

Technical Specifications/ Requirements

ELECTRICAL PARTS AND TOOLS TO BE SUPPLIED FOR RUSUMO POWER COMPANY LIMITED (RPCL) AT POWER HOUSE AND SWITCHYARD

1. INTRODUCTION

The Regional RUSUMO Falls Hydroelectric Project is located at RUSUMO Falls on the KAGERA River which forms the border between RWANDA and TANZANIA. Power production facilities are located entirely on the right bank of the KAGERA River in TANZANIA, while the Switchyard is located on the left bank of the River KAGERA in RWANDA.

The RUSUMO POWER COMPANY LIMITED (RPCL) has been established as a corporate identity with shareholding by the three Governments and it is the owner of Regional RUSUMO Falls Hydroelectric Project. NELSAP implemented the project through a Project Implementation Support Agreement (PISA) with RPCL. Within this document reference is made to both NELSAP and the RPCL roles reflecting the intended transition from NELSAP to the RPCL toward completion and commissioning of construction works.

Therefore, RPCL is seeking for the supply spare parts and tools subjected in this document in perspective of shorting downtime of the plant when the installed parts will fail.

2. OBJECTIVE:

Rusumo Power Company Limited aims to meet a high-quality service from an experienced supplier of Electro-Mechanical items and acquire the spare parts and tools for its equipment at Intake, Powerhouse and Switchyard.

3. SCOPE OF WORK

To supply the listed spare and tools to Rusumo Power Company Limited with the following technical specifications for each.

No	DETAILS OF SPARE PARTS AND TOOLS	
	DESCRIPTION	TECHNICAL SPECIFICATIONS
1	Water Level sensor (09 pieces)	Type: MPM4700 Measuring range 0mH ₂ O ~ 1mH ₂ O... 200mH ₂ O Output signal of 4-20mA Overload ≤ 2 times full scale pressure Pressure type Gauge pressure type, absolute pressure type Precision parameters: Long-term stability: ≤ ± 0.2% FS/ year

		<p>Compensation temperature: -10°C ~ 70°C Operating temperature: -20°C ~ 60°C (intrinsic safety explosion-proof type) -20°C ~ 70°C (Cable material: polyethylene, polyvinyl chloride) -20°C ~ 80°C (Cable material: polyurethane) Storage temperature -20°C ~ 85°C Vibration 20g, 20Hz ~ 5000Hz Impact 20g, 11ms Protection level IP68 Weight ≤ 250g (excluding cable weight)</p>
2	<p>Water level sensor (09 pieces)</p>	<p>Type: KYB19 Range: 0 ~ 9m Accuracy: ±0.25% Intelligent: ±0.1% Power supply: 14~36VDC, Standard: 24VDC±5%, Ripple < 1% Intelligent: 12~36VDC With display meter, Output: 4 ~ 20mA Intelligent: both 4-20mA and digital signal compatible with Hart protocol Electrical connection: Integrated type: M16 x1.5 internal thread sealing joints Split type: M20 x1.5 internal thread sealing joints Cable protection tube Cable Type: Double wearable waterproof air guide cables</p> <p>Armored type: Φ 6 armored outer diameter stainless steel tube Medium</p> <p>Temperature 0°C~70°C Intelligent: ±0.1% Intrinsically safe meet GB3836.1 GB3836.4 standards Ingress Protection Mark: ExiaIICT5 ~ T6 IP68 (sensor part) , IP65 (electric circuit part)</p>
3	<p>Set of water level sensor (9pcs)</p>	<p>Sensor Names: LR3000 Product characteristics: Process connection: G3/4 Communication interface: IO-Link Freely rotatable housing: 3600 Probe length: 1.0m 2 Outputs: OUT1: switch/IO-Link OUT2: 4...20mA/0...10V UB: 18...30V DC IOU: 200mA Ptank : -1...16bar Setting range: 1.0 ...157.cm/ 0.4 ...61.8 Inch IP:67 PROBE: E43207 COAX TUBE E43214 RL520 mm</p>
4	<p>Oil level sensor (9pcs)</p>	<p>Sensor Names: LR3000 Product characteristics: Process connection: G3/4</p>

		<p>Communication interface: IO-Link Freely rotatable housing: 3600 Probe length: 1.0m 2 Outputs: OUT1: switch/IO-Link OUT2: 4...20mA/0...10V UB: 18...30V DC IOU: 200mA Ptank : -1...16bar Setting range: 1.0 ...157.cm/ 0.4 ...61.8 Inch IP:67 PROBE: E43208 COAX TUBE E43215 RL 520 mm</p>
5	Bearing Pad Temperature sensor (9 pces)	<p>Sensor Names: TR10-H Sensor working temperature ranges: from -196 ... +600 °C Measuring element: Pt100 Connection method: Dual elements 2 x 3-wire Metal probe Material: Stainless steel Diameter: 8 mm Length: selectable Regardless of the design, the first 60 mm of the sensor tip must not be bent. For temperature measurement in a solid body, the diameter of the bore into which the probe should be inserted, should be no more than 1 mm larger than the probe diameter. Mounting G1/2" BSP(M) Cable Entry: Plastic with +80 °C maximum Ingress protection per IEC/EN 60529 Degree of Protection: IP65 Output Signal: 4 to 20 mA Mounting Position: Vertical</p>
6	Limit switches (09 pieces)	<p>Type: D4C-1203 Shape/Structure: General-purpose Limit switches Actuator: Cross roller plunger Electrical ratings: 5 A at 250 VAC/ 4 A at 30 VDC Contact form: SPDT Cable specifications: VCTF oil-resistant cable, 4 cores, 3 m Degree of protection: IP67 Nominal sectional area: 0.75 mm² Diameter: 7.6 dia. Ambient temperature Operating: -10 to 70 °C (with no icing) Ambient humidity: 35 to 95 % Contact resistance (Initial value) 300 mΩ max. Insulation resistance 100 MΩ min. (at 500 VDC) Shock resistance Destruction: 1,000 m/s²max.</p>

			Malfunction: 500 m/s ² max. IP:67
7		Limit switches (9 pieces)	Type: WLCA12N Actuator type: Adjustable roller level Contact form: 1CO Current Rating: 10A Head type: Side Rotary Head IP:67 Termination: Screw Voltage rating: 12 to 125V DC and 250V AC Vibration resistance Malfunction 10 to 55 Hz, 1.5-mm double amplitude *6 Shock resistance: Destruction 1,000 m/s ² max. Malfunction 300 m/s ² *6 Ambient operating temperature: -10 to +80°C (with no icing) *7 Ambient operating humidity: 35% to 95% RH Weight Approx. 255 g Rated frequency 50/60 Hz
8		Limit switches (9pieces)	Type: FIYA IIVVER Connector Type Auxiliary Terminal: SPDT Actuator Type: Rotary Connectivity Protocol: Auxiliary Unit Count: 1.0 Count Style: Manual Power Source: Manual Horsepower: 0.5 hp Installation Method: Click Temperature Range: 0-3 Kelvin Sound Level: 0.05 dB Number Of Holes: 1000 Tool Tip Description: Bullet Point Accessory Connection Type: Quick Connect Special Features: Portable, Quiet
9		Height sensor (6 pieces)	Type: AUM58-A10AMR-1212 Single turn:4096 Multi turn:4096 Output:4-20mA Temperature25 to 85 ⁰ C Series: Multifunction traveling limiter Rated Voltage:220V Rated Current:3A Gear Ratio: 1:78
10		Media Converter (3 Pieces)	•Standards: IEEE802.3, IEEE802.3u, IEEE802.3x, IEEE802.1Q, IEEE802.1p, IEEE802.1D, IEEE802.1W •Protocols: SW-Ring, STP/RSTP, QoS, VLAN, IGMP v1/v2/v3, SNMP v1/v2c, Telnet

		<ul style="list-style-type: none"> •Flow control: IEEE802.3x flow control, Back-pressure based flow control <p>Functions</p> <ul style="list-style-type: none"> •Switch functions: SW-Ring, QOS, 802.1QVLAN, RSTP, SNMP, Port trunking, static multicast filter, port mirroring, bandwidth management, broadcast storm control, port flow statistics, upgrade online, up and download configuration file, user name access system •SW-Ring: Support Single, Couple, Chain, Dual homing <p>Exchange attribute</p> <ul style="list-style-type: none"> •100M forward speed: 148810pps •100M maximum filter speed: 148810pps •Transmit mode: store and forward •System exchange bandwidth: 2.0G •MAC address table: 2K •Memory: 1M <p>Interface</p> <ul style="list-style-type: none"> •Electric port: RJ45 connector, 10Base-T/100Base-TX auto speed control, Half/full duplex and MDI/MDI-X auto detect •100M fiber port: 100Base-FX, SC/ST/FC connector, support single mode (20/40/60/80Km optional), multimode (2Km), wavelength: 850nm, 1310nm, 1550nm •Console port: debug serial port carry out CLI command •Alarm port: 2-bit terminal block 1 channel relay alarm output <p>Transfer distance</p> <ul style="list-style-type: none"> •Twisted cable: 100M (standard CAT5/CAT5e cable) •Multimode: 850nm, 2Km ; 1310nm, 5Km ; •Single-mode: 1310nm, 20/40/60Km; 1550nm, 80/100/120Km <p>LED indicators</p> <ul style="list-style-type: none"> •Run indicator: Run •Interface indicator: Link (1~8) •Power supply indicator: PWR1, PWR2 •Alarm indicator: Alarm <p>Power supply</p> <ul style="list-style-type: none"> •Input Voltage: 24VDC (12~48VDC) •Type of input: 4-bit 7.62mm terminal block •Support dual power supply redundancy •Support reverse polarity protection •Support overload current protection <p>Consumption</p> <ul style="list-style-type: none"> •No-load consumption: 5.0W@24VDC •Full-load consumption: 6.1W@24VDC <p>Environmental</p> <ul style="list-style-type: none"> •Working temperature: -40°C to 75°C •Storage temperature: -40°C to 85°C •Relative Humidity: 5% ~ 95% (no condensation)
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			<p>Mechanical Structure</p> <ul style="list-style-type: none"> •Shell: IP40 protection grade, metal shell •Installation: DIN rail mount •Weight: 800g •Size (WxHxD): 136 mm x 52mm x 105mm <p>Industry Standards EMI: FCC Part 15, CISPR (EN55022)</p>
11	Human Machine Interface (HMI) Touch Screen 10" (1pce)		<p>Technical features: HMI Name:MT4513T</p> <ul style="list-style-type: none"> • 10.4" TFT Display • 65536 True Color TFT LCD • 32-bit, 400 MHz RISC CPU • 128 MB FLASH + 64 MB DDR2 • 512 KB Recipe Memory, Record Data Easily • Real-Time Clock, 2 Year Reserve Time when Powered Off • 2 COM Ports, Supports Simultaneous Communication ; RS232/RS422/RS485 • Input Voltage Range 10~28VDC <p>Insulation Resistance > 50M Ω @ 500 VDC Dielectric Strength Test 500 VAC 1 Minute Weight 2 Kg Degree of Protection IP65 (Front Panel) CE Certification Comply with EN61000-6-2:2005 and EN61000-6-4:2007 Standards FCC Compatibility Complies with FCC Class A Operating Temperature 0°~50°C Operating Humidity 10~90% Shockproof Test 10~25 Hz (X, Y, Z Direction, 2G, 30 Minutes) Cooling Method: Natural Air Cooling</p>
12	Hall Effect zero speed sensor (3 pieces)		<p>Type: F16A40 Supply voltage: 8...25 VDC Current consumption Max. 12 mA (without load) Signal output Square wave signal from NPN output transistor with internal 2.7 kOhm pull-up resistor, DC-coupled to supply (negative pole = reference Voltage).</p> <ul style="list-style-type: none"> • Sink current: max. 25 mA • Output voltage: • Uhigh ~ supply voltage • Ulow < 0.5 V at I = 25 mA <p>Frequency range 0 Hz...15 kHz Housing M16x1.5, tightening torque: max. 35 Nm Connection Connector: M12x1 thread, 4 pins, black Protection Sensor head: IP68 Cable outlet: IP67 Insulation Housing and electronics galvanically separated (500 V/50 Hz/ 1 min) Pole wheel Prerequisite: Toothed wheel of a ferrous material (e.g. Steel 1.0036) Optimal performance with</p> <ul style="list-style-type: none"> • Involute gear • Tooth width > 10 mm • Side offset < 0.2 mm

			<ul style="list-style-type: none"> • Eccentricity < 0.2 mm Air gap between sensor and pole wheel: Module 2.0 (DP 12.7): 0.3...1.5 mm Operating temperature -40°...+125°C
13	Runner Blade Position Sensors (3 pieces)		<p>Analog Output: Current: 4 20 mA</p> <p>Measured output variables Position for one or two position magnets Position + speed (without direction) or velocity (with direction) for one position magnet Position for one position magnet + temperature inside the sensor electronics housing</p> <p>Measurement parameters Null/Span adjustment 100 % of electrical stroke Resolution 16 bit (internal resolution 0.1 μm) Update time Stroke length ≤ 200 mm ≤ 350 mm ≤ 1200 mm ≤ 2400 mm ≤ 4800 mm ≤ 7620 mm Update time 0.25 ms 0.333 ms 0.5 ms 1.0 ms 2.0 ms 5.0 ms Linearity deviation 1 < ±0.01 % F.S. (minimum ±50 μm) Repeatability < ±0.001 % F.S. (minimum ±1 μm) Hysteresis < 4 μm typical Temperature coefficient < 30 ppm/K typical</p> <p>Speed/velocity measurement Range 0.01...10 m/s or 1...400 in./s Deviation ≤ 0.05 % Resolution 16 bit (minimum 0.01 mm/s)</p> <p>Operating conditions Operating temperature -40...+85 °C (-40...+185 °F) Humidity 90 % relative humidity, no condensation Ingress protection IP67 (connectors correctly fitted)/IP68 (3 m/3 d) for cable outlet Shock test 150 g/11 ms, IEC standard 60068-2-27 Vibration test 30 g/10...2000 Hz, IEC standard 60068-2-6 (excluding resonant frequencies)/ RH5-J: 15 g / 10...2000 Hz, IEC standard 60068-2-6 (excluding resonant frequencies) EMC test Electromagnetic emission according to EN 61000-6-3 Electromagnetic immunity according to EN 61000-6-2 The RH5 sensors fulfill the requirements of the EMC directives 2014/30/EU, UKSI 2016 No. 1091 and TR CU 020/2011 Operating pressure 350 bar (5,070 psi)/700 bar (10,150 psi) peak (at 10 × 1 min) for sensor rod/RH5-J: 800 bar (11,600 psi) Magnet movement velocity Any</p> <p>Design/Material</p>

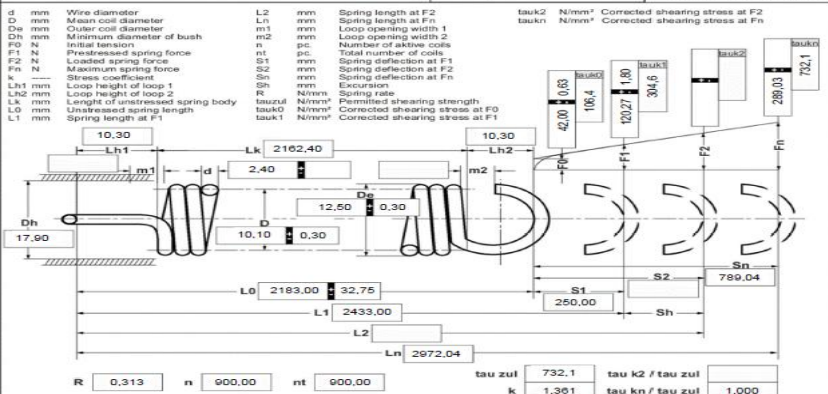
			<p>Sensor electronics housing Aluminium (painted), zinc die cast Sensor flange Stainless steel 1.4305 (AISI 303) Sensor rod Stainless steel 1.4306 (AISI 304L)/RH5-J: Stainless steel 1.4301 (AISI 304) RoHS compliance The used materials are compliant with the requirements of EU Directive 2011/65/EU and EU Regulation 2015/863 as well as UKSI 2022 No. 622 Stroke length 25...7620 mm (1...300 in.)/RH5-J: 25...5900 mm (1...232 in.)</p> <p>Electrical connection Connection type 1 × M16 male connector (6 pin), 1 × M12 male connector (5 pin) or cable outlet Operating voltage 12...30 VDC ±20 % (9.6...36 VDC) Power consumption < 3.25 W Dielectric strength 500 VDC (DC ground to machine ground) Polarity protection Up to -36 VDC Overvoltage protection Up to 36 VDC</p>
14	Megawatt transducer (Multifunction transducer) (3 pieces)	<p>Type: Rish Ducer M20 Auxilliary Voltages range: 85-230V AC/DC Output :2 Analog Outputs 0-20 mA or 0-10 V Series: MXX Accuracy Class :0.2 for Voltage & Current Input: 100 to 693V L-L 1 to 6A Communication Ports: RS232 Mechanical design: Housing T24 for rail and wall Rated frequency: mounting 50 Hz or 60 Hz Application: 4-wire,3-phase system, Basic programming Input voltage: Design value $U_r = 400$ V Input current: Design value $I_r = 5$ A without specification of primary ratings</p>	
15	Guide vanne and Runner Blade Position indicator (3 pieces)	<p>Indicator name: AMO-32 Aux Supply: 24VDC ±10% Display: 32/2 Digit seven segment red 12.5mm height Accuracy: ± 1% Input: 4 to 20mA Opening Span:0 to 100% Output: 4 to 20mA corresponding to 4-20 mA input 0 to 10mA for raise function 0 to 10mA for lower function 0 to 10mA for override function For setting rate of closing and Opening: Output is adjustable(preset) open circuit Voltage 12V</p>	
16	Speed Monitoring	<p>Name: K3HB-RNB Type: Frequency, Rate Input type NPN, Voltage pulse</p>	

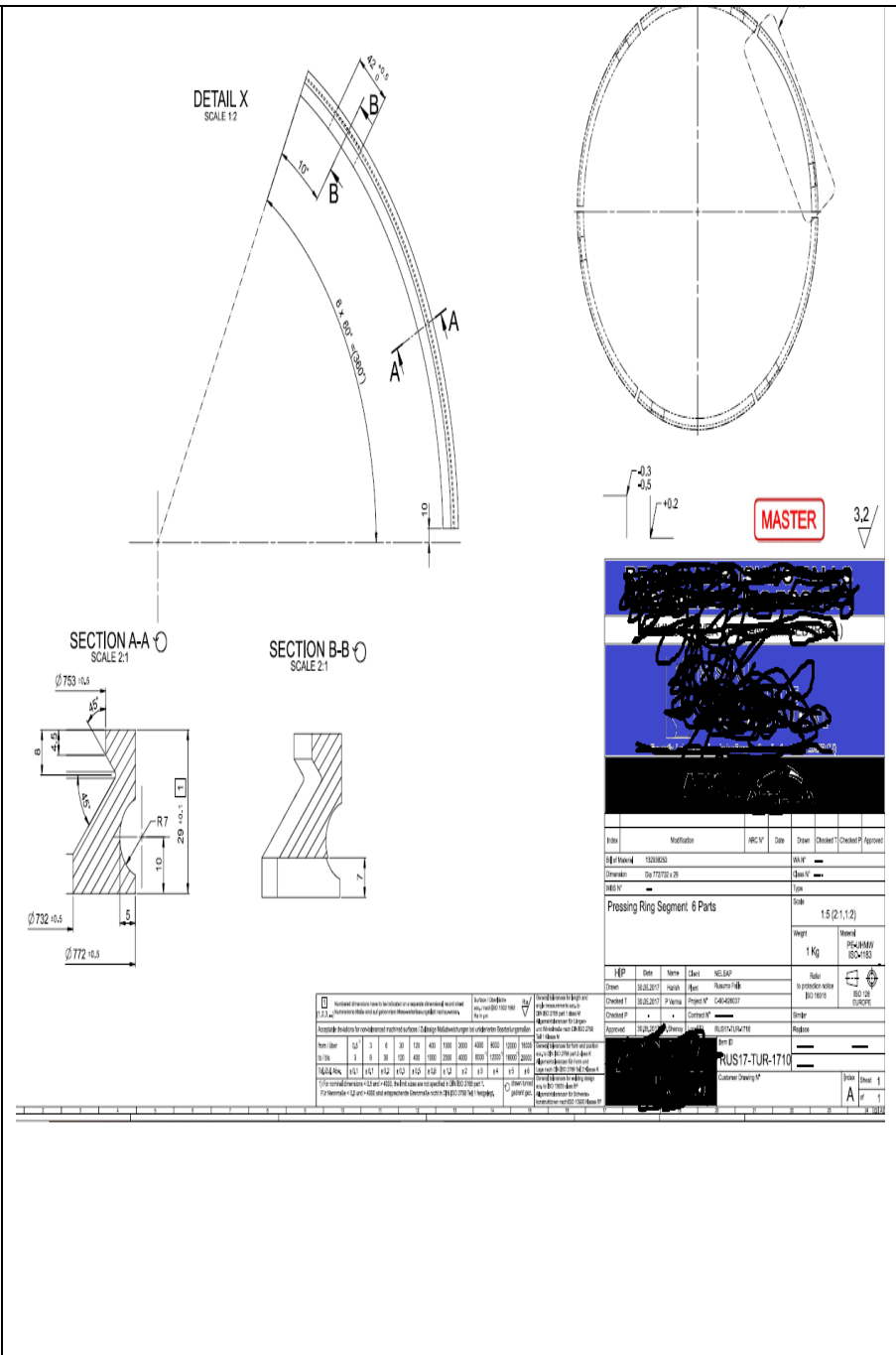
	Device (3 pieces)	<p>Input range 0 to 30 Hz, 0 to 50 kHz Size 1/8 DIN (96 x 48 mm) Number of digits 5 Output type: None Supply voltage AC 100-240 V Accuracy: +/- 0.006% rgd +/- 1 digit Communication port(s) None Features: Colour change display Product Width (unpacked) 96 mm Product Height (unpacked) 48 mm Product Depth (unpacked) 95 mm</p>
17	Optical Fibre Splicing Kit (1 Set)	<p>Condition: 100% Brand New Splicing Time: 5s Heating Time: 15s Heating Method: Automatic Heating (Preheating) Focusing Mode: Six Motor Auto Focusing Applicable Fibers: SM (G.652 And G.657), MM (G.651), DS (G.657), NZDS (G.655) Splice Loss: 0.025dB (SM), 0.01dB (MM) 0.04dB (DS / NZDS) Control Technology: RealTime Control and Calibration with ARC Return Loss: Better Than 60DB Fiber Diameter: Cladding Diameter: 80150um Coating Diameter: 1001000um Fiber Cutting Length: Coating Less Than 250um: 816mm Coating Less Than 2501000um: 16mm Software Update Length: Automatic Update; Button Time Update: 1 Second Visual Fault Locator: Power: 15mw, 2hz Flicker and Constant Set should consist of:</p> <p>Fiber optic stripper CFS-2 Screwdriver S/D (-)5×100mm KEVLAR Scissor Screwdriver S/D (+) #1×100mm Longitudinal Buffer Tube Slitter Screwdriver S/D (-)6×100mm Steel Wire Rope Cutter Screwdriver S/D (+) #2×100mm Round Cable Cutter 4 oz. Bottle of Alcohol 6Pcs Electronic Screwdriver Set Blow Brush (MS-15C) 6" Lineman's pliers Utility knife 6" Needle Node Pliers 3.5M Tape Measure 6" Side Cut Pliers Precision tweezers 8" Adjustable wrench Black Marker LED Flashlight and Laser Light</p>

			Carrying Tool Case(385×275×110mm)
18		HEADCOVER DRAINAGE AC MOTO- PUMP (3 Pieces)	Names: Three phase M2BAX80 MA-2IBM3/IM1001 Supply Voltage:400V AC ±15% Rated power: 0.75KW Frequency:50Hz ±5% Speed: 2820 RPM Power:1 hp Rated Current:1.76 A Power factor:0.79 Efficiency: 77.4% Duty: S1 Protection Level:IP55 Insulation Class: F Working temperature: 50°C Standards: IEC60034-1
19		HEADCOVER DRAINAGE DC MOTO- PUMP (3 Pieces)	Names: PERMANENT MAGNET DC MOTOR Supply Voltage:125V DC Speed: 3000 RPM Power:1 HP Rated Current:7.5 A Duty: S1 Insulation Class: B Working temperature: 50°C
20		Proximity Probe Runner- Clearance sensor (12 Pieces)	Names: TQ-432 Proximity probe - Measuring range: 4 mm- Temperature range:-25°C to +140°C- Sensitivity: 4 mV/μm Frequency response: DC to 20 kHz Transducer input requirements: High-frequency power source via matching conditioner, type IQS 452 OPERATION (at 23°C ±5% in target material VCL 140, 1.7225) Sensitivity: 4 mV/μm (100 mV/mil) Linear measuring range: 0 - 4 mm Frequency response: DC to 20 kHz (-3dB) Interchangeability of elements: ≤5% Protection class: IP 68 according to IEC 529 and DIN 40050 Tip of transducer: Pressure proof 100 bar Rear of transducer:-With BOA armoured cable : Pressure proof 10 bar- With stuffing gland & FEP cable : Pressure proof 1 bar Explosive atmosphere: CENELEC certificate LCIE SYST 93.C6081X EEx ib IIC T6 Probe construction: Wire coil, Ø 8 mm, Peek tip, encapsulated in 1.4435 stainless steel body with high-temperature epoxy glue Integral cable: FEP covered 70 Ω coaxial cable, Ø 3.6 mm Option:BOA stainless steel armour sheathing and heat shrinkable insulating sleeve Connector: Miniature coaxial male connector type AMP 1-330 723-0 Accessories : EA 402 Extension cable

			IQS 452 Signal conditioner
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No	DESCRIPTION	TECHNICAL SPECIFICATIONS
21	Pressure Gauge (2 pieces)	WIKA, Model 213.50, 0-1MPa
22	Temperature Gauge (2 Pieces)	Baumer, 1-100°C, Resolution 1°
23	Ball Valve (2 Pieces)	Levicon CF8, 25mm
24	Ball valve (For Air Connection Port) 3 Pieces	KAVAATA 1/2 BSP PN16
25	HEX NUT (32 Pieces)	M20 ISO 4032
26	Needle valve with bleed (6 Pieces)	APTEK G1/2", BSP, PN 16
27	Manual operated franged Ball valve (3 Pieces)	25NB CL150
28	O rings 50 Meteres	5mm
29	Expansion joint (2 Pieces)	DN 200
30	Needle with bleed (6 Pieces)	APTEK G1/2", BSP, PN 16
31	Manual operated franged Ball valve (3 Pieces)	25NB CL150
32	Pressure Gauge (2 Pieces)	BAUMER 0-1MPA
33	Head Hex Screw (32 Pieces)	M20 ISO 4032
34	Stainless Threaded Rod (12 Meters)	M12
35	Mechanical seal (12 Pieces)	Material: Packing seal, Dimension: 3mm
36	Pressure gauge (4 Pieces)	BAUMER 0-1MPA
37	Quarter turn electrical actuator (3 Pieces)	SDTORK, SD-1001-05-ECO
38	Manual operated Ball valve (3 Pieces)	25NB CL150
39	Needle valve with bleed (1 Piece)	APTEK G1/2", BSP, Pressure ratin
40	Pressure Gauge Dial Type (1 Piece)	Baumer, G1/2 BSP 0-10Mpa
41	Pressure switch for low presssure indicator (1 Piece)	Danfoss KP36, 0.2-1.4Mpa, 1/2" BSP
42	Flow indicator	KROHNE OPTIFLUX 2000
43	Pressure Gauge (1 Piece)	BAUMER 150mm dial, G1/2", 0-1Mpa
44	Temperature Gauge with Thermowell (1 Piece)	100mm Dial, G1/2", 0-100°C
45	Dial Flow Indicator (without switching contact) (1 Piece)	40NB, 20-166LPM
46	Thermostatic Valve (1 Piece)	AVTA
47	Needle valve with bleed (2 Pieces)	APTEK G 1/2", BSP(F), 3Mpa
48	Air Valve (7 Pieces)	single ball
49	Temperature Gauge with switching contact (1 Piece)	WIKA, 1-120°C, DIN 16196, U max 250V

50	Air filter (2 Pieces)	GZ 047 ZP																																																																																																														
51	Pressure gauge (1 Piece)	Baumer, 1-20Bar																																																																																																														
52	Safety Valve (1 Piece)	Spring loaded, G-1"BSP, set P. to open 14Bars																																																																																																														
53	Filter, Pressure Regulator and lubricator Unit with pressure gauge (3 Pieces)	JANATICS: Size: G-1" BSP, 12 Bars, adjustable from 1-12 Bars, Oil injected to Air: 1-2 Droop/min																																																																																																														
54	O rings v-type (3 Pieces)	V-RING TWVB01100 N6T50																																																																																																														
55	O rings 6mm (50 Meters)	ROUND CORD - 6mm Material NBR 70 SHORE A																																																																																																														
56	O rings 7.5mm 50 meters	ROUND CORD - 7.5mm Material NBR 70 SHORE A																																																																																																														
57	Spring and Holder (3 Pieces)	<div data-bbox="699 651 1544 1370" data-label="Complex-Block"> <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>Firm/Name _____ Covers. partner _____ Street _____ ZIP/City _____ Phone _____ Fax _____ E-mail _____</p> </div> <div style="width: 30%;"> <p>Cust.no. _____ Date _____ <input type="checkbox"/> Inquiry <input type="checkbox"/> Order Ref.no. _____ Piece _____ Del.date _____</p> </div> <div style="width: 30%; text-align: right;"> <p>GUTEKUNST FEDERN Carl-Zeiss-Strasse 15 D-72555 Metzingen Phone 0049 7143 960-0 Fax 0049 7123 960-195 technik@gutekunst-co.com www.gutekunst-federn.de Extension spring</p> </div> </div> <div style="margin-top: 10px;"> <table border="0" style="width: 100%; font-size: 8px;"> <tr> <td>d mm</td><td>Wire diameter</td><td>L2 mm</td><td>Spring length at F2</td><td>tau k2</td><td>N/mm²</td><td>Corrected shearing stress at F2</td> </tr> <tr> <td>D mm</td><td>Mean coil diameter</td><td>Ln mm</td><td>Spring length at Fn</td><td>tau kn</td><td>N/mm²</td><td>Corrected shearing stress at Fn</td> </tr> <tr> <td>De mm</td><td>Outer coil diameter</td><td>m1 mm</td><td>Loop opening width 1</td><td></td><td></td><td></td> </tr> <tr> <td>Dh mm</td><td>Minimum diameter of bush</td><td>m2 mm</td><td>Loop opening width 2</td><td></td><td></td><td></td> </tr> <tr> <td>F0 N</td><td>Initial tension</td><td>n</td><td>Number of active coils</td><td></td><td></td><td></td> </tr> <tr> <td>F1 N</td><td>Prestressed spring force</td><td>nt</td><td>Total number of coils</td><td></td><td></td><td></td> </tr> <tr> <td>F2 N</td><td>Loaded spring force</td><td>S1 mm</td><td>Spring deflection at F1</td><td></td><td></td><td></td> </tr> <tr> <td>Fn N</td><td>Maximum spring force</td><td>S2 mm</td><td>Spring deflection at F2</td><td></td><td></td><td></td> </tr> <tr> <td>k</td><td>Stress coefficient</td><td>Sh mm</td><td>Excursion</td><td></td><td></td><td></td> </tr> <tr> <td>Lh1 mm</td><td>Loop height of loop 1</td><td>R</td><td>Spring rate</td><td></td><td></td><td></td> </tr> <tr> <td>Lh2 mm</td><td>Loop height of loop 2</td><td>tau zul</td><td>Permitted shearing strength</td><td></td><td></td><td></td> </tr> <tr> <td>Lk mm</td><td>Length of unstressed spring body</td><td>tau k0</td><td>Corrected shearing stress at F0</td><td></td><td></td><td></td> </tr> <tr> <td>L0 mm</td><td>Unstressed spring length</td><td>tau k1</td><td>Corrected shearing stress at F1</td><td></td><td></td><td></td> </tr> <tr> <td>L1 mm</td><td>Spring length at F1</td><td></td><td></td><td></td><td></td><td></td> </tr> </table>  <div style="margin-top: 10px;"> <table border="0" style="width: 100%; font-size: 8px;"> <tr> <td>1 Coiling direction <input type="checkbox"/> left <input checked="" type="checkbox"/> right</td> <td>3 Excursion Sh _____ mm</td> <td>9 Surface treatment _____</td> </tr> <tr> <td>2 Loop shape and loop position Loop shape 1 _____ Loop shape 2 _____ Loops offset to one another by _____ degrees (in the dir. of the right helix)</td> <td>4 Stress cyc. end. 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58	Inline Filter element (MEX14 AT101,102) (6 Pieces)	2.0250 PWR10-B00-0-V (LS REXROTH)																																																																																																																																																																																																																																																																																																																																																																																										
59	Return Filter element (MEX10 AT004) (3 Pieces)	1.1000 PWR10-A00-0-V																																																																																																																																																																																																																																																																																																																																																																																										
60	Inline Filter element (MEX 20 AT 101) (3 Pieces)	2.0160 PWR6-B00-0-V																																																																																																																																																																																																																																																																																																																																																																																										
61	Return Filter (MEX 40 AT101) (3 Pieces)	20.1051 PWR10-E00-6-V																																																																																																																																																																																																																																																																																																																																																																																										
62	Air Dehumidifier (12 Pieces)	Rexroth BFSK80-2X/H3V3-M-S-0																																																																																																																																																																																																																																																																																																																																																																																										

63	Pressure Gauge (1 Piece)	BAUMER 150mm dial, G1/2", 0-1Mpa
64	Temperature Gauge with Thermowell (1 Piece)	100mm Dial, G1/2", 0-100°C
65	Dial Flow Indicator (without switching contact) (1 Piece)	40NB, 20-166LPM
66	Thermostatic Valve (1 Piece)	AVTA
Hydraulic Oils		
No	Description	Technical Specifications
67	Power Turbo Super (4400Liters)	AW32 (ISO VG 32)
68	Grease for Rope wires (200Kg)	Graphite calcium based SH/T 0369-1992
69	Anti-wear Hydraulic Oil (For spillway gates) (2000Liters)	L-HM46
70	Lubricating oil for crane and trolley Reducers (200Liters)	L-CKC220
71	Grease for bearing of main lifting and, trolley traveling mechanism (200Kg)	SYB1403-59
WORKSHOP CONSUMMABLES		
WELDING		
No	ITEM	SPECS
72	Mild steel hollow sections	20x20x2 (10 Pieces)
		20x40x2 (10 Pieces)
		30x30x2 (10 Pieces)
		30x30x3 (10 Pieces)
		40x40x3 (10 Pieces)
		40x40x2 (10 Pieces)
		40x60x4 (10 Pieces)
		60x60x4 (10 Pieces)
73	Mild steel sheet metal	1.5X1200X2400 (1 sheet)
		3X1000X2000 (1 sheet)
		5X1000X2000 (1 sheet)
74	Stainless steel sheet metal	1.5X2400X1500 (1 sheet)
		2X2400X1500 (1 sheet)
75	Metal profiles	L-profile: 30X30X3, 40X40X3 (2 Pieces each type)
		C-profile: 30X30X3, 40X40X3 (2 Pieces each type)
76	Mild steel electrode	diameter : 3.2 mm, SMAW E6013 (10Kg)
		diameter: 2.5 mm, SMAW E6013 (10Kg)
77	Stainless steel electrode	diameter: 2.6 mm, SMAW E308L-16 (10Kg)

78	Weld Shipping hammer	Material: high carbon steel, straight head, with shock proof handle, tapered chisel on both ends, overall length: 290mm (1 Piece)
79	Wire brush	BRH-SS2W, BRH-SS3W, BRH-SS4W, BRH-MS2W, BRH-MS3W, BRH-MS4W, BRH-SSXM, BRH-STXM (1 Piece Each type)
80	Cutting disc	Type: T41 steel
		speed: max 80m/s
		rpm: 8500
		Abrasive: A60T4BF
		Size: 115X1.2X22.2 (8 Pieces)
		125X1.2X22.2 (6 Pieces)
81	Grinding disc	180X1.6X22.2 (6 Pieces)
		Type: A 24 PBF
		Abrasive: 30L5V
		Size: 115X6X22.2 (10 Pieces)
125X6X22.2 (10 Pieces)		
82	Acetylene gas	40 CF, 50.4 l, 60 bar (1 Bottle)
83	Oxygene gas	M2, 50 l, 200 bar (1 Bottle)
84	Mild steel filler metal	diameter: 3mm (20 Boxes) type: ER 70 S-G
85	Stainless steel filler metal	diameter: 3mm (20 Boxes)
		type: ER 308
86	Mastic for metal	P38 (5kg)
87	Spark lighter	gas welding and cutting REF TW1002 (1 piece)
88	Nozzle cleaner	R41.50, fingers diameter: 0.8mm-3.2mm (1 piece)
89	Brazing rods	Diameter: 3mm, 1.5 mm (20 Boxes)
90	Protractor	opening max: 180 degree (1 piece)
91	Dies and taps	DIN 13-4: ISO nominal diameter: 5-110 mm, material: HSS (1 set)
92	Reamers	diameter: 5-30 mm (1 set)
93	Counter boring tools	diameter: 8-30mm (1 set)
94	Countersinking tools	diameter: 19-40 mm (1 set)
	MACHINING	
	ITEM	SPECS
95	HSS cutting tools	material grade: M2
		size: 14X200 HSS (3 Pieces)
		16X200 (3 Pieces)
		18X200 (3 Pieces)
96	Carbide cutting tools	material grade: YG6
		Tip size: 20X13X13 mm Carbide (3 Pieces)
97	Mild steel round bar	35X6000 mm (1 set)
		45X6000 mm (1 set)
		60X6000 mm (1 set)
		20X60000 mm (1 set)
		40X6000 mm (1 set)

98	Aluminum round bar	45X6000 mm (1 set)
99	Metal sandpapers	P1500 (1 package)
		P2500 (1 package)
		P800 (1 package)
		P1200 (1 package)
		P400 (1 package)
		P600 (1 package)
		P240 (1 package)
		P280 (1 package)
		P360 (1 package)
100	Cutting fluid	Neat cutting oil 137: ISO VG 32, Kinematic viscosity at 40degree: 30-36 Cst, flash point: 170 Neat cutting oil 522: ISO VG 22, Kinematic viscosity at 40degree: 22-24 Cst, flash point: 160 (40Liters)
101	Metal File	material: alloy steel T12, length: 35mm, handle type: plastic, Flat
		Round (1 Set)
		Half round (1 Set)
102	Center punch	diameter: 2,4 mm, material: HHS, body: knurled, length: 100mm (3 Pieces)
103	Steel Scriber	Body material: steel, tip hardness: 55-60HRC, single ended, overall length: 7 inches, body surface: knurled
104	Chisel tool	type: bevel edged (25 degree), blade width: (6mm,10mm, 13mm, 19mm, 25mm), blade material: chrome-vanadium steel, handle material: wood, blade length: 19mm, (1 set)
105	Milling cutters (HSS and Carbide): Ball nose mill cutter (Both): Material: HSS, cutter diameter: 4mm, shank diameter: 4mm, length of cutting flute: 10mm, total length: 51mm End mill cutter 8x8x22x25(Both): Material: HHS, shank diameter: 8mm, cutter diameter: 8mm, length of flute (LOF): 25mm, Length of cut (LOC):22 mm, overall length (OAL): 72, helix angle: 45 degrees, number of flute: 4 T-Slot mill cutter(Both): 1 piece /each type 12X12x10X60 Material: HSS, cutter diameter: 12 mm, shank diameter: 12mm, length of flute: 10 mm, total length: 60mm Slab mill cutter (Both): 1 piece /each type Material: HSS, Inner diameter: 33mm, outer diameter: 120mm, Z:40 Side and face mill cutter (Both): 1 piece /each type Material: HSS, Inner diameter: 33mm, outer diameter: 110 mm, width: 6 mm, Z: 40 Involute gear cutter (Both): 1 piece /each type Material: HSS, Inner diameter: 33mm, number of cutters:10, pressure angle: 20 degrees, Z:10 Face mill cutter (Indexable carbide insert) : 1 piece /each type	

	Material of insert: Carbide, diameter: 38 mm, lead angle 90 degree, arbor diameter: 24 mm, number of inserts: 6 Arbor mill cutter Material: HSS, inner diameter: 33mm, outer diameter :110mm Z: 40 Twist drill fluting cutter Material: HSS, shank diameter:35, cutting diameter: 35 mm, flute length: 158, total length :190 Z:2
106	Indexing head& foot step for milling base size 168*90 (1 set) worm gear reduction ration 1/40 number of hole plate A 15, B21, C37
	Pipes
107	Stainless steel pipes diameter: 1inch (5 Pieces) diameter: 25mm (5 Pieces) diameter: 22mm (5 Pieces) diameter: 21.6mm (5 Pieces) diameter: 32mm (5 Pieces)

4. DRAWINGS, DATA, MANUALS AND TECHNICAL-CUM-PERFORMANCE

The following shall be supplied as part of the contract along with the Bid Document:

- Operation and maintenance Manuals and other documentation;
- Detailed dimensioned drawing showing clearances required for the surrounding installed equipment in the panel reference with the existing;
- Shipping drawings showing dimensions, weights and protective arrangements during transportation;
- Type of tests and special test reports conducted;
- The identification shall be in accordance with existing one which will replace;
- The products shall be delivered in the market boxes of sufficient sturdy to withstand long term storage in dry, ventilation room with low humidity.

5. PARTICIPATION CONDITIONS

Participation in this tender is open on equal terms to all natural and legal persons who possess the technical conditions and financial capabilities required to perform the contract and should bid for all or part of Lots.

RPCL hereby invites sealed bids from eligible and qualified bidders for the supply of spare parts and Tools as specified in the Table above to Rusumo Power Company Limited.

6. FINAL ACCEPTANCE TEST AND REPORT

After the delivery has been completed, the factory acceptance tests report shall be submitted by the Supplier to the client representative to ascertain that all manufactory requirement has been met.