

REQUEST FOR QUOTATIONS

Procurement of Goods under RFQ/Shopping Procedures

Purchaser: *Meghalaya Basin Management Agency (MBMA)*

Contract title: *Procurement of DIY equipment for UAV
under CLLMP*

RFQ No: *MBMA/CLLMP/90/2022-23/GD-96/604*

S#	Description	Date & Time
1	Date of Issue of RFQ	November 9th, 2022
2	Last Date and Time of submission of RFQs	November 24th, 2022 at 1400 Hrs.
3	Opening of RFQs	November 24th, 2022 at 1430 Hrs.

Applicable Procurement Guidelines/Regulations Date:

[Procurement Regulations July 2016]



MEGHALAYA BASIN MANAGEMENT AGENCY (MBMA)

Regd. Address: House No. L/ A-56 Lower Nongrim Hills,

Shillong, East Khasi Hills, Meghalaya- 793003

(CIN No. U75144ML2012NPL008509)

Phone: +91-364- 2522921/2522992

Website: www.mbda.gov.in, E-mail: admin.mbda@gov.in

MBMA/CLLMP/90/2022-23/GD-96/604

Date: November 9th, 2022

INVITATION FOR QUOTATIONS FOR PROCUREMENT OF DIY EQUIPMENT FOR UAV UNDER CLLMP

To

Dear Sir/Madam,

Subject: INVITATION FOR QUOTATIONS FOR PROCUREMENT OF DIY EQUIPMENT FOR UAV UNDER CLLMP

Government of India has received a funding from the **International Bank for Reconstruction and Development (IBRD)** in the form of Loan toward the cost of **Meghalaya Community- Led Landscape Management Project (MCLLMP)**, **Meghalaya Basin Management Agency (MBMA)** is the implementing agency of the Project and intends to apply part of the proceeds of this loan to eligible payments under the contract for which this invitation for quotations is issued.

1. You are invited to submit your most competitive quotation for the following goods as per the mentioned lots below:-

***Detailed Specifications given at Annexure 1**

Sl no	Brief Description of the Goods*	Quantity	Delivery Period	Consignee Address
# 1	Procurement of DIY Equipment for UAV	1 Nos. each	45 days	As per place of Delivery mention in serial no.3

***: bidder may apply for one or more Lots, however they are requested to mention the Lot numbers they are bidding for.**

Terms and Conditions

1. **Eligibility:** A Bidder (a) shall not participate in more than one Quotation; (b) shall not have conflict of interest as defined in the Bank’s Procurement Regulations; and (c) should not have been (i) temporarily suspended or debarred by the World Bank Group in compliance with the Bank’s Anti-Corruption Guidelines and its Sanctions Framework; or (ii) blacklisted or suspended by Central or any State Government Departments in India.
2. **Clarifications & Amendments:** If the Purchaser receives any request for clarification of this RFQ Document, it will upload its response together with any amendment to this document, on www.mbda.gov.in and www.cllmp.com for information of all Bidders. Bidders should check on the website, for any amendments to the terms and conditions and for Award of Contract.
3. **Place of Delivery:** Your Bid must be submitted on or before the date mentioned below at the address mentioned here : Meghalaya Basin Development Authority (MBDA), MegLIFE office, 2nd Floor, Shalom Building, Lower Lachumiere, Shillong -793001, Meghalaya
4. **Quotation Price**
 - a) The bidder must mention the Lot that they are offering. However the quantity offered should be 100% of the requirement for the quoted Lot. Corrections, if any, shall be made by crossing out, initialling, dating and re writing.
 - b) All duties, taxes and other levies payable on the raw materials and components shall be included in the total price.
 - c) Goods and Service Tax (GST) should be indicated separately.
 - d) The rates quoted by the bidder shall be fixed for the duration of the contract and shall not be subject to adjustment on any account.
 - e) The Prices shall be quoted in Indian Rupees only.
 - f) Bidder must expressly mention the name/brand of the items offered by them in the price schedule along with proper product brochures.
 - g) The bidder must mention in details about the product being offered in lieu of the specified specifications and not by simply mentioning “Complied”. Such bids with no proper details are likely to be disqualified.

5. Qualification of Bidders

- a) Have the legal capacity to enter into a contract;
- b) Not be insolvent, in receivership, bankrupt or being wound up or subject to legal proceedings for any of these circumstances;
- c) Not have had your business activities suspended or debarred from public procurement by the State Government of Meghalaya or Government of India.

6. Documents Evidencing Qualification: Bidders are requested to submit copies of the following documents as evidence of your qualification.

- a. Valid trading license/registration or equivalent/Exemption Certificate.
- b. Valid certificate of GST registration;
- c. Self-declaration to the effect the bidder is not insolvent, in receivership, bankrupt or being wound up or subject to legal proceedings for any of these circumstances.
- d. Self-declaration that the bidder's business activities are not suspended or debarred from public procurement by the State Government of Meghalaya, any other State Government or Government of India.

7. Validity of Quotation: Quotations shall remain valid for a period not less than 90 days after the deadline date specified for submission.

8. Evaluation of Quotations: The Purchaser will evaluate and compare the quotations lot wise that are determined to be substantially responsive i.e. which

- (a) are properly signed ; and
- (b) Confirm to the terms and conditions and specifications.
- (c) The Quotations would be evaluated lot wise; GST will not be taken into consideration while evaluating the quotations.
- (d) Any historical information, if required may be asked from the bidders during evaluation of quotes.

9. Award of contract: The Purchaser will award the supply orders to the bidders whose quotations have been determined to be substantially responsive in respective lots and who has offered the lowest evaluated quotation price for that respective lot. The announcement for this assignment will be published in www.cllmp.com and www.mbda.gov.in

- a. Notwithstanding the above, the Purchaser reserves the right to accept or reject any quotations and to cancel the bidding process and reject all quotations at any time prior to the award of contract. The numbers against each item may increase or decrease at the time of issuing the Purchase Order.

- b. The bidder whose quotation is accepted will be notified of the issue of Supply Order by the Purchaser prior to expiration of the quotation validity period. The terms of the accepted offer shall be incorporated in the supply order (sample form attached).
9. Payment shall be made within 60 days after delivery of the goods.
10. Normal commercial warranty/ guarantee shall be applicable to the supplied goods.
11. You are requested to provide your sealed quote latest by 1400 hours on November 24th, 2022. Quotations that have been submitted on or before time will be opened at 1430 Hrs. on November 24th, 2022. Late quotes will be rejected.
12. We look forward to receiving your quotations and thank you for your interest in this project.

Sd/-

Name: Gunanka DB, IFS
Address: Meghalaya Basin Management Agency, Office of Meghalaya Basin Development Authority, Upper Nongrim Hills, Shillong – 793003; Meghalaya
Tel. No.: 0364 -2522921
Email: mbdaprocurement@gmail.com

FORMAT OF QUOTATION

Sl. No. ¹	Description of Goods	Specifications (complied or Not complied as per each specs along with Product Brochures.	Qty.	Unit	Quoted Unit Rate ² Lot wise at destination in Rs.	³ GST and similar other taxes applicable on finished Goods/ Services	Total Price per line item at Destination - inclusive of discounts, all taxes and duties	
							In Figures	In Words
Total								

Gross Total Cost: Rs.

We agree to supply the above goods in accordance with the technical specifications for a total contract price of Rs.....
(Amount in figures) (Rs... amount in words) within the period specified in the Invitation for Quotations.

We also confirm that commercial warranty/guarantee of 12 months shall apply to the offered goods.

We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in bribery or collusive agreements with competitors.

Signature of Supplier

¹ A bidder may offer for one or more than one lots.

² Any unconditional discounts if offered shall be specified in this column along with the unit rates.

³ Indicate each applicable tax separately.



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Phone: +91-364- 2522921/2522992

Website: www.mbda.gov.in, E-mail: admin.mbda@gov.in

SUPPLY ORDER

To:

M/s

.....

Dear Sirs,

Sub: Supply of

Reference: Your Quotation No..... Dated

1. Your quotation no.....of(Date) for the supply of **has been accepted. You are requested to** supply the following goods/equipment at the rates quoted by you and specified against each as per the specifications and terms & conditions specified hereunder:

Lot#	Brief description of goods/equipment	Specifications	Quantity to be supplied	Unit Rate (Rs.)	Total Price (Rs.)
			Total		

1. Delivery Period:days from the date of issue of this supply order.
2. Place of delivery
3. Consignee Address:
4. GST if any will be paid at actual prevailing on the date of supply (if not already included in the cost above).
5. Extended Warranty/Guarantee shall be 12months from the date of delivery and acceptance.
6. Payment shall be made within 60 days of delivery; and acceptance of the goods/equipment.

(Purchaser)

Date:

Name: Shri Gunanka DB, IFS
Designation: Additional Project Director,
CLLMP, MBMA
Place: Shillong, Meghalaya

SPECIFICATIONS

Lot No	Features	Specifications	Qty of the Equipments
DIY Equipment for the FPV UAV			
Lot1	FPV Goggles		1
	Screen Size	2× 2 inch or Higher	
	Screen Resolution (Single Screen)	1440 × 810 or Higher	
	Screen Renew Rate	120 Hz or Higher	
	Communication Frequency	2.4-5.850 GHz	
	Transmitter Power (EIRP)	Min.30 dBm	
	Live View Mode	720p/120fps or better	
	Video Format	MP4 (Video format: H.264) or better	
	Supported Video Play Format	MP4, MOV, MKV or More Audio format: AAC-LC, AAC-HE, AC-3, MP3 or More	
	Power Input	Voltage: 9 V (Max.) Type: LIPO 2s Charging Temperature: 0°C to 45°C Energy: 18 Wh Max Charging Power 10 W	
	FOV	Adjustable from 30° to 54°. Adjustable image size from 50%-100%	
	Interpupillary Distance Range	58 -70 mm or better	
	Supported Storage Card	microSD cards with storage capacities of up to 128GB. or Higher	
	Accessories must be included	Battery	2
FPV Lens Protector		1	

	FPV Sponge Foam Padding	1
	FPV Goggles Power Cable	1
	FPV Goggles Antenna	1
	PV Goggles Headbands	1
Remote Controller		
Operation Frequency	2.4-5.850 GHz	1
Operating Current/Voltage	0.6A @ 7.6 V or Better	
Transmission Distance (Unobstructed, free of interference)	4 km or Higher	
Transmitter Power (EIRP)	Min. 30 dBm	
Charging Time	3 hours or Less	
Battery Life	9 hours or Higher	
FPV Air Unit		
Operating Frequency	2.4-5.850 GHz	1
Transmitter Power (EIRP)	Min.30 dBm	
Min. Latency (end-to-end)	720p/60fps: <40 ms	
Max. Transmission Distance	Min.4 km	
Video Format	MP4 (Video format: H.264; Audio format: ACC-LC)	
I/O Interface	USB-C, MMCX, 3-in-1 port, microSD card slot	
Supported Flight Control System	Must support Betaflight or better	
Input Power	7.4-17.6 V, about 4-9 W	
Channels	Min. 8	
Accessories must be included	FPV Air Unit Antenna	1 Qty
	FPV Air Unit Antenna (SMA)	1 Qty

	FPV Air Unit MMCX to SMA Cable	1 Qty
	FPV Air Unit Coaxial Cable	1 Qty
	FPV Air Unit 3-in-1 Cable	1 Qty
FPV Flight Controller		1
Chip	STM32F722RET6 or Higher	
Speed	216 MHz	
Clock Frequency-Max:	26 MHz	
RAM	16 MB or Higher	
Input Voltage	12 V - 25.5 V (3-6s)	
BEC	5V/2A	
Mounting Distance	30.5mm*30.5mm	
Firmware	TMOTORF7 (Beta Flight)	
Sensor	Gyroscope	
	Barometer	
Frame		1
Main material	Carbon fiber	
Frame Size	220 mm	
Model	Quadcopter FPV	
Battery Type 1		4
Battery Capacity	1300mAh	
Continuous Discharge	120C-130C	
Max Burst Discharge	240C-260C	
Charge Plug	JST-XHR or Better	
Discharge Plug	XT60 or Better	

No of Cells	4-6s	
Battery Type 2		
Battery Capacity	1550mAh	4
Continuous Discharge	120C-130C	
Max Burst Discharge	240C-260C	
Charge Plug	JST-XHR or Better	
Discharge Plug	XT60 or Better	
No of Cells	4-6s	
Motors		
KV	3800	6
Lead	24# AWG 100mm	
Shaft Diameter	2 mm	
Idle Current @ 5V	0.9A	
Max Power for 60s	372 W	
Max Weight	15 g	
Internal Resistance	81 milli Ohms	
Configuration	12N14P	
Rated Voltage	3-4 S	
Peak Current for 60s	23A	
Propellers		
Size	5.1"	8
Pitch	4.7"	
Blade	3 or more	
Mounting Hole	5mm	

	Propeller Material	Carbon fiber or Higher	
	Centre Hub Thickness	7mm	
	ESCs		
	Type	2S~3S 4in1 Brushless ESC	
	Current	4*55 A	1
	Peak Current for 60s	4*75 A	
	BEC	Min 10V @ 2.0A	
	Battery	LiPo 3-6s	
	DIY Equipments for the Quadcopter UAV		
Lot2	Frame		
	Type	Quadcopter	
	Board	PCB version	
	Wheelbase	550mm	1
	Arm Size	235×42	
	Motor Mount Bolt Holes	16, 19, and 25mm	
	Landing Gear	Carbon Fiber	
	Total Weight	Max 760 g	
	Flight Controller		
	Processor	32bit ARM® Cortex®-M7 with DP-FPU or Higher	
	Speed	400 Mhz or Higher	1
	RAM	1 MB or Higher	
	Flash	2 MB or Higher	
SRAM	32 bit ARM® Cortex®-M3, 24Hz, *KB or Higher		

Failsafe	32 bit failsafe co-processor or Better
Sensor	16 bit gyroscope Or Higher
	14-bit accelerometer/magnetometer or Higher
	3-axis accelerometer/gyroscope or Better
	2* Barometer Pressure Sensor
	Magnetometer
Power input volyage	4 - 6 V
Power Rated Input Current	2.5 A
Power rated output	14 W
USB port input voltage	4 -6V
USB port rated input current	250 mA
Servo rail input Voltage	3V / 5V
ADS-B	A 1090 MHz ADS-B receiver must be integrated
Autopiloted	Yes
Min. Interfaces	14x PWM servo outputs (8 from IO, 6 from FMU)
	S.Bus servo output
	R/C inputs for CPM, Spektrum / DSM and S.Bus
	Analogue / PWM RSSI input
	5x general purpose serial ports, 2 with full flow control
	2x I2C ports
	SPI port (un-buffered, for short cables only not recommended for use)

	2x CAN Bus interface	
	3x Analogue inputs (3.3V and 6.6V)	
	High-powered piezo buzzer driver (on expansion board)	
	High-power RGB LED (I2C driver compatible connected externally only)	
	Safety switch / LED	
	Optional carrier board for Intel Edison (now obsolete)	
GPS/RTK		
Receiver Type	u-box M8 high precision GNSS modules (M86) or Better	
Satellite Constellation	GPS L1c/A; GLONASS L1OF; BeiDou B1I or More	
Positioning Accuracy	3D FIX: 2.5 m / RTK: 0.025 m	
Processor	STM32F302 or Better	
IMU Sensor	ICM20948 or Better	
Navigation Update Rate	Max. 8Hz	
Communication Protocol	CAN	
Operating Temperature	(-40 to 85°C)	
Motors		
KV Rating	400 KV	6
Lead	Enameled Wire 50 mm	
Shaft Diameter	4 mm	
Idle Current	0.2 A	
Max Power	216 W	
Internal Resistance	645 milli ohms	

Configuration	12N14P	
BatteryVoltage	4-6s, 16.8-25.2 V	
Peak Current	9.4 A	
ESCs		
Continuous Current	40 A	6
Peak Current	60 A	
BEC	No	
LiPo Battery	2-6s	
Programmable Item	Timing	
Propellers		
Length	13 inch	6
Max Thrust	4.5 kg	
Pitch	4.4	
Material	CF + Epoxy	
Battery Strap		
Material	Nylon	10
Length	20 cm	
Battery Charger		
AC Input Voltage Range	100 - 240 V	1
Output Power	65 W	
Charge Current Range	0.1 ~ 6 A	
Maximum Discharge Power	10 W	
Discharge Current Range	0.1 ~ 2.0 A	
Drain Current for Balancing Li-Po's	200 mA/Cell	

Li-ion/Po cell count	02-04 cells	
NiCd/NiMH cell count	6 - 8 Cells	
Pb battery voltage	06-12 cells	
Battery Tester		
Alarm set range (V)	2.7-3.8	1
Battery Input	1S-8S Battery	
Battery Type	LiPO/LiFe/Li-Ion/LiMn	
Cell Voltage Display Range (V)	0.5-4.5	
Pack voltage display range(V)	3.7-36	
Battery		
Capacity	5200(mAh)	2
Output Voltage	11.2(VDC)	
Charge Rate	1 ~ 3(C)	
Discharge Plug	XT-60	
Balance Plug	JST-XH	
Max. Burst Discharge	80C (416.0A)	
Max. Charge Rate	5 C	
Max. Continuous Discharge	40C (208.0A)	
Tachometer		
Rotation speed measurement		
Range	Optical (non-contact) measurement: 1 to 99999 revolutions/minute Contact measurement: 1 to 19999 revolutions/minute	1
Precision	±0.02%RD+1 or Less	
Sensing distance	(optical) 500 mm or More	

	Battery life	About 40 hours or more	
	Weight	Max. 250 g	
	DIY Equipments for the Heavy Payload Hexacopter UAV		
Lot3	Carbon Fiber Frame		1
	Frame	Hexacopter	
	Material	Carbon Fibre	
	Type	Side Folding	
	Max. Takeoff Weight	min 20 kg	
	Size	Diagonal Wheel base: 1150 mm	
	Arm	Carbon fibre tube	
	Motor mount	30mm CNC Metal Processing	
	Connector	Aluminium Alloy 4 pcs	
	Battery Compartment	Carbon fibre tube	
	Landing gear	18 mm Aluminium Tube	
	Extra Accessories must be quoted		
	Drone granula Spreading system	1 unit	1
	35L Spraying Gimal system	1 unit	1
	Tools for Assembling	1 unit	1
	Flight Controller		1
Flight Performance			
Maximum Wind Resistance	10m/s		
Max Yaw Angular Velocity	150 deg/s		
Max Tilt Angle	35°		
Ascent/Descent	Ascent: 5m/s		

	Descent: 4m/s
SDK	
SDK	Mobile SDK / Onboard SDK
SDK Port	API/CAN2 or Better
Extending Functions	
iOSD Data Storage	Built-in data recorder or Better
Intelligent Flight Modes	Point of Interest, Waypoints, Home Lock, Course Lock and More
Remote Parameter Adjustment	Yes
PC Assistant	Must support simulator
Hovering Performance	
Hovering Accuracy	Vertical: 0.5m
	Horizontal: 1.5m
Peripheral	
Supported Multi-rotor	Quadcopter: I4, X4
	Hexacopter: I6, X6, Y6, IY6
	Octocopter: X8, I8, V8
Supported ESC	400Hz frequency or More
Recommended Battery	3S to 12S LiPo
Assistant Software System Requirement	Windows 7 /8 /10 (32 or 64 bit)
	Mac OS
Recommended Radio	Lightbridge 2; S-BUS; D-BUS or More
Protection	
Motor Fail Protection	Minimum 6 axis
Propulsion Protection	Motor Overload

No Fly Zones	Supported	
Low Battery Level Warning	Smart RTH	
Low Battery Voltage Warning	Supported	
GPS		3
Operating Voltage (VDC)	5VDC	
Navigation Update Rate	10Hz or Higher	
Maximum Speed	515m/s	
Tracking Sensitivity	-167 dBm	
Motors		6
KV Rating	120 KV	
Lead	Enamelled wire 90 mm	
Shaft Diameter	15 mm	
Idle Current @ 24 V	1.5 A	
Max Power	4560 W	
Weight	Max. 650g	
Internal Resistance	22 milli ohms	
Configuration	36N42P	
Rated Voltage	10-14s	
Peak Current for 180s	70A	
ESCs		6
Continuous Current	100A	
Peak Current	120A	
Standby Consumption	50mA or Less	
BEC	No	

Refresh Rate	500Hz.	
Throttle response Speed	500ms at initial startup, 150ms afterwards	
Propellers		
Length	29"	4
Pitch	9.5	
Max. Thrust	32 kg	
Optimum RPM	1400-3600 RPM/min	
Material	CF+Epoxy	
No. of Blade	2blades- foldable	
LiPo Battery		
Battery Capacity	22000 mAh	2
Configuration	14S1P	
Output Voltage	51.8 V	
Discharge Plug	AS150-F	
Max. Burst Discharge	25 C	
No. of cells	6 cells	
Transmitter & Receiver		
Remote Controller		
Working Voltage	4.2 V	2
Frequency	2.4 - 2.483 GHz	
Update Way	APP Update Online	
Endurance	Min. 20 Hours	
Channels	12 or More	
Frequency hopping	FHSS or Better	

Battery	10000 mAH	
Charging Port	USB-TYPE-C	
Display	Inbuilt 5.5 inch high brightness display	
Interface	S.Bus/PPM/PWM/serial port and Others	
Receiver		
Channels	12 or More	
Power Supply	5V	
Working Current	180mA	
Resolution	720p or Better	
Frame rate	30 fps or Better	
Camera		
Working current	140mA	
Resolution	640*360 or Better	
Camera angle	120° or Higher	
Working voltage	12-72V	
LED light power	6W	
Charger		
Input Voltage	100 ~ 240(V AC)	
Output	50.4 V/ 25.0 A	
Output Power	100-120V Max Output Power 750W×2CH / 180-240V Max Output Power 1200W×2CH	1
Charge Current	18 A 50/60Hz	
Battery Type	LiPo or more	
Battery Cell Count	6/12/14s	

	Working Mode	Balance Charge Mode Storage Mode Charge Mode	
	Land ROVs		
Lot 4	BLDC Motors along with Electronic Speed Controller		5
	KV Rating	110KV	
	Rated Torque	1.3 Nm or Higher	
	Peak Torque	4 Nm or Higher	
	Max Speed	4600 rpm	
	Rated Current	15A or Higher	
	Peak Current	46A or Higher	
	No. of Pole-Pair	21 or Higher	
	Resistance Phase to Phase	125 μ ohms	
	Inductance Phase to Phase	87 μ H	
	Transmitter & Receiver		2
	Antenna Length	26 mm	
	Charging Port	Yes	
	Code Type	Digital	
	DSC Port	Yes(3.5mm)	
	Low Voltage Warning	Yes (Less than 9V)	
	Supporting Model	RC Car/RC Boat	
	No. of Channels	6 or Higher	
	Operating Voltage	12 VDC	
RF Power	Less Than 20 dbm		
Sensitivity	1024 dBm		

Non Continuous Servo		
Angle of rotation	180	20
Operating Voltage (VDC)	6 ~ 8.4	
Operating Speed	0.15sec/60 degree	
Stall torque	10kgcm - 70kgcm	
Servo wire length	Max. 32cm	
Dead zone setting	Max. 3 uS	
Gear Type	Metal	
Suspension		8
Material	Aluminium Alloy body & Bell metal Spring	
Ball Head Aperture	3mm	
No Ball Head Aperture	5mm	
Spring Diameter	Max.17 mm	
Total Length	Max. 98 mm / 3.86"	
Hole centre to hole centre	Max. 90 mm	2
Flight Controller		
Processor	32 bit Cortex M4 with FPU or Better	
Speed	168 MHz or Higher	
RAM	256 KB or Higher	
Flash	2 MB or Higher	
Failsafe	32 bit failsafe co processor or Better	
Sensor	16 bit gyroscope Or Higher	
	14-bit accelerometer/magnetometer or Higher	
	3-axis accelerometer/gyroscope or Better	

	Barometer.	
Min. Interface	5x UART (serial ports), one high-power capable, 2x with HW flow control	
	2x CAN (one with an internal 3.3V transceiver, one on expansion connector).	
	Spectrum DSM / DSM2 / DSM-X Satellite compatible input.	
	Futaba S.BUS compatible input and output.	
	PPM sum signal input.	
	RSSI (PWM or voltage) input.	
	I2C.	
	SPI.	
	3.3 And 6.6V ADC inputs.	
	Internal micro USB port and external micro USB port extension.	
Input Voltage	7V	
Firmware	Compatible Mission Planner	
Micro SD card Slot	Yes	
GPS		
Operating Voltage (VDC)	5VDC	
Navigation Update Rate	10Hz	
Maximum Speed	515m/s	
Tracking Sensitivity	-167 dBm	
Carbon Fibre Fabric		
Material Warp	Carbon fibre	5
Length	Min. 10m	

Width	Min.1 m	
Thickness	0.111mm (200G)	
Melting Point	More than 4000 °C	
Thermal Conductivity	100 W/mK or Higher	
Heat Capacity	800 J/g K or Higher	
Yield Strength	2500 Mpa or Higher	
Density	2000 kg/m3 or Higher	
Yarn Size Warp	3K or Better	
Weave	Uni-directional	
Ultimate Tensile Strength	Min 4000 Mpa	
Modulus of elasticity	Min. 400 Gpa	
Elongation	2.0% or Less	
More	Anti-aging and corrosion resistance.	
Linear Bearings		
Material	Stainless Steel	
Size	LM12UU	20 Qty for the each size
	LM16UU	
	LM20UU	
	LM25UU	
	LM30UU	
	LM35UU	
	LM40UU	
Outer Casing	Chromium Steel	
Bearings		20

Material	Stainless Steel	
Groove	Deep Groove for radial and Axial Load	
Inner Diameter	10 to 30 mm	
Thickness	Max. 30 mm	
Weight	17 (each) gm	
Omni Wheels		
Roller Type	Bearing	
Body Material	Aluminium	
Internal Diameter	16 mm	
Length of Roller	30 mm	
Min. Load Capacity	3 kg/wheel	8
Number of Plates	2	
Number of Rollers per Wheel	8	
Outer Diameter	60 mm	
Roller Material	Nylon+ TPR or Better	
Spacer material	Nylon or Better	
Nuts and Bolts		
Material	Stainless Steel	
Drive Type	Hex Socket	
Head Style	Button Head	
Size	M3 X 8	20
	M3 X 12	20
	M3 X 16	20
	M3 X 20	20

	M3 Nuts	80
	M4 X 8	20
	M4 X 12	20
	M4 X 16	20
	M4 X 20	20
	M4 Nuts	80
	M5 X 8	20
	M5 X 12	20
	M5 X 16	20
	M5 X 20	20
	M5 Nuts	80
	M6 X 8	20
	M6 X 12	20
	M6 X 16	20
	M6 X 20	20
	M6 Nuts	80
Continuous Servo Motor		
Angle of rotation	360	20
Operating Voltage (VDC)	6 ~ 8.4	
Operating Speed	0.13sec/60 degree to 0.17sec/60 degree	
Stall torque	<u>70kgcm or Higher</u>	
Servo wire length	Max. 32cm	
Dead zone setting	Max. 3 uS	
Gear Type	Metal	

Jumper Wire		10 Qty for each cable	
Type	Jumper Wire		
Wire	Aluminium / Copper		
Length	20 cm or Higher		
Cable	Male to Female		
	Male to Male		
	Female to Female		
DIY Equipments for the Water Based ROVs			
lot5	Thrusters		5
	Max.Throttle FWD/REV Thrust	16 / 10 kg f	
	Operating Voltage	7-24 volts	
	Motor Kv (no load)	Min. 200 RPM/V	
	Throttle Current (Power)	Min. 43 Amps	
	Throttle RPM	Min. 3000 RPM	
	Overall Cable Length	1.5 m or More	
	ROV ESCs		5
	Voltage	7-26 V (2-6S)	
	Max Current (Constant)	50A	
	Power Connector	XT90M	
	Motor Connectors	4.5mm Female Bullet	
	Signal Connector	3-pin servo connector (0.1" pitch) (ground, blank, signal)	
	Signal Voltage	3.3-5 V	
Pulse Width Signal		5	
Stopped	Min. 1500 μ s		

	Max Forward	Min. 1900 μ s	
	Max Reverse	Min. 1100 μ s	
	Li-ion Battery		4
	Nominal Voltage	14.8V	
	Nominal Capacity	15.6Ah or Higher	
	Maximum Continuous Current Draw	60A	
	Maximum Burst Current Draw	132A	
	Maximum Charge Current	20A	
	Minimum Safe Voltage	12V	
	Discharge Connector	XT90S or Better	
	Balance Plug	5 pin JST-XH or Better	
	Thermistor Plug	2 pin JST-XH or Better	
	Thermistor Resistance	R 25 = 10k Ω , \pm 1% (at 25 $^{\circ}$ C)	
	Thermistor Working Temperature	-40-110 $^{\circ}$ C	
	DIY UAVs and ROVs		
Lot6	ROV Land Rover		1
	Infrared Distance Sensor		
	Optical Detection Range	Min.10 m	
	FOV	20 $^{\circ}$	
	Servo		
	Operation Modes	Angle mode, Speed mode	
	Power Connector Module		
	Communication Port	CAN bus (5)	
	Output	USB Type-A power port: 5V 2A Power port with pin header: 5V 4ATX30 power port:	

	12V 5A
Input	12 V
Narrow Infrared Units	
Effective Range	Min. 6 m
Effective Area	Varies from 10° to 40°
Wide Infrared Units	
Effective Range	Min. 3 m (in indoor lighting conditions)
Effective Width	360° (in indoor lighting conditions)
Chassis Speed Range	0-3.5 m/s (forward) 0-2.5 m/s (backward) 0-2.8 m/s (sideways)
Max Chassis Rotational Speed	600°/s
Brushless Motor	
Max Rotational Speed	1000 rpm
Max Torque	0.25N·m
Max Output Power	19 W
Control Method	Closed-loop speed control
Protection	Overvoltage protection Over temperature protection Soft-start Short-circuit protection Chip and sensor anomaly detection
Gimbal	
Controllable Range	Pitch: -20° to +35° Yaw: ±250°
Mechanical Range	Pitch: -24° to +41° Yaw: ±270°

Max Rotational Speed	540°/s
Controller	
Latency	Connection via Wi-Fi: 80-100ms Connection via Router: 100-120ms (unobstructed, free of interference)
Live View Quality	720p/30fps
Max Live View Bitrates	6 Mbps
Operating Frequency	2.4 GHz, 5.1 GHz, 5.8 GHz
Operating Mode	Connection via Wi-Fi, Connection via Router
Max Transmission Distance	Min.300 m
Transmission Power (EIRP)	Max. 30dBm
Battery	
Capacity	Min. 2400 mAh
Battery Type	LiPo 3S
Energy	Min. 25.92 Wh
Weight	Min. 169 g
Battery Life in Use	Min. 35 minutes
Battery Life on Standby	Min.100 minutes
Charger	
Output	Port: 12.6 V=0.8A or 12.6 V=2.2A
Voltage	12.6 V
Rated Voltage	28 W
Router	
Routers	TP-Link Archer C7; NETGEAR X6S or Better

Accessories			
Robotic Arm	Horizontal: 22 cm, Vertical: 15 cm with Min. 2 no.of axes		
Gripper	Should support Gripper (Min.10 cm)		
Camera	CMOS 1/4"; Effective pixels: 5 MP with 1080 video resolution		
Blaster	Controllable Launching Frequency-1-8/s; Having a max launching frequency of 10/s; and an initial Launching speed of 26 m/s		
Smart Batteries	4 Qty Extra	4 Qty Extra	
Micro DIY Drone			
Lot7	Aircraft		1
	Takeoff Weight	Max 410 gm	
	Diagonal Distance	Max 120 mm	
	Ascent Speed	Min 6 m/s	
	Descent Speed	Min 6 m/s	
	Max Speed	30 m/s	
	Takeoff Altitude	Max.5000 m	
	Hover Time	Min.20 mins	
	Flight Distance	Min.12 km	
	Max Wind Speed Resistance	10.7 m/s (Level 5)	
	Transmission Power (EIRP)	Max. 33 dBm	
	Antennas	Dual Antennas or Better	
	Satellite	GNSS+GPS + Galileo + BeiDou	
	Hovering Accuracy Range	Vertical: ± 0.1 m (with Vision Positioning) or better ± 0.5 m (with GNSS Positioning) or better	

	Vertical: ±0.3 m (with Vision Positioning) or better ±1.5 m (with GNSS Positioning) or better
Camera	
Sensor	1/1.7-inch CMOS or Better
Effective Pixels	48 MP or Higher
Lens	FOV: 155°
Aperture	f/2.8
Focus Range	0.6 m to ∞
Video Resolution	4K @ 50/60fps
EIS	Must supports RockSteady and HorizonSteady and more
Gimbal	
Stabilization	Single-Axis (tilt) or better
Sensing System	
Downward (Binocular Vision and ToF)	ToF Effective Measurement Height: 10 m Precise Hovering Range: 0.5-10 m Vision Sensor Hovering Range: 0.5-20 m
Remote Controller	
Communicating frequency	2.4 - 5.85 GHz
Transmission Power	Max. 31.5 dBm
Operating time	Min 9 hours
Charging time	Min 2.5 hrs
Intelligent Flight Battery	
Battery Capacity	Min. 2420 mAh
Voltage	Min 14.76 V
Type	Li-ion

Energy	35.71 Wh@0.5C or higher	
Weight	Min 165 g	
Video Transmission		
Communication Bandwidth	Max 40 MHz	
Max Video Transmission Range	10 km	
FPV Goggles		
Weight	Max 300g	
Screen Size (single screen)	0.49-inch	
Resolution (single screen)	1920×1080	
Refresh Rate	Max 100 Hz	
Interpupillary Distance Range	56-72 mm	
Diopter Adjustment Range	-8.0 D to +2.0 D	
FOV (single screen)	51°	
Wi-Fi Protocol	Wi-Fi 802.11b/a/g/n/ac	
Bluetooth Protocol	Bluetooth 5.2	
Max Video Transmission Bitrate	50 Mbps	
Wi-Fi Wireless Streaming	Supports DLNA Protocol	
Battery Capacity	Min 1800 mAh	
Extra Accessories must be Quoted		
Battery	4 Qty Extra	4 Qty Extra
Battery for FPV Goggles	2 Qty Extra	2 Qty Extra
Motion Controller	1 Qty Extra	1 Qty Extra
Backpack	1 Qty Extra	1 Qty Extra

	Extra propellers	2 sets(CW+CCW) Qty Extra	2 sets(CW+CCW) Qty Extra
	Car Charger	1 Qty Extra	1 Qty Extra
	Nano DIY Drone		
Lot8	Aircraft		1
	Takeoff Weight	Max.250g	
	Max Ascent Speed	5 m/s	
	Max Speed	16 m/s	
	Max Service Ceiling Above Sea Level	4000m	
	Flight Time	Min. 50 mins	
	Hovering Time	Min. 40 mins	
	Max Flight Distance	25 km	
	Max Wind Speed Resistance	10.7 m/s (Level 5)	
	Max Tilt Angle	Forward: 40°, Backward: 35°	
	Global Navigation Satellite System (GNSS)	GPS + Galileo + BeiDou	
	Operation Frequency	2.400-5.850 GHz	
	Transmitter Power (EIRP)	30 dBm or Less	
	Hovering Accuracy Range	Vertical: ± 0.1 m (with vision positioning) ± 0.5 m (with GNSS positioning)	
		Horizontal: ± 0.3 m (with vision positioning) ± 0.5 m (with high-precision positioning system)	
	Sensing System	Forward; Backward; Downward	
	Gimbal		

Mechanical Range	Tilt: -135° to 80° Roll: -135° to 45° Pan: -30° to 30°
Controllable Range	Tilt: -90° to 60° Roll: -90° or 0°
Stabilization	3-axis mechanical gimbal (tilt, roll, and pan)
Camera	
Focal Length	24 mm or Better
Field of View	82.1° or Better
Minimum Focus Distance	3.3' / 1 m
Shutter Speed	Electronic Shutter 2 to 1/8000 Seconds or Better
Sensor Resolution	Effective: 48 Megapixel or Higher
Video Format	3840 x 2160p at 24/25/30/48/50/60 fps (150 Mb/s MOV/MP4 or More)
Still Image Support	DNG / JPEG / Raw or more
Aperture	f/1.7 or Higher
Wi-Fi	
Protocol	802.11 a/b/g/n/ac
Transmitter Power (EIRP)	20 dBm or Less
Bluetooth	
Protocol	Bluetooth 5.2 or higher
Transmitter Power (EIRP)	8 dBm or Less
Flight Battery Plus	
Capacity	3850 mAh or Higher
Voltage	7.38 V
Battery Type	Li-ion

Energy	28.4 Wh	
Charging Time	Max 80 mins	
Tranmitter		
Transmitter Power (EIRP)	26dBm or Less	
Storage Capacity	Min.8GB	
Max Battery Life	Min. 4 hours	
Wi-Fi Protocol	802.11 a/b/g/n	
Wi-Fi Transmitter Power (EIRP)	23 dBm or Less	
Bluetooth Protocol	Bluetooth 4.2 or Higher	
Bluetooth Transmitter Power (EIRP)	10 dBm or Less	
Charging Hub		
Input	Max. 12 V, 3 A	
Output (USB)	Max Voltage: 5 V, Max Current: 2 A	
Charging Type	Three batteries being charged in sequence or better	
Extra Accessories must be quoted		
Smart Batteries	6 Qty Extra	6
Propellers Guard	1 Set	1 Set
Carrying Case	1 Qty	1
Charging Hub	2 Qty	2