S-PLANE

Rugged | SWaP Sensitive | Certification-ready

NX-FCU

Flight Control Unit

Features

Overview

- Integrated navigation, flight control and mission management unit
- Unparalleled processing power, memory and onboard storage
- Integrated redundant and dissimilar IMUs and dual-antenna differential GNSS with RTK, SBAS, PPP, ALIGN and RAIM options
- Wide range of configurable I/O (Serial, Ethernet, GPIO, PWM, CAN, ADC)
- Optional integrated MIMO Mesh, L/S/C-Band or UHF communication links
- Available in flexible configurations, including redundant and non-redundant
- RTCA DO-254 & DO-178 Design Assurance Level A/B/C variants and environmentally qualified to DO-160 for safety and certification
- Available in multiple build variants

Applications

- Fixed-wing, rotary-wing, and hybrid AAM aircraft
- Manned and unmanned systems
- Manned fly-by-wire systems
- Remote piloting solutions

Overview

The NX-FCU is the Small Form Factor (SFF) variant of S-PLANE's renowned X-SERIES flight and mission automation solutions for fixed-wing, rotary-wing, and hybrid AAM UAS and OPS. The NX-FCU was specifically optimised for Size, Weight and Power (SWaP), without compromising ruggedness, reliability or certifiability of the solution. The result is a highly functional yet physically compact design able to meet strict unmanned aviation regulations.

The NX-FCU is ideally suited to modern manned and unmanned aircraft for both civil and military applications. It is used for functions such as flight automation, fly-by-wire computing, and remote piloting. Integrated navigation sensors, a wide range of highly configurable I/O and embedded communication links, provide it with the flexibility and capability of meeting almost any automation requirement. The NX-FCU is designed for reliability (a safety-centric approach), and offers optional redundancy, a rugged hardware design and a safety critical software architecture, making it the responsible choice for UAS system integrators aiming at system certification.

The NX-FCU is available in various build variants, ranging from dual redundant to non-redundant versions. It supports Self-Checking Pair (SCP) (COM/MON) configurations that can be arranged in Dual Failover Redundancy (DFR) or Triple Failover Redundancy (TFR) architectures. This results in the ultimate redundant safety with physical separation and optional hardware dissimilarity (CPU, sensors, and communication). Available as Target Hardware with Board Support Package (BSP), as a complete Appliance with flight software or as Target Appliance with Run-Time Environment (RTE) and RTE Components as required to fast-track a project.

NX-FCU

Build Variants

The NX-FCU is available in various build variants with a selection of available state-of-the-art integrated devices to meet the needs of individual customers. All NX-FCU build variants are rugged and reliable and ready for application to manned and unmanned airborne and ground control systems where certification is essential. By choosing the best variant for your application, the NX-FCU becomes an optimised fit-for-purpose and SWaP-sensitive solution for your project.

Contact S-PLANE for further information and support in selecting and configuring an NX-FCU for your system.

NX-FCU CSMC

Redundant FCU with Integrated Comms

The NX-FCU CSMC offers a tightly integrated dual redundant navigation, flight control, and communication solution for UAS.

Ideal for manned and unmanned aircraft, this rugged, fault-tolerant and certification-ready unit, with dissimilar integrated communication, provides the ultimate in automation reliability in a SWaP sensitive design.

C2 communication reliability is ensured through redundant LOS data links with optional integrated MIMO Mesh, L/S/C-Band or UHF communication links.

NX-FCU CSC

Redundant FCU without Integrated Comms

The NX-FCU CSC offers the ideal navigation, flight control and mission management solution for manned and unmanned aircraft.

Rugged, reliable and certification-ready, this highly functional unit provides unparalleled performance in a SWaP sensitive design.

With integrated sensors, a wide range of highly configurable I/O, and dual redundancy the NX-FCU has both the flexibility and capability of meeting almost any flight control and automation requirements.

NX-FCU Custom Variants

Custom Configured Flight/Mission Controller

The NX-FCU is also available in various custom configured build variants, including:

- CM: Non-redundant control unit with integrated communication solutions. Ideal as rugged and reliable ground data terminals in mobile ground stations.
- CSM: Non-redundant control unit with integrated sensors and communication solutions. Applications include ground data terminals with integrated datalink radios.
- CS: Non-redundant control unit with integrated sensors. Ideal as rugged and reliable simplex controllers. These can still be applied in DFR and TFR with voting.
- VSM: Alternative Vehicle Specific Modules (VSM) such as single-board OEM solutions for applications with tight SWaP and cost margins.

NX-FCU

Environmental Qualification

BASIC	
Operational Temperature	RTCA DO-160G, Section 4, Category B4 -40°C to +71°C (at the conduction interface)
Storage Temperature	RTCA DO-160G, Section 4, Category B4 -47°C to +85°C (at the conduction interface)
Operational Vibration	RTCA DO-160G, Section 8 Category S (Curve M, Fixed Wing) Category R (Curve G, Helicopter)
Vibration Transport	MIL-STD-810G, 514.7, Procedure I (Cat 4, 5-500Hz)
Operational Shock and Crash Safety	RTCA DO-160G, Section 7, Category B 20 g/11 ms
Humidity	RTCA DO-160G [3], Section 6 Category B 95% RH at 65°C
Altitude	RTCA DO-160G, Section 4, Category D2 Up to 50 000 ft

INGRESS	
Fluid Susceptability	RTCA DO-160G, Section 11
Waterproofness	RTCA DO-160G, Section 10, Category Y (And IPx6)
Fungus Resistance	RTCA DO-160G, Section 13
Salt Fog	RTCA DO-160G, Section 14
Sand and Dust	RTCA DO-160G, Section 12 (>IP5x)

Extended and system-specific RTCA DO-160G qualification available.

NX-FCU

Technical Specifications

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	NX-FCU CSMC	NX-FCU CSC	NX-FCU CM
GENERAL			
Navigation	GNSS/AD-Aided INS (EKF)	GNSS/AD-Aided INS (EKF)	GNSS/AD-Aided INS (EKF)
Control	Fixed-Wing, Rotary-Wing, and Multi-Rotor	Fixed & Rotary Wing	Fixed & Rotary Wing
Mission	Waypoint, Loiter, Follow	Waypoint, Loiter, Follow	Waypoint, Loiter, Follow
Health Monitoring	PBIT, CBIT, IBIT	PBIT, CBIT, IBIT	PBIT, CBIT, IBIT
Redundancy	Dual Redundant	Dual Redundant	Simplex Computer
Certification & Qualification	DO-254, DO-178 & DO-160G	DO-254, DO-178 & DO-160G	DO-254, DO-178 & DO-160G
OS Support	Linux and PikeOS	Linux and PikeOS	Linux and PikeOS
SENSORS			
GNSS Receiver	Redundant & Dissimilar	Redundant & Dissimilar	No
Internal Receiver Options	Novatel, Trimble, uBlox	Novatel, Trimble, uBlox	N/A
GNSS Heading	Yes	Yes	N/A
GNSS Accuracy: Differential	<2 cm	<2 cm	N/A
GPS & GLONASS	Yes	Yes	N/A
GALILEO & BEIDOU	Yes	Yes	N/A
IMU	Yes	Yes	N/A
INPUT / OUTPUT			
Software-configurable Multi-protocol Serial Ports	16x	16x	16x
GPO / PWM	16x	16x	16x
GPI / Input Capture	16x	16x	16x
Dedicated HILS Support	Yes	Yes	Yes
Ethernet	2x 1000BASE-T / 2x 100BASE-TX	2x 1000BASE-T / 2x 100BASE-TX	2x 1000BASE-T / 2x 100BASE-TX
CAN	3x CAN v2.0b	3x CAN v2.0b	3x CAN v2.0b
ADC	8x 16 bit	8x 16 bit	8x 16 bit
Dedicated Configuration / Ports	Yes	Yes	Yes
TELEMETRY / C2			
Internal Modem Options	Microhard, Silvus	N/A	Microhard, Silvus
Frequencies	UHF, L, S and C bands	N/A	UHF, L, S and C bands
Data Rate	Link dependent	N/A	Link dependent
LOS Range	30km to 100km for internal links	N/A	30km to 100km for internal links
Redundancy	Yes	N/A	Yes
MECHANICAL & ELECTRICAL			
Dimensions H x W x D	100 x 110 x 94 mm	100 x 110 x 94 mm	100 x 110 x 94 mm
Mass (Configuration Dependent)	1 700 g	1 550 g	1 450 g
Input Voltage	6.4 VDC to 32.2 VDC	6.4 VDC to 32.2 VDC	6.4 VDC to 32.2 VDC
Power (Typical)	40 W	35 W	20 W
Processors	Arm 1.4 GHz or Intel x86 1.2 GHz	Arm 1.4 GHz or Intel x86 1.2 GHz	Arm 1.4 GHz or Intel x86 1.2 GHz
RAM	LPDDR5 RAM for Arm and 4GB LPDDR4 for x86	LPDDR5 RAM for Arm and 4GB LPDDR4 for x86	LPDDR5 RAM for Arm and 4GB LPDDR4 for x86
Data Storage	Dual 32 GB SSDs per computer	Dual 32 GB SSDs per computer	16 GB or 32 GB SSD per computer (Processor Dependent)

Number of ports indicated is maximum available and depends on overall configuration. I Power consumption is dependent on selected build variant. I Specifications subject to change without notice.

X-KIT Key Equipment

X-CUBE

- The X-CUBE is the core avionics unit of the X-KIT for UAS/OPS conversion
- Function: Flight Control Unit (FCU), Power Distribution Unit (PDU) and Input/Output (I/O) Concentrator
- Support SCP, DFR and TFR internal redundancy with dedicated voting
- Further supports dual X-CUBE external redundancy with failover architecture

X-ADT

- Airborne Data Terminal (ADT)
- Function: Mission Computer, I/O Concentrator, HD-SDI Video Encoder, Data Storage, Ethernet Switch
- Supports S-PLANE's mission software and third-party or custom containerised software
- Interfaces with and manages and controls mission payloads (RADAR, EO/IR, SIGINT, AIS and Direction Finder)

X-RPU

- Remote Piloting Unit (RPU)
- Function: Safety-critical Command & Control Computer, and I/O Concentrator
- Interfaces to Primary Flight Controls (PFC), GCC MFD, Hard I/O (buttons and switches with parallel redundancy) and to data links/tracker

TRACKER+

- Stand-alone GNSS-based antenna tracker for UHF, L-, S- and C-bands
- Function: Long-range Line of Sight Communication (LOSCom) between aircraft and Ground Control Stations (GCS)
- Mesh network enabled

GCC and Paragon

- Ground Control Console (GCC)
- Configured as a Remote Piloting Station, Payload Operating Station, or Engineering Station
- Function: HMI for Paragon, PFD with HUD, and MFD (touch display) for Remote Piloting

Equipment Chains & Products

	AIRBORNE CONTROL	GROUND CONTROL	COMMUNICATION	SIMULATION
NX-FCU	Automation & ISR Mission		Automation & ISR Mission	
X-CUBE	Automation		Automation	
X-ADT	ISR Mission		ISR Mission	
X-RPU		Automation		
GCC		Automation & ISR Mission		
Paragon	Automation & ISR Mission			
X-GDT		ISR Mission	Automation & ISR Mission	
TRACKER+			Automation & ISR Mission	
XSIM-HILS				Automation & ISR Mission
XSIM-Workbench				Automation & ISR Mission
XSIM-Video				Automation & ISR Mission

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Information provided on this brochure is subject to change without notice.