEL

Improved performance throughout the orbit

16 WEEKS LEAD TIME

5+ YEARS LIFETIME

24kRad RADIATION

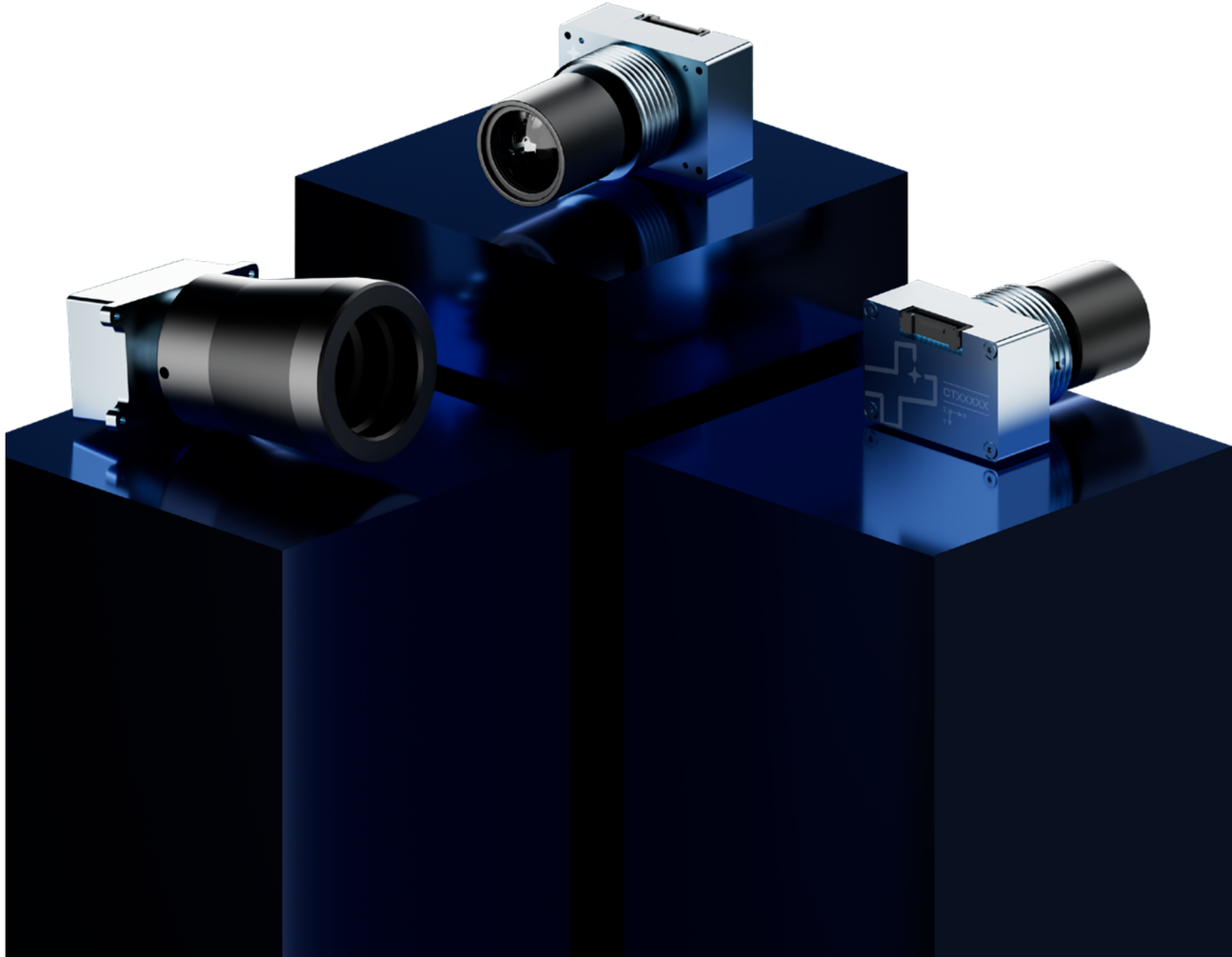
14.16 g RMS RANDOM VIBRATION

OPTICAL SENSORS

STAR TRACKER

High Performance, Compact Star Tracker

A high-accuracy miniature star tracker equipped with a baffle and precision optical lens for reliable star imaging. The star tracker outputs full quaternions and has both “lost in space” and tracking modes. Additionally, to support the high-volume production of these sensors and reduce lead times, CubeSpace (CS) has novel in-house designed and built dark optics tunnels, which allows for the concurrent calibration of multiple star trackers. The modular design of these tunnels makes them easily scalable based on production demands.



FEATURES

FLIGHT-PROVEN ALGORITHMS

Confidence in performance due to flight heritage

CMOS-BASED OPTICAL SENSOR

Less demand on power budget without sacrificing performance

OUTPUTS FULL QUATERNIONS

Pre-processed verified outputs for ease of results interpretation

BAFFLE WITH PRECISION LENS

Improved availability during sunlit parts of the orbit

LARGE ON-BOARD STAR CATALOGUE

99.7% sky coverage

COMMON NODE DESIGN

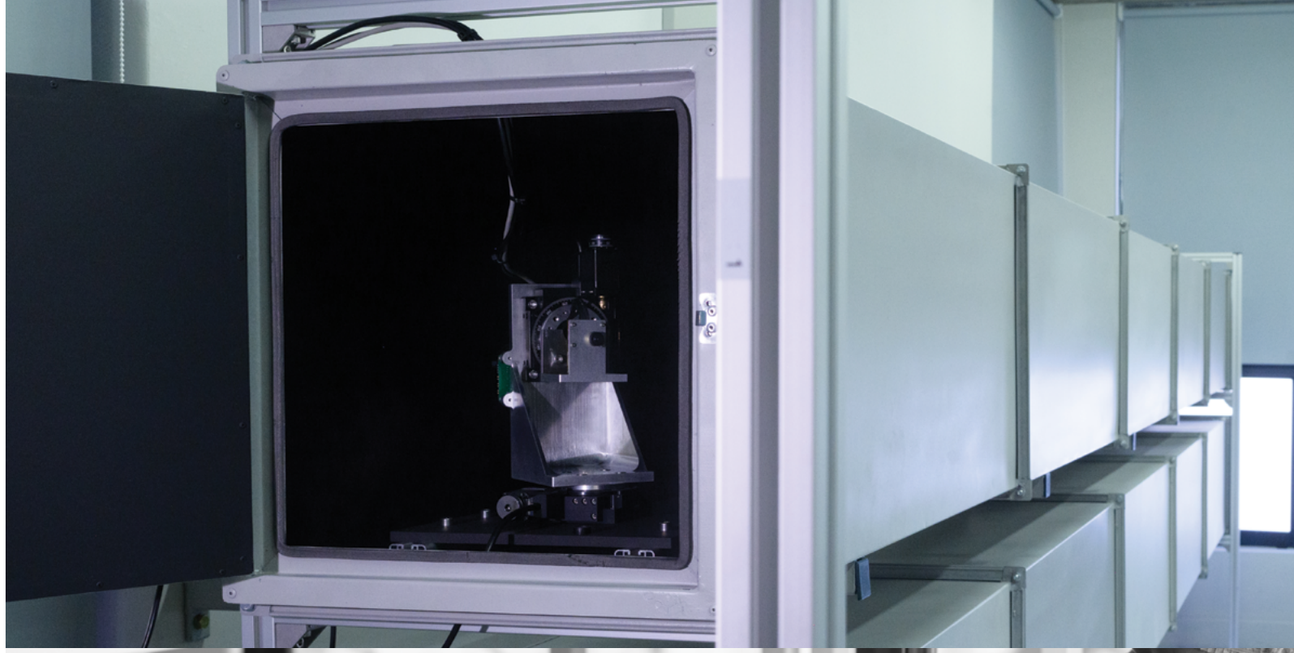
Standardised interfaces and functionality shared between all Gen 2 products

INTEGRATED PROCESSOR

Reduced ADCS computer processing demand

*PRELIMINARY SPECIFICATIONS

OPTICAL SENSORS	FINE SUN SENSOR	EARTH HORIZON SENSOR	STAR TRACKER*
PERFORMANCE			
Accuracy [°]	0.2° (vector) 2σ	1° (roll and elevation) 3σ	35” (cross-axis) 175” (roll) 3σ
Max slew rate [°/s]	70	14	0.3
PHYSICAL			
Mass [g]	15	18	70
Dimensions [mm]	35x24x22	35x24x20	43x24x63.75
Detection field of view [°] (Horizontal/vertical)	166	90/80	NA
Detection field of view [°] (Diagonal)	176	90	NA
Total Sun and Earth Exclusion Angle [°] NA NA 70	N/A	N/A	70
POWER AND DATA			
Data bus	CAN/UART/I2C/RS-485		CAN/UART/RS-485
Connector	Molex Micro-Lock Plus		
Update rate [Hz]	Up to 2	Up to 2	Up to 1
Supply voltage [V]	3.3	3.3	3.3
Peak power [mW]	200	152	363
Average power [mW]	93	126	192
QUALIFICATION LEVELS			
Radiation [TID]	24 kRad		
Vibration	14 g RMS (NASA GEVS)		
Shock	1500 g		
Thermal (Vacuum) [°C]	-20 to 80 °C		
Thermal (Hot & Cold Start) [°C]	-35 to 70 °C		



8 WEEKS LEAD TIME

5+ YEARS LIFETIME

24kRad RADIATION

14.16 g RMS RANDOM VIBRATION

MAGNETOMETER

Temperature-calibrated Magnetometer

CubeSpace (CS) offers a robust 3-axis magnetometer that can be supplied in either a compact form factor, or a deployable form factor for satellites with larger magnetic disturbances. The deployable form factor contains a backup 3-axis sensor, while the compact form factor allows for easy integration into your satellite and added redundancy for peace of mind. Our magnetometers are tested in our high-accuracy Helmholtz cage, which simulates a uniform 3-axis magnetic field for accurate testing results.

FEATURES

INTEGRATED PROCESSOR
Reduced ADCS computer processing demand

TEMPERATURE-CALIBRATED MAGNETOMETER
In-lab pre-calibration performed

IN ORBIT CALIBRATION
Magnetometer calibration can be optimised in-orbit using our included software utility

RESTORABLE DEPLOYMENT MECHANISM
Verification of deployment can be done during ground testing

COMMON NODE DESIGN
Standardised interfaces and functionality shared between all Gen 2 products

DEPLOYMENT INDICATOR
Measurable confirmation of deployment

MAGNETOMETER	DEPLOYABLE MAGNETOMETER	COMPACT MAGNETOMETER
PERFORMANCE		
Noise per channel [3-sigma] [nT]	50	120
Linearity [full scale] [%]	0.6 %	0.6 %
Sensitivity [nT]	13	25
Field Measurement Range [G]	±8	±8
PHYSICAL		
Mass [g]	16	6
Dimensions [mm] *height with protrusion is 9.6	17x82x6.5*	24x24x7.8
POWER AND DATA		
Data bus	CAN/UART/RS-485	CAN/UART/I2C/RS-485
Connector	Molex Micro-Lock Plus	
Update rate [Hz]	5	6
Supply votage [V]	3.3	3.4
Peak power [mW]	230	
Average power [mW]	50	
Deployment power [mW]	2 350	N/A
QUALIFICATION LEVELS		
Radiation [TID]	24 kRad	
Vibration	14 g RMS (NASA GEVS)	
Shock	1500 g	
Thermal (Vacuum) [°C]	-20 to 80 °C	
Thermal (Hot & Cold Start) [°C]	-35 to 70 °C	

ORDER YOUR ADCS

We Sign An NDA If You Need One

We are aware of the sensitivities of your mission, and we respect your privacy.

You Share Your Mission Details With Us

You fill in our easy-to-use Mission Overview document which guides you through the important considerations for your satellite ADCS.

We Provide You With An ADCS Analysis

We advise on the selection of sensors, and size of actuators required. We identify 3rd party components if required.

We Provide You With a Simulation Report

We use your satellite specifications, together with the selection of components, to estimate the performance of your satellite in orbit.

We Ensure Compatibility Of Electrical And Mechanical Interfaces

The ADCS solution has the option of customisation of mechanical and electrical interfaces.

We Provide You With A Quotation Based On Our Publicly Available Pricing

Our pricing is public, and standardised. We provide discount for bulk orders. Shipping to your door is included in all orders.

PLACE YOUR ORDER

When The System Is Complete, We Deliver It To Your Facility

You receive the system packaged in a robust case. Ground support equipment and PC testing software included.

We Can Assist With Integration Support If Required

We provide remote assistance with integration. If required, we can assist with on-site integration.

We Are On High-Priority Standby To Support In-Orbit Commissioning

Our team of experts have over 100 years of collective ADCS experience, and are available to support you in orbit.

INTEGRATION RESOURCES

SUPPORTING DOCUMENTATION

Our supporting documentation includes ICDs, detailed product descriptions, product user manuals, product firmware reference manuals, and a full CAD library to assist you in the development of your mission. This thorough documentation package is readily available upon request, at no cost.

ADCS COMMISSIONING AND OPERATIONS MANUAL

Our comprehensive Commissioning and operations manual, along with our software API library, supplied in html and XML formats, is readily available at the time of order to help customers develop a precise concept of operations (con-ops) plan. Our experienced team is always on stand-by to offer additional support, including integration support, commissioning plan review, and in-orbit data analysis.

SUPPORT APPLICATION

All our products, be they standalone or as part of an integrated ADCS solution, are supplied with our Support Application Package which consists of a HW interface, to allow ease of interfacing with the product or ADCS solution, as well as a windows-based SW application with a user-friendly GUI which streamlines the health check process upon delivery and allows quick and easy firmware and configuration updates.

QUICK START GUIDE

Our step-by-step QuickStart Guide is provided with every customer shipment to assist in setting up a standard ADCS solution or product for ground testing. This guide ensures a seamless setup process, enabling the completion of the Health Check and documenting the necessary steps to receive your unique flight configuration, which must be uploaded to the ADCS solution Computer before satellite close-out.

LET'S DISCUSS YOUR MISSION

We want to use our experience of over 350+ missions to help our partners build successful satellites that will change the world.

Contact us, and lets get started!

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