

TECHNICAL SPECIFICATION FOR GPS TIME SYNCHRONISATION UNIT - UI 474-283 Rev.1

Appendix A: Technical Schedules

Schedule A and Schedule B provide technical details against tendered equipment/Supplier's statement of compliance or non-compliance. The tenderer is requested to complete this Schedule A/B as part of the tender submission data package.

When completing the Schedule A/B, the tenderer is requested to take cognisance of the following:

It is expected of the tenderer to state clearly, for each clause that requires a statement of compliance in the Schedule A/B, either "Comply" or "Do Not Comply". The Tenderer shall provide detailed evidence for each answer specifically stating the **exact location** of the evidence in the supporting documentation i.e **document name and reference, page number, paragraph number**.

If a clause in the Schedule A/B requires information only, e.g. describe application etc. The tenderer is at liberty to provide any information deemed appropriate.

SCHEDULE A : PURCHASER'S PARTICULAR REQUIREMENT

SCHEDULE B: THE TENDERER'S COMPLIANCE

Clause No	Description of Clause	Schedule A (Purchaser's Particular Requirement)	Weight	Schedule B Compliance	Clause Score	Total Score	Comments
4	FUNCTIONAL REQUIREMENTS	Stated for Information only					
4.1	Environmental requirements	Stated for Information only					
	The GPS time synchronising unit receiver shall:	State Compliance					
4.1.1	Operate within a temperature range of -20 0C to +55 0C.	State Compliance	2				
4.1.2	Handle relative humidity of up to 100% outdoors and between 10-95% inside the substation in the specified temperature range.	State Compliance	1				
4.1.3	Be immune to environmental conditions as per IEC61850-3 standard.	State Compliance	1				
4.1.4	Provide error free operation when exposed to EMI stress and electrical surges, as per class 2 requirements of IEEE 1613.	State Compliance	1				
4.1.5	Operate within an altitude range of 0 – 2000m.	State Compliance	1				
4.2	Enclosure Protection	Stated for Information only					
	The device shall meet the following enclosure protection:	State Compliance	1				
4.2.1	The IP rating of 41 for indoor GPS time synchronisation receiver.	State Compliance	1				
4.2.2	Suitably protected against corrosion as per SCSSCAAP9.	State Compliance	1				
4.3	Power and Earthing Requirements	Stated for Information only					
4.3.1	The power supply in voltages supported shall be 48, 110 and 220 volts DC.	State Compliance	3				
4.3.2	The offer shall include an optional dual power supply.	State Compliance	1				
4.3.3	The GPS time synchronising unit shall be equipped with a surge arrestor to be fitted between the antenna and the receiver.	State Compliance	2				
4.3.4	The surge arrestor shall include the earth stud for bonding to the earth mat.	State Compliance	1				
4.3.5	Wherever the surge arrestor is applied, it shall be replaceable and repositionable.	State Compliance	1				
4.3.6	The Supplier shall specify the losses incurred by the surge arrestor.	State Compliance	1				
4.3.7	The surge arrestor shall comply with the IEC 61000-4-5 standard class 4.	State Compliance	2				
4.4	System Alarms	Stated for Information only					
	The GPS time synchronising unit shall provide the following alarm functionality:	State Compliance					
4.4.1	GPS unhealthy alarm: for internal malfunction.	State Compliance	3				
4.4.2	GPS bad time alarm: when the unit is not locked or not tracking the satellites.	State Compliance	3				
4.4.3	These alarms shall be available for mapping as potential free input contacts to be used with the existing SCADA system.	State Compliance	3				
4.4.4	The alarms shall be available over SNMP version 2c.	State Compliance	3				
4.5	Timing Output Requirements	Stated for Information only					
	The GPS time synchronising unit shall have the following timing output functionality:	State Compliance					
4.5.1	A Pulse Per Minute signal (PPM) with adjustable duty cycle.	State Compliance	3				
4.5.2	Pulse Per Second signal (PPS) with adjustable duty cycle.	State Compliance	1				
4.5.3	The PPM and PPS outputs shall be fed via isolated opto-couplers which should be capable of switching 110 and 220 VDC.	State Compliance	3				
4.5.4	The timing accuracy for PPM and PPS signals shall be 1ms from UTC.	State Compliance	3				
4.5.5	A Pulse Per 30 Minute signal (PPHH) with adjustable duty cycle with accuracy of 1ms from UTC. (Preferable)	State Compliance	1				
4.5.6	Standard IRIG-B signals:	State Compliance					
4.5.6.1	IRIG-B122	State Compliance	3				
4.5.6.2	IRIG-B002	State Compliance	3				
4.5.7	1.1.1 The accuracy of the IRIG-B timing output shall be no more than 100µs from UTC.	State Compliance	3				
4.5.8	1.1.2 An NTP version 4 Server which provides time synchronisation over a networked environment.	State Compliance	3				

4.5.9	1.1.3 An SNTP version 4 Server which provides time synchronisation over a networked environment.	State Compliance	3				
4.5.10	1.1.4 The GPS time synchronising unit shall output UTC + offset time which is selectable.	State Compliance	3				
4.5.11	1.1.5 The GPS time synchronising unit shall be a Grandmaster Clock supporting IEEE 1588 version 2 precision time protocol, and IEEE Std C37.238-2011 and it shall be clearly stated if it is an add-on or integrated module.	State Compliance	3				
4.6	GPS Receiver and Clock Requirements	Stated for Information only					
4.6.1	The primary source of time information to the GPS receiver shall be obtained from the GPS satellites to establish a UTC time base.	State Compliance	3				
4.6.2	The GPS receiver shall have an internal real time clock that will maintain accurate time if the communication to the GPS satellites is lost or is of bad quality.	State Compliance	3				
4.6.3	Each GPS time synchronising unit delivered shall include a 19 inch rack mount option.	State Compliance	3				
4.6.4	The <i>Supplier</i> shall specify the accuracy of the internal clock of the GPS receiver and preference shall be given to the most accurate internal real time clock.	Stated for Information only	2				
4.6.5	The GPS time synchronising unit shall have the capability to generate a dashboard report in .pdf format.	State Compliance	3				
4.6.6	The GPS time synchronising unit shall be able to output logs in .pdf format.	State Compliance	3				
4.7	Interface Requirements	Stated for Information only					
	The device shall support the following physical interfaces and all shall be modular and optional:	State Compliance					
4.7.1	Phoenix connectors for PPM and PPS outputs.	State Compliance	3				
4.7.2	BNC connectors for IRIG-B002 TTL.	State Compliance	3				
4.7.3	Phoenix connectors for IRIG-B002 RS485.	State Compliance	3				
4.7.4	IRIG-B002 Optical output via LC connectors (Preferable) or ST connector as a second option.	State Compliance	3				
4.7.5	BNC connector for IRIG-B122.	State Compliance	3				
4.7.6	Ethernet ports shall be 100Base-Tx (RJ45) and 100Base-Fx (LC connector Preferable).	State Compliance	3				
4.7.7	The <i>Supplier</i> shall state number of ports provided for each timing output and the capability of each timing output to drive loads.	State Compliance	2				
4.8	Display Requirements	Stated for Information only					
4.8.1	The GPS time synchronising unit shall have a backlit digital display and indications on the front panel which show the following:	State Compliance					
4.8.1.1	The time of the day (any format)	State Compliance	2				
4.8.1.2	The date (Any format preferably user configurable).	State Compliance	2				
4.8.1.3	The power status of the clock.	State Compliance	2				
4.8.1.4	The total signal strength	State Compliance	2				
4.8.1.5	The number of satellites locked and synchronised to the receiver clock.	State Compliance	2				
4.8.1.6	GPS synchronised – when the receiver is accurately tracking the GPS time signal.	State Compliance	2				
4.8.1.7	GPS locked – when the unit is locked or tracking satellite.	State Compliance	2				
4.8.1.8	GPS bad time – when the unit is not locked or tracking	State Compliance	1				
4.8.2	It is preferred that the GPS time synchronisation unit shall offer a PC dashboard functionality that displays the number of satellites locked and synchronized to the clock.	State Compliance	3				
4.9	GPS Antenna Requirements	Stated for Information only					
4.9.1	The antenna shall be an active antenna.	State Compliance	3				
4.9.2	The active antenna shall be powered from the indoors unit.	State Compliance	3				
4.9.3	The antenna shall be supplied with the installation bracket for mounting the antenna.	State Compliance	3				
4.9.4	The antenna shall operate from a distance of up to 100m from the indoors unit.	State Compliance	2				
4.9.5	The antenna cable shall be screened coaxial cable.	State Compliance	3				
4.9.6	The antenna shall be designed for outdoor use in accordance with the IEC 61000-4-3 EMC standard.	State Compliance	3				
4.9.7	The antenna shall be housed in a shielded enclosure with the IP rating of 68.	State Compliance	3				
4.9.8	The antenna shall be supplied with an optional antenna splitter to feed at least four GPS receivers. (The data sheet of the antenna splitter shall be provided).	Stated for Information only	2				
4.10	Security	Stated for Information only					
4.10.1	The GPS time synchronising device shall be immune to spoofing	State Compliance	2				
4.11	Configuration Tool	Stated for Information only					
4.11.1	The configuration of the unit shall be password protected.	State Compliance	1				
4.11.2	The cable delay compensation shall be user configurable.	State Compliance	2				
4.11.3	Basic configuration shall be via the front panel of the GPS receiver.	State Compliance	1				
4.11.4	Device shall be configurable via Ethernet or serial connection.	State Compliance	3				
5	General Specification	Stated for Information only					
5.1	Software License	Stated for Information only					

	The Supplier shall provide an enterprise software license, if any, for all software provided with the GPS time synchronising unit for use by the Purchaser.	State Compliance	3				
5.2	Documentation	Stated for Information only					
5.2.1	The Supplier shall supply a complete set of documentation. Such documentation shall enable Purchaser's personnel to perform maintenance on the GPS time synchronising units. The documentation shall include the following:	State Compliance					
5.2.1.1	Manuals	State Compliance	2				
5.2.1.2	Connection Drawings to IED's	State Compliance	2				
5.2.2	Manuals shall include the following:	State Compliance					
5.2.2.1	Hardware manuals with all the mechanical, electrical and environmental specifications of the units	State Compliance	1				
5.2.2.2	Engineering manuals – with all the installation and electrical schematics for the complete system	State Compliance	1				
5.2.3	All documents shall be supplied in English Language.	State Compliance	1				
5.2.4	All documents shall be supplied in a digital format and hard copy format and shall be available on the internet.	State Compliance	1				
5.2.4	The Supplier shall provide the exact ordering code (model number) of the time server with all the relevant accessories.	State Compliance	1				
5.5	System Durability	Stated for Information only					
5.5.1	The service life of the GPS time synchronising units shall not be less than 10 years.	State Compliance	2				
5.5.2	The <i>Supplier</i> shall notify the <i>Purchaser</i> in writing of the unit obsolescence as soon as it becomes known to the <i>Supplier</i> .	State Compliance	1				
5.6	Quality Assurance	Stated for Information only					
5.6.1	Eskom's Quality Assurance requirements as specified in ISO 9001:2015 are applicable.	State Compliance	1				
5.7	Testing and Approval	Stated for Information only					
5.7.1	The Supplier shall provide a detailed acceptance testing procedure to verify the timing accuracy of the GPS time synchronising unit.	State Compliance	2				
5.7.2	The Supplier shall provide with this tender the compliance test certificates from independent test authority to:	State Compliance					
5.7.2.1	IEEE 1588 version 2	State Compliance	1				
5.7.2.2	IEEE C37.238-2011	State Compliance	1				
5.7.2.3	Immunity to substation environment	State Compliance	1				

Signature: AM Khoza

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