

Annexure A

Specifications for UAV COTS Components

1 Group 1: Motors, ESC and Propeller specifications

- The motors, electronic speed controllers (ESC), and propellers are required to meet the specifications below.
- Lead times must be indicated on the quotation
- The data sheet and/or full specification of the component must also be submitted.

1.1 UAV Electric Motor – Qty = 12

Specifications	
Motor Size(mm)	Φ 81.4 * 66.9 mm
KV Value	190 RPM/V
Lead	Enamelled Wire 100mm
Shaft Diameter	IN : 10mm OUT : 10mm
Idle Current(10V)	3.5 A
Peak Current(180s)	135 A
Max Power (180s)	6000W/12S
Internal Resistance	16 mΩ
Rated Voltage (LiPo)	10 – 12S
Configuration	24N22P
Motor Weight (g)	780 g
Must match with the ESC below	

1.2 UAV Electric Motor ESC – Qty = 8

Specifications	
Battery	6–14S LiPo
Continuous Current	195 A

Peak Current	280 A
Power Wire	180 mm - 8AWG
Weight	318 g
Dimensions (L × W × H)	106 mm × 50 mm × 36 mm
ESC Programming Card	TA DATA LINK

1.3 UAV Electric Motor ESC – Qty = 6

Specifications	
Supported Battery Range	6 – 12S LiPo (22.2 – 44.4 V)
Continuous Current	180 A
Peak Current	200 A for ~10 seconds
Control Method	Field-Oriented Control (FOC)
Switching Frequency	500 Hz
Protection Features	Includes start-up protection, overload protection, motor lock-up protection, and throttle loss detection.
Ingress Protection	IP56
Dimensions	~112.2 × 50.5 × 35.5 mm
Weight	279 g (± 2 g)

1.4 20×18 Propeller – Qty = 2

Specifications	
Diameter	20 in (508 mm)
Pitch	18 in (457 mm)
Material	Fibreglass-reinforced nylon composite
Hub Diameter	2.00 in (5.08 mm)
Hub Thickness	1.05 in (2.67 mm)
Shaft Diameter	25/64 in
Weight	7.62 oz (216 g)

1.5 21×20 Contra Propeller No. 1 – Qty = 14

Specifications	
Diameter	21 in (533,4 mm)
Pitch	18 in (508 mm)
Material	Carbon
Propeller Location	Front

1.6 21×20 Contra Propeller No. 2 – Qty = 14

Specifications	
Diameter	21 in (533,4 mm)
Pitch	18 in (508 mm)
Material	Carbon
Propeller Location	Rear

1.7 Propeller Inserts/Reducer – Qty = 8

Specifications	
Description	Propeller Insert Tree (plastic molded) which will reduce the center hole from 10 mm in increments
These inserts can be used to convert any 8 mm or 10 mm hole to the following sizes:	8mm 6mm 5mm 4mm 3mm

1.8 Carbon fiber propeller spinner No. 1 – Qty = 16

Specifications	
Diameter	3.5 inch (89 mm)
Material	Carbon Fiber
Design	Spinner for 2-blade electric R/C airplanes

Vents	Yes
Application	Electric-powered R/C airplanes
Features	Lightweight, durable, aerodynamic

2 Group 2: Avionics and Communications specifications

- The avionics and communication components are required to meet the specifications below.
- Lead times must be indicated on the quotation.
- The data sheet and/or full specification of the component must also be submitted.

2.1 Airspeed + Temperature + Humidity Sensor – Qty = 4

Specifications	
MCU / Processor	STM32F4 series
Pressure Sensor Model	SM5391 (differential pressure)
Airspeed Measurement Range	0 – 106 m/s
Pressure Measurement Range	±6895 Pa
Accuracy / Error	±1% FS (full scale)
Temperature Measurement	–20 °C to +125 °C
Humidity Measurement	0 - 100% RH
Heater / Pitot Tube Heating	Resistive heater, 35 W front-end power
Operating Voltage	16 – 68 V (HV HUB input)
Protocol / Communication	DroneCAN (also supports CANx etc.)
Compatibility	ArduPilot, PX4, CUAV / Pixhawk, etc.
Operating Temperature Range	–20 °C to +85 °C
Physical Dimensions	102 × 29.4 × 28.2 mm
Weight	~25 g
Ingress / Protection Rating	IP54 (with optional better installation)
Special Features	• Intelligent de-icing & drainage • Low drift even at low temperatures • Vibration-resistant differential pressure design • Dual temperature compensation • Built-in pitot tube, humidity & temp sensors

2.2 CAN Power Module – Qty = 10

Specifications	
Processor	STM32F405RG, ARM Cortex-M4, 168 MHz, 1 MB Flash, 196 KB RAM
Input Voltage Range	7–60.9 V (2S–14S LiPo)
Continuous Current Rating	200 A
Burst Current Capability	400 A for 1 s @25 °C; up to 1000 A for <1 s @25 °C
Maximum Current Sensing	376 A
Voltage Measurement Accuracy	±0.1 V
Current Measurement Accuracy	±5%
Temperature Accuracy	±1 °C
BEC Outputs	Two independent 5.3 V BEC ports, up to 3 A each
Communication Protocol	DroneCAN
CAN Termination	Software-controlled
Cooling Design	High-efficiency aluminum housing (heat sink) and includes fan
Interface Type	Molex CLIK-Mate 2 mm 6-pin connector
Battery IN/OUT Connection Options	XT90 connectors, tinned wires, or XT90 + ring terminal
Dimensions (excluding cable)	45 mm × 41 mm × 26 mm
Weight (including cable)	185 g
Operating Temperature	–25 °C to 85 °C
Firmware Support	Firmware upgrades supported; calibration supported

2.3 Power Distribution Board (PDB) – Qty = 6

Specifications	
Connectivity Options	6 upward-facing XT90 connectors 2 upward-facing XT30 connectors High-current screw terminals

Continuous Current Rating	300 A
Burst Current Rating	1000 A (short durations)
Connector Orientation	Top-entry layout (upward-facing)

2.4 Telemetry Radio – Qty = 4

Specifications	
Frequency Range	840–845 MHz (license-exempt in many regions)
Transmit Power	Adjustable from 100mW to 1W (20–30 dBm)
Link Rate	Up to 345 kbps
Serial Baud Rate	300 bps to 230.4 kbps asynchronous
Operating Modes	Point-to-Point, Point-to-Multipoint, Store & Forward Repeater, Peer-to-Peer
Spreading Methods	Frequency Hopping, GMSK, 2GFSK, 4GFSK, QPSK
Input Voltage	DC 7–35V (4-position JST-GH connector)
Power Consumption	Sleep: <1mA; Idle: 3.5mA; Rx: 45–98mA; Tx: 1000–1400mA
Weight	44g (without antenna); 71g (with antenna)
Error Detection	32-bit CRC, ARQ
Connector	6-position JST-GH (compatible with Pixhawk TELEM ports)
Diagnostic Features	UART transmission LED, Three-stage RSSI LED, Diagnostic Port LED
USB Interface	USB Type-C port with integrated USB-to-UART converter
Temperature Range	Industrial grade: -55°C to +85°C

2.5 GNSS Base Station – Qty = 2

Specifications	
Function	GNSS RTK Base Station – provides correction data (RTCM) for rover GNSS units

GNSS Module / Receiver	u-blox ZED-F9P dual-band GNSS receiver (supports L1/L5)
Supported Constellations	GPS, GLONASS, BeiDou, QZSS (multi-constellation)
GNSS Bands	L1, L5, plus additional bands: B1I, B2a, E1b/C, E5a, L1C/A, L1OF
Correction Output	RTCM via UAVCAN and UART / Serial
Communication Interfaces	UAVCAN, UART (Serial)
Power Requirements	4.75V – 5.25V input power supply
Included Items	Main unit (Here4 Base), USB cable. Antenna is not included
Weight	~ 90 g (with cable)
Operating / Storage Temperature	–40 °C to +80 °C
Compatibility	Works with Here4 GPS, Here3 GPS, HerePro; compatible with ArduPilot & PX4 (as base station)
Antenna	External multi-band GNSS antenna required; dual-band patch or Taoglas dual pin active antenna often paired; L1/L5 bands supported

2.6 GNSS Module – Qty = 3

Specifications	
GNSS Module	u-blox NEO-F9P dual-band high-precision receiver (L1/L5)
Supported Satellite Systems	GPS, GLONASS, Galileo, BeiDou, QZSS, SBAS
Receiver Bands	B1I, B2a, E1B/C, E5a, L1C/A, L1OF, L5
Processor / MCU	STM32H757 dual-core processor
IMU / Compass	ICM42688 (IMU) + RM3100 (magnetometer)
Barometer	MS5611
Communication Protocols	DroneCAN FD (8 Mbit/s), UART / UBX / NMEA / RTCM 3.3, SPARTN 2.0.1
Update / Navigation Rate (RTK)	Up to 20 Hz

Positioning Accuracy	~ 0.01 m + 1 ppm CEP in RTK fix mode
Maximum Speed Support	500 m/s
RTK Convergence Time	Less than 10 seconds in good conditions
Acquisition Times	Cold start ~25 s, Aided ~2 s, Hot start ~2 s
Sensitivity	Tracking/navigation –167 dBm, Cold start –148 dBm, Hot start –157 dBm; Reacquisition –160 dBm
Antenna	Dual-band antenna (supports L1 & L5)
Other I/O / Features	8 outputs (PWM or BDSHOT), RC input (RCIN), Hotshoe, Camera trigger, built-in LEDs, optional Drone-ID in “Blue” version
Size / Dimensions	16 × 68 mm (board/module size)
Weight	~ 60 g (with cable)
Operating Temperature	–40 °C to +85 °C

2.7 Long-Range LiDAR Sensor – Qty = 2

Specifications	
Measurement Range	• 0.1 - 180 m @ 90% reflectivity (TF03-180) • 0.1 - 70 m @ 10% reflectivity • Under bright ambient (100 klux) ≈ 0.1-130 m @ 90% reflectivity 0.1-50 m @ 10% reflectivity
Minimum Range / Blind Spot	0.1 m
Accuracy	±10 cm (within 10 m); beyond that ~1% of distance measured
Distance Resolution	1 cm
Repeatability (1σ)	< 3 cm
Frame Rate	Adjustable: 1 Hz up to 1000 Hz (default 100 Hz)
Ambient Light Immunity	Up to 100 klux
Field of View (FOV)	0.5° (narrow beam)
Light Source / Wavelength	Laser Diode (LD) 905 nm

Protection / Housing	Enclosure rating IP67, housing material = aluminium alloy, optical window using IR band-pass glass
Supply / Electrical	• Voltage: 5 V to 24 V DC • Avg Current: ≤150 mA @ 5 V; ≤80 mA @ 12 V; ≤50 mA @ 24 V • Peak current ~150 mA • Power ≤1 W
Interfaces / Data Output	UART, CAN; optional RS-232 / RS-485; 4-20mA analog option in certain versions
Baud Rate / Communication Details	Default UART 115200; CAN up to 1 Mbps; configurable parameters (frame rate, output mode, over-range threshold, etc.)
Operating Temperature	-25 °C to +60 °C
Storage Temperature	-40 °C to +85 °C
Weight	~ 89 g ± 3 g (standard / RS-version)
Dimensions (L × W × H)	44 × 43 × 32 mm

2.8 Full HD Digital Image Transmission System – Qty = 3

Specifications	
Function / Use Case	Long-range FPV video link + telemetry + RC signal relay + OSD overlay; suitable for UAVs, FPV, unmanned vehicles etc.
Video Resolution & FPS	1080p @ 60 fps
Latency	~ 150 ms (low latency mode)
Maximum Transmission Range	Up to 30 km unobstructed
Standard Effective Range	~ 15 km with omni antennas; ~ 30 km with directional / long-range antennas
Frequency / RF Band	5100-5825 MHz (centered ~ 5550 MHz)
Transmit Power (Typical)	~ 25 dBm (≈ 320 mW) output power
Channels	16 communication channels supported

Ground Unit (Controller) Display	0.96-inch OLED touchscreen for status/parameter config
Ground Unit Size / Weight	Dimensions (excluding antennas & battery): ~ 109 × 61 × 28 mm; Weight (excluding antennas & battery): ~ 132 g
Power / Battery / Charging	- Ground unit fast-release battery support (NP-F550 / F750 / F770 / F950 / F970). - 30W PD fast charging supported. - External power via XT30 connector for 7-16.8V input allowed.
Antenna Options	Standard omni antennas (5 dBi); optional directional/long-range antennas (~11 dBi) for ground unit; SMA connectors used.
Power Consumption (Ground Unit)	~ 5 W under normal operating conditions (with standard setup)
Interfaces & Protocol Compatibility	- Supports SBUS, PWM remote control inputs. - Telemetry via Mavlink for OSD overlay. - Compatible with flight controllers like PX4, ArduPilot, INAV, etc. - Supports control through SIYI FPV app or QGroundControl.
Environmental / Operating Temperature	-10 °C to +50 °C operating temperature (ground unit)

2.9 8-Channel Diversity Receiver – Qty = 3

Specifications	
Channels / Outputs	8 channels; supports PWM outputs; also capable of PPM, SBUS, CRSF protocols
Diversity	True dual-input, chip-based diversity for better signal reception/noise rejection
Beacon Mode	Built-in LiPo battery for GPS / RF beacon when main power is lost; helps with locating lost airframes; GPS module optional to use full features
Telemetry Port	BST port included; for RSSI/link quality among others
Sensitivity / Receiver Range	Very high: quoted sensitivity up to -130 dBm

Input Power / Voltage	5 V to 6 V via servo header; reverse-polarity protected
Dimensions (L × W × H)	30 × 50 × 12 mm
Weight	25 g
Included Items	Two TBS Crossfire antennas, BST splitter (one input to three outputs), 20 cm BST cable

2.10 UBEC Power Module – Qty = 8

Specifications	
Input Voltage	3–14S LiPo, via XT30 connector
Output Voltage Options	6.0 V / 7.2 V / 8.0 V / 9.2 V (settable via onboard DIP switches)
Output Current	Continuous: 12 A; Burst: 24 A
Efficiency	> 90% (high-efficiency DC–DC regulator)
Outputs	4-channel parallel header pins (for servos) + XT30 high-current output
Protection Features	Over-current, short circuit, overheat, low-voltage cutoff
Housing Material	Metal enclosure (acts as heatsink; reduces EMI)
Size	48 × 33.6 × 16.3 mm
Weight	47.8 g

2.11 UAV Flight Controller and Base board – Qty = 5

Specifications	
Processor	STM32H753, 480 MHz ARM Cortex-M7, 2 MB Flash, 1 MB RAM
Failsafe Processor	STM32F103, 72 MHz ARM Cortex-M3, 1 MB Flash, 96 KB RAM
Sensor Suite	3× Accelerometer/Gyroscope (ICM-42688-P, BMI088, ICM-20649) 2× Magnetometer (IST8310, LIS3MDL) 2× Barometer (DPS310)

Interfaces	14 × PWM Outputs 5 × UARTs 2 × CAN Bus (DroneCAN supported) 1 × I ² C 1 × SPI 1 × ADC Input
Power Supply	Dual Power Inputs (redundant), 4.75 V – 5.5 V
Onboard Storage	512 KB FRAM
External Storage	microSD/SDHC (UHS-I supported)
Dimensions	Flight Controller Module: 38.8 x 31.8 x 30.1mm (± 2 mm) Standard Baseboard: 52.4 x 102 x 16.7mm (± 2 mm) (Aluminum)
Weight	Flight Controller Module: 50 g (± 2 g) Standard Baseboard: 72.5 g (± 2 g) (Aluminum)
Operating Temperature	–40 °C to +85 °C
Mounting Pattern	30.5 × 30.5 mm (± 2 mm)
Power Module	PM02D HV Power Module
Baseboard	Standard Baseboard v2A

2.12 Wingtip Navigation / Position / Strobe Light – Qty = 2 Pair

Specifications	
Dimensions	75.5 mm × 21.1 mm × 19 mm (~2.97" × 0.83" × 0.74")
Weight (each)	30 g (1.06 oz)
Input Voltage	9 –18 V DC
Nav/Position Current	0.2 A @ 14V
Input Current – Strobe:	0.36 A @14V (peak)
Average Current Consumption per Frame – Strobe:	0.06 A
Input Power - Nav/Position:	2.8 W @14V

Input Power - Strobe:	5.04 W peak
Repetition Rate of Strobe:	48 cycles per minute
Fuse (Circuit Breaker) Recommendation:	2.5 A for position 2.5 A for strobe
Operating Temperature:	from -40°C to +85°C from -40°F to +185°F
Overheat Protection:	Yes (+85°C / +185°F)
Reverse Polarity Protection:	Yes
Transient Voltage:	50V/1s
Waterproof, Dust-proof, Vibration-proof:	Yes

2.13 UAV humidity and temperature sensor – Qty = 20

Specifications	
Sensing Element	SHT35 (alternatives: SHT30, SHT31)
Typical Accuracy	±1.5 % RH, ±0.1 °C
Repeatability (3σ)	0.15 % RH, 0.08 °C
Operating Temperature	0 °C to +65 °C (physical sensor range -40 °C to +120 °C with reduced accuracy)
Operating Humidity Range	0–100 %; prolonged exposure above 80 % RH may degrade accuracy
I ² C Interface	4-pin JST-GH connector; dual connector option; default I ² C address 0x44, switchable to 0x45 via jumper JP1
Power Requirements	3.6–5.4 V input voltage, internal over-voltage protection via Zener diode
Dimensions & Mass	30 × 15 × 6.5 mm PCB; mass ≈ 2 g (without cabling)
Integration	Fully supported by PX4 autopilot (enable by setting SENS_EN_SHT3x = 1); compatible with TF-ATMON monitoring systems

2.14 High-Current DC Power Distribution Busbar – Qty = 16 x Black + 16 x Red (32 total)

Specifications	
Type	High-current DC electrical distribution busbar with multiple connection studs
Rated Current	600 A continuous current rating for high-load circuits
Maximum Voltage	Up to 48 V DC system voltage
Number of Outputs	8 connection points (studs) for power distribution
Terminal Stud Size	M10 threaded studs for high current cable lugs and ring terminals
Base Material	Durable ABS plastic base providing mechanical strength and insulation
Busbar Material	High-conductivity tin-plated brass/copper distribution block to minimize resistance and heat
Fasteners	Corrosion-resistant stainless steel screws and nuts for secure connections
Electrical Conductivity	High electrical conductivity suitable for heavy DC power distribution
Corrosion Resistance	Tin-plated and stainless steel components reduce oxidation and rust in marine/vehicle environments
Use Cases	Power distribution in automotive, marine, RV, yacht, and off-grid electrical systems
Environmental Suitability	Designed for installation in vehicles and vessels where moderate exposure to humidity and vibration occurs
Mounting Configuration	Straight busbar with evenly spaced studs for neat cable routing and distribution
Physical Orientation	Flat/straight arrangement for compact installation in electrical panels or vehicle fuse compartments
Dimensions (L x W x H)	Max 316 × 56 × 56 mm (± 1 mm)

3 Group 3: Recovery System specifications

- The Recovery System components are required to meet the specifications below.
- Lead times must be indicated on the quotation.
- The data sheet and/or full specification of the component must also be submitted.

3.1 Drone Parachute System – Qty = 3

Specifications	Overall Parachute System
Payload Rating	Up to 40 kg (maximum)
Mounting Footprint (L×W)	209 × 55 mm, 4 × M3 bolts
Power Input Voltage	5 V to 24 V DC
Trigger Mechanisms	PWM signal, or serial port/command
Main Parachute Size	Effective deployed diameter 3.04 m - Ultra Light 120"
Power-Input	4.9 V – 6.1 V
Weight System	350 g
Data Communication	Two-way communication supported
Specifications	Drone Trigger Mechanism
Weight	26 - 66 g
Power Source	Built-in 5V regulator supplying 500 mA
Voltage output	5V / 500 mA
Required battery specs	Sufficient C value, able to provide 30A continuous and 70A peak current in all working temperatures
Battery voltage	3 – 6 cell Li-Po
Receiver voltage	4.9V - 6.1V
Fuse	Upgrade; V4 Pro Trigger (4S) dual input with 5V supply for receiver
Specifications	Drone Parachute Lancher
Mounting Footprint (L×D)	209 × 55 mm, 4 × M3 bolts
Weight System	157 g
Operating Temperature	-25°C to +40°C

Add-ons	Comment
Drone Trigger Mechanism	Additional V4 Pro Trigger (4S) dual input with 5V supply for receiver
Parachute Liner Cloth	Spare parachute cloth
Fuse	Spare Ready-to-Use Fuse 5 PCS
Shroud line organiser fork	Spare shroud line folding tool with 4x clips required

3.2 Remote Beacon – Qty = 3

Specifications	
Connector	USB-C
Operating Temperature	-20°C to +50°C
Storage Temperature	10°C to +45°C
Input Voltage Rating	3.75V - 6.00V
Input Amperage Rating	225mA max
Battery Capacity	4000 mAh
Battery Type	Lithium Polymer
Battery Endurance	Up to 8 hr (dependent on environmental conditions)
Charge Time	4 hr
Size & Weight	Dimensions: 73 × 24 × 19 mm (± 2 mm); Weight: 29 g (± 2 g)

4 Group 4 specifications

- The components are required to meet the specifications below.
- Lead times must be indicated on the quotation.
- The data sheet and/or full specification of the component must also be submitted.

4.1 UAV Servo Motor – Qty = 24

Specifications	
Operation Voltage(rated)	DC 7.4 V
Operation Voltage Range	DC 6.0 V-8.4 V

Torque	36 kgf.cm@6.0V 45 kgf.cm@7.4V 50 kgf.cm@8.4V
Speed	0.19 sec/60°@6.0V 0.15 sec/60°@7.4V 0.13 sec/60°@8.4V
Operating Temperature Range	-20 °C to +65 °C
Case Material	Aluminium Alloy
Motor Type	Brushless
Gear Set Material	Phosphor Bronze & Hardened Steel
Shielded Connecting Cable	22 AWG
Case Dimensions	40.5 mm * 20 mm * 42 mm
Weight	80 g