

DOCUMENT NO.: KP1/13D/4/1/TSP/09/125



REAL TIME KINEMATICS MOBILE MAPPERS- SPECIFICATION

A Document of the Kenya Power & Lighting Co. Plc
October 2023



TITLE:

**REAL TIME KINEMATICS
MOBILE MAPPERS-
SPECIFICATION**

Doc. No.

KP1/13D/4/1/TSP/09/125

Issue No.

1

Revision No.

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0.1 CIRCULATION LIST

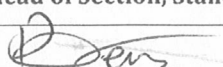
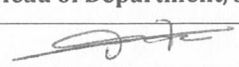
COPY NO.	COPY HOLDER
1	Manager, Standards
2	Electronic copy (pdf) on Kenya Power server (http://172.16.1.40/dms/browse.php?fFolderId=23)

REVISION OF KPLC STANDARDS

In order to keep abreast of progress in the industry, KPLC Standards shall be regularly reviewed. Suggestions for improvements to approved standards, addressed to the Manager, Standards Department, are welcome.

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0.2 AMENDMENT RECORD

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)	Approved by (Name & Signature)
0	2023-10-19	New Issue	Nancy Wairimu	Dr. Eng. Peter Kimemia

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FOREWORD

This Specification has been prepared by the Standards Department in collaboration with FDB/GIS section, both of The Kenya Power and Lighting Company Plc. (KPLC) and it lays down requirements for Real Time Kinematics (RTK) mobile mappers for collecting survey-grade accurate GIS data of Kenya Power network.

Real Time Kinematics mobile mappers are a GPS correction devices that provides real time corrections to location data while the drone is capturing imagery.

There is no other specification in this series.

This specification stipulates the minimum requirements for RTK mobile mappers acceptable for use in the company and it shall be the responsibility of the supplier(s) and manufacturer to ensure that the offered design is of the highest quality and guarantees excellent service to KPLC and good workmanship in the manufacture of RTK mobile mappers.

Users of KPLC specifications are responsible for its correct interpretation and application.

The following are members of the team that developed this specification:

Name	Division
Nancy Wairimu	Institute of Energy Studies & Research
Ekrah Maina	Network Management

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1. SCOPE

1.1. This specification is for newly manufactured RTK mobile mappers for collecting survey-grade accurate GIS data of Kenya Power network.

2. NORMATIVE REFERENCE

The following standard and guidelines contain provision, which, through reference in this text, constitute provisions of this specification. For dated editions, the cited edition will apply; for undated editions, the latest edition of the referenced document shall apply.

IEC 60529: Degrees of protection provided by enclosure (IP code).

ISO 15693: Cards and security devices for personal identification. Contactless vicinity objects.

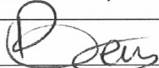
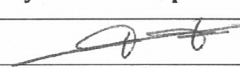
ISO 14443: Cards and security devices for personal Identification. Contactless proximity objects.

MIL-STD-810G: Department of Defense Test Method Standard: Environmental Engineering Considerations and Laboratory tests.

3. DEFINITIONS AND ABBREVIATIONS

For the purpose of this specification, the definitions and abbreviations given in the reference standards and the following abbreviations shall apply:

KPLC-	Kenya Power and Lighting Company (plc)
IEC	International Electro-technical Commission
ISO	International Standards Organization
FDB	Facilities Database
GIS	Geographical Information System
RTK	Real Time Kinematics
IP	Ingress Protection
GMS	Global Mobile Services
CPU	Central Processing Unit
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
IPS	In-plane Switching
SIM	Subscriber Identity Module
4G	Fourth generation of broadband cellular network technology
Wi-Fi	Wireless Fidelity

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USB	Universal Serial Bus
OTG	On The Go
WCDMA	Wideband Code Division Multiple Access
FDD-LTE	Frequency Division Duplexing – Long Term Evolution
WWAN	Wireless Wide Area Network
LAN	Local Area Network
PAN	Personal Area Network
NFC	Near- Field Communication
SD	Secure Digital

4. REQUIREMENTS

4.1. SERVICE CONDITIONS

The RTK mobile mappers shall be suitable for use outdoors in tropical areas and harsh climatic conditions including areas exposed to:

- Altitudes of up to 2200m above sea level;
- Humidity of up to 95%;
- Average ambient temperature of +30°C with a minimum of 0°C and a maximum of +45°C;
- Heavy Saline conditions along the coast.

4.2. SPECIFIC REQUIREMENTS

The RTK mobile mappers' particular requirements shall be as per table 1.

Table 1: Particular requirements of the RTK mobile mappers

NO.	PARAMETER		REQUIREMENT
1.	Platform	Operating System	≥Android 11 (GMS)
		CPU	≥8 cores 2.2 GHz
2.	GNSS accuracies	Channels GPS	≥184
		Constellation	GPS L1C/A L2C GLONASS L1,L2 Galileo E1,E5b BeiDou B1,B2
		RTK	2 cm HRMS
		Autonomous	< 1 m HRMS
		RTK Convergence time	< 10s
		Concurrent GNSS	≥4

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NO.	PARAMETER	REQUIREMENT
3.	Display	Size
		8.1"
		Screen
		IPS touch screen ,corning gorilla glass 3,capacitive multi-touch, ≥ 5 points
4.	Communications	Resolution
		1920 x 1200
		Brightness
		Glare resistant, direct sunlight viewable (readable) Glove/rain mode
		SIM
		Dual SIM
		Network Modem
		4G modem GSM: 850/900/1800/1900
		Wi-Fi
		802.11 a/b/g/n/ac
		Bluetooth
		Bluetooth™ 5.1
5.	Ports	USB
		OTG (Support hot plug)
		Built in 4G modem
		WCDMA: B1/B2/B5/B8 FDD-LTE: Band1/ Band3/ Band4/ Band5/ Band 7/ Band8/ Band17/ Band20/ Band28
		Cellular (WWAN)
		2G (850,900,1800,1900) 3G (1,2,5,8) 4G/LTE: (1,2,3,4,5,7,8,12,13,17,20,25,26,28,38,39,40,41)
		Wireless LAN
		2.4 GHz + 5 GHz: 802.11a/b/g/n/ac
		PAN
		BT V4.2 LE
6.	Graphics	NFC
		13.56 MHz; ISO 14443A/B, ISO 15693
		Audio
		Headphone support noise suppression
7.	Memory	Type-C, OTG; quick charge 3.0
8.	Battery	Adreno 506
9.	Battery	Card slot
		micro SD card ≥ 256 GB
		Voltage
		3.8V
10.	Cameras & sensors	Capacity
		8000 mAh
		Battery life
		8h
11.	Sensors	Charging time
		Fast charging (Quick charge 3.0)
		Features
		Anti-jamming Anti-spoofing
12.	Cameras & sensors	Cameras rear
		≥8megapixel with autofocus and flash
13.	Cameras & sensors	Cameras front
		≥5 megapixel
14.	Sensors	Gyroscope
		Compass
		Accelerometer
		Pressure
		Proximity
		Ambient light

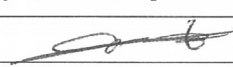
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NO.	PARAMETER	REQUIREMENT
12.	Environment	Operating
		-20°C to 55°C (-4°F to 131°F) MIL-STD-810G, Method 501.5/502.5 Procedure II
		Drop/Shock
		6 drops from 1.5mm, concrete surface
		Storage
		-40°C to 70°C (-40°F to 158°F) MIL-STD-810G, Method 501.5/502.5 Procedure I
		Mechanical Shock
		MIL-STD-810G:2019 Method 516.8/Procedure I
13	Certifications & Samples	Sand/ Dust
		IP67, IEC 60529
		Water
		IP67, IEC 60529
		Humidity
		0 – 95% (non-condensing) MIL-STD-810G, Method 507.5 Procedure II
		Altitude
		4572 m (15000 ft.)
14	Accessories	1. Authorized service center locally (Authorization certificate required)
		2. Pre-installed software with permanent license
		3. Permanent post processing license(permanent)
		4. Sample mobile mapper to be provided for testing
		1. Screen protector
		2. RTK antenna and charger
		3. Hard cover
		4. Stylus
		5. Type-C USB cable

5. TESTS REQUIREMENTS

5.1. The RTK mobile mappers shall be inspected and tested in accordance with relevant international standards and provision of this specifications.

6. MARKING AND PACKING

6.1. MARKING

6.1.1. The following information shall be legibly and indelibly marked on the RTK mobile mappers;

- Name of the item and its brand name
- Name of the manufacturer
- Year of the manufacturer
- The words "Property of Kenya Power and Lighting Company Plc"

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- 6.2.1. The RTK mobile mappers shall be packed packaged in such a manner as to minimize damage and entry of moisture during transportation, storage and handling.
- 6.2.2. Documentation in English language such as manuals shall be provided in the case.
- 6.2.3. The following information shall be indelibly printed on the case clearly and prominently displayed ;
- a) Name of the item and its brand name
 - b) Name of the manufacturer
 - c) Year of the manufacturer
 - d) The words "**Property of Kenya Power and Lighting Company Plc**"

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APPENDICIES**A: TESTS AND INSPECTION (Normative)**

- A.1 It shall be the responsibility of the supplier to test or to have all the relevant tests performed.
- A.2 Copies of Type Test Certificates and Type Test Reports issued by a third party testing laboratory that is accredited to ISO/IEC 17025 shall be submitted with the tender for the purpose of technical evaluation. A copy of the accreditation certificate for the testing laboratory shall also be submitted with the tender (all in English Language). Any translations of certificates and test reports into English language shall be signed and stamped by the Testing Authority.
- A.3 The bidder shall provide current e-mail address, fax and telephone numbers and contact person at the Testing Laboratory where Type Tests were carried out.
- A.4 The RTK mobile mappers shall be subject to acceptance tests at the manufacturer's works before dispatch. Engineers appointed by KPLC shall witness acceptance tests.
- A.5 Test certificates for the RTK mobile mappers to be supplied shall be submitted to KPLC for approval before shipment/delivery of the equipment.
- A.6 On receipt of the RTK mobile mappers, KPLC will inspect them and may perform or have performed any of the relevant tests in order to verify compliance with the specification. The supplier shall replace without charge to KPLC the RTK mobile mappers, which upon examination, test or use fail to meet any or all of the requirements in the specification.

B: QUALITY MANAGEMENT SYSTEM (Normative)

- B.1 The supplier shall submit a Quality Assurance Plan (QAP) that will be used to ensure that RTK mobile mappers' physical properties, tests and documentation, will fulfill the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfill the requirements of ISO 9001: 2015.
- B.2 The Manufacturer's Declaration of Conformity to applicable standards and copies of quality management certifications including copy of valid and relevant ISO 9001: 2015 certificate shall be submitted with the tender for evaluation.
- B.3 The bidder shall indicate the delivery time of the RTK mobile mappers, manufacturer's monthly & annual production capacity and experience in the production of the type and size of items being offered. A detailed list & contact addresses (including e-mail) of the manufacturer's previous customers for similar type of the handheld printer sold in the last five years as well as reference letters from at least four of the customers shall be submitted with the tender for evaluation.

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C: DOCUMENTATION (Normative)

- C.1 The bidder shall submit its tender complete with technical documents for tender evaluation. The technical documents to be submitted (all in English language) for tender evaluation shall include the following:
- a) Fully filled clause by clause Guaranteed Technical Particulars (GTP) signed by the manufacture,
 - b) Copies of the Manufacturer's catalogues, brochures, drawings and technical data;
 - c) Sales records for the last five years and at least four customer reference letters;
 - d) Details of manufacturing capacity and the manufacturer's experience;
 - e) Copies of required Type Test Reports by a Third Party Testing Laboratory accredited to ISO/IEC 17025;
 - f) Copy of accreditation certificate to ISO/IEC 17025 for the Third Party Testing Laboratory;
 - g) Manufacturers Letter of Authorization, ISO 9001:2015 certificate and other technical documents required in the tender.
 - h) Manufacturer's warranty and guarantee;
- C.2 The successful bidder (supplier) shall submit the following documents/details to The Kenya Power & Lighting Company for approval before manufacture:
- a) Fully filled clause by clause Guaranteed Technical Particulars (GTP) stamped and signed by the manufacturer, specific values shall be filled in, terms like "yes", "Agree", "complied" shall not be acceptable ;
 - b) Drawings of the RTK mobile mappers to be manufactured for KPLC.
 - c) Quality Assurance Plan (QAP) that will be used to ensure that the design, material; workmanship, tests, service capability, maintenance and documentation will fulfill the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfill the requirements of ISO 9001:2015.
 - d) Detailed test program to be used during factory acceptance testing;
 - e) Marking details and method to be used in marking the RTK mobile mappers;
 - f) Packaging details (including packaging materials).
- C.3 The successful bidder and Manufacturer shall demonstrate the design, connection and measurement of all parameters of all the parameters the standard is able to measure at their cost to at least 20 KPLC staff locally.

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D: GUARANTEED TECHNICAL PARTICULARS (Normative)

To be filled and signed by the Manufacturer and submitted together with relevant copies of the Manufacturer's catalogues, brochures, drawings, technical data, sales records for previous five years, four customer reference letters, details of suppliers' capacity and experience; and copies of complete type test certificates and test reports for tender evaluation, all in English Language)

Tender No.

Clause number	Item Description	KPLC requirement	Bidder's offer (indicate full details)
	Manufacturer's Name and address		Specify
	Country of Manufacture		Specify
	Bidder's Name and address		Specify
	Brand name		Specify
1.	Scope		Specify
2.	Normative References		Specify
3.	Definitions and Abbreviations		Specify
4.	Requirements		
4.1	Service Conditions		
a)	Altitudes	Up to 2200mm above sea level	Specify
b)	Humidity	Up to 95%	Specify
c)	Temperature	Average +30°C with a minimum of 0°C and a maximum of + 45°C	Specify
d)	Heavy saline conditions		Specify
4.2	Specific Requirements		
1.	Platform	Operating System	Specify
		CPU	Specify
2.	GNSS accuracies	Channels GPS	Specify
		Constellation	Specify
		RTK	Specify
		Autonomous	Specify
		RTK Convergence time	Specify
		Concurrent GNSS	Specify
3.	Display	Size	Specify
		Screen	Specify
		Resolution	Specify
		Brightness	Specify
4.	Communications	SIM	Specify
		Network Modem	Specify

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Clause number	Item Description	KPLC requirement	Bidder's offer (indicate full details)
		Wi-Fi	Specify
		Bluetooth	Specify
		USB	Specify
		Built in 4G modem	Specify
		Cellular (WWAN)	Specify
		Wireless LAN	Specify
		PAN	Specify
		NFC	Specify
		Audio	Specify
5.	Ports		Specify
6.	Graphics		Specify
7.	Memory	Card slot	Specify
8.	Battery	Voltage	Specify
		Capacity	Specify
		Battery life	Specify
		Charging time	Specify
9.	Features		Specify
10.	Cameras & sensors	Cameras rear	Specify
		Cameras front	Specify
11.	Sensors		Specify
12.	Environment	Operating	Specify
		Drop/Shock	Specify
		Storage	Specify
		Mechanical Shock	Specify
		Sand/ Dust	Specify
		Water	Specify
		Humidity	Specify
		Altitude	Specify
13.	Certifications & Samples		Specify
14.	Accessories		Specify
5.	Test Requirements		Provide test reports
6	Marking and Packing		
6.1	Marking		Specify
6.2	Packing		Specify
A	Test and inspection		

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Clause number	Item Description	KPLC requirement	Bidder's offer (indicate full details)
A.1	Responsibility of carrying out tests		State
A.2	Copies of Type Test Reports submitted with tender		Provide
A.3	Contacts of testing laboratory		Provide
A.4	Acceptance tests at the manufacturers works		State compliance
A.5	Test certificates to be submitted by supplier to KPLC for approval before supply/delivery		State compliance
A.6	Inspection at the stores and replacement of rejected items		State compliance
B	Quality Management System		
B.1	Quality Assurance Plan		Provide
B.2	Copy of ISO 9001:2015 Certificate		Provide
B.3	Manufacturer's experience		State
	Manufacturing Capacity (units per month)		State
	List of previous customers		State
	Customer reference letters		State
C	Documentation		
C.1	Documents submitted with tender		State compliance
C.2	Documents to be submitted by supplier to KPLC for approval before manufacture		State compliance
C.3	Training of at least 20 KPLC staff locally		State compliance
	Statement of compliance to specification (indicate deviations if any & supporting documents)		State compliance

.....
Manufacturer's Name, Signature, Stamp and Date

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