

ANNEX II: TECHNICAL SPECIFICATIONS & ANNEX III: TECHNICAL OFFER
SECTION 3: TECHNICAL DATA SCHEDULE 15
REPEATER STATION 1 (FOR EXISTING COMMUNICATION SYSTEM)

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SECTION 3: TECHNICAL DATA SCHEDULE

**LOT 3: Development of remote supervision and control
systems for the medium voltage distribution grid in the
area of Elektrosrbija Kraljevo**

**TECHNICAL REQUIREMENTS FOR REPEATER STATION 1 (FOR EXISTING
COMMUNICATION SYSTEM)**

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REPEATER STATION 1 (FOR EXISTING COMMUNICATION SYSTEM)

Item	Description	Unit	Required	Guaranteed
1	GENERAL			
1.1	Manufacturer			
1.2	Type			
1.3	Model			
1.4	Country of origin			
1.5	Standards		IEC 60099-4, ETSI 300-220/UHF HIGH 300-113 ETS 300-683 LVD72/23/EEC (93/68/EEC)	
1.6	QMS		ISO 9001	
1.7	Mount location (indoor/outdoor)		outdoor	
2	RADIO TRANCEIVER			
2.1	Data rates		4800...19200 bps	
2.2	VHF Range		140 – 174 MHz	
2.3	UHF Range		435 – 470 MHz	
2.4	Collision avoidance		Yes, configurable by user	
2.5	Repeating		Multiple repeating, minimum 4 repeaters in one radio connection	
2.6	Standards		ETSI 300-113, MPT1411, FCC Rule 90.210	
3	RADIO TRANSMITTER			
3.1	Transmitter power (TX power)		0.01 W – 5.0 W configurable by user	
3.2	Accuracy of power	dB	+/- 2 dB	
3.3	The parasite emission signal	dBm	MAX – 37 dBm	
4	RADIO RECEIVER			
4.1	Sensitivity		-110... -116 dBm@ BER 10-6. (depending on data rates and bandwidth)	
4.2	The parasite emission signal		MAX – 57 dBm	
4.3	Adjacent channel rejection		> 60 dB	

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Item	Description	Unit	Required	Guaranteed
5	SERIAL INTERFACE RS-232			
5.1	Three-wire, Rx/Tx/GND			
5.2	Data rates		600...57600 bps	
6	SOFTWARE PACKAGES SHALL BE DELIVERED WITH DEVICES			
6.1	for control and parametrization modem on site via a mobile computer (without computer delivery)		yes	
7	PROTOCOL			
7.1	Protocol toward existing data concentrators and repeater stations		R4E3	
8	CONNECTORS			
8.1	Ethernet connector		RJ45	
8.2	Antenna connector		BNC female	
8.3	RS-232 COM 1		DB9 female	
8.4	RS-232 COM 2		DB9 female	
9	RATED VALUES			
9.1	Casing power source voltage	V AC	230 VAC	
9.2	Power block (AC/DC)		12 V DC, 12 Ah rechargeable batteries	
9.3	Power block (AC/DC) consumption	A	0,14 A DC (stand-by)	
9.4	Power Supply for radio communication module	V DC	12	
9.5	Frequency range	MHz	435 – 470	
9.6	Output power	W	0.01 - 5	
9.7	Bandwidth	kHz	12,5	
9.8	Receiver sensitivity	dBm	from -110 to -118 dBm at BER lower than 10^{-6}	
10	CASING			
10.1	Material		Stainless steel	
10.2	Protection class	IP	IP64	
10.3	Temperature range	° C	-25° C to + 60 ° C	

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Item	Description	Unit	Required	Guaranteed
10.4	Thermostat casing		yes	
10.5	Maintaining the temperature hysteresis	° C	5° C to 15°C	
10.6	Casing open alarm and signaling		yes	
10.7	Radio communication module casing class	IP	IP50	
10.8	Radio communication module temperature range	° C	-25° C to + 60 ° C	
11	DOCUMENTATION			
11.1	The device shall be delivered with complete documentation (CD and printouts) for mounting and maintenance. The documentation shall be on Serbian		Yes	
12	CERTIFICATE OF COMPLIANCE AND TESTING DOCUMENTATION			
12.1	The device shall be delivered with complete certificate of compliance documentation: factory test sheets in accordance with IEC standards			
13	FUNCTIONS			
13.1	"Store and forward" (transmitter and receiver) functionality installed;			
13.2	Event triggered communication ("event driven" system);			
13.3	Option of communication between the SCADA server and concentrator station with the remote unit with a digital communication module via a direct or alternative digital radio communication route (option to set direct or alternative paths via data concentrator)			

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Item	Description	Unit	Required	Guaranteed
13.4	Option of connecting the remote terminal unit with a digital communication command module to the existing data concentrator and existing repeater network on frequencies pre-approved by RATEL according to proprietary protocol – R4E3 (due to compatibility with the existing installed system);			
13.5	Communication options - "point to point", "point to multipoint" and "peer to peer" ("mesh" technology with "multirepeating" functionalities);			
13.6	Battery capacity and charging control as well as protection against deep discharge installed.			
13.7	Internal status test functionality implemented. LED present to indicate a test in progress.			
13.8	Option of multiple attempts to establish communication with the concentrator unit in case of communication issues installed (total number of attempts not less than 30 via direct and not less than 30 via alternative route);			
13.9	Option to test all LEDs on the panel and all status messages displayed on the panel			
13.10				
13.11	Option of software adjustment of output power within the range of 10 mW to 5,0 W;			
13.12	Implemented communication link quality test (communications test)			
13.13	Data transmission quality testing (Bit Error Rate test);			
13.14	Option to measure the RSSI factor in real time (measuring signal reception quality in real time);			

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Item	Description	Unit	Required	Guaranteed
13.15	Presence of Debounce filtering function, i.e. the option to define the digital input filtering time to eliminate possible digital signal peaks; the option of allotting a different time to each individual digital input point is required;			
13.16	Option of operation as a repeater in one or several parallel radio systems			
13.17	Presence of I/O module for processing and transmission of 16 digital I/O			
13.18	Power unit overvoltage protection			
13.19	Various technical solutions for the device are acceptable only if they provide full functionality in accordance with the specified requirements			
OVERALL COMPLIANCE WITH THE REQUIREMENTS (YES/NO)				