

 <p>SOLARIS NATIONAL SYNCHROTRON RADIATION CENTRE</p>	<h2>RF Group</h2>		
<i>Solaris Project Document No.</i>	<i>Version no.</i>	<i>Created: 25.02.2015</i>	
<i>RF-OR-016</i>	<i>0.1</i>	<i>Modified:</i>	

Scope of delivery for integration of RF system for storage ring

<i>Prepared by:</i> P. Borowiec	<i>Checked by:</i>	<i>Approved by:</i>
<i>Authorship:</i>		
<i>Distribution list:</i>		

1.	Scope of delivery	4
2.	Definitions	4
3.	Technical parameters of devices installed on site	4
3.1.	RF transmitter.....	4
3.2.	Circulator	4
3.3.	RF Cavity	5
4.	Description and scope	5
5.	Technical parameters of components for delivery.	6
5.1.	6 1/8" EIA coax rigid line	6
5.2.	6 1/8" EIA directional coupler	6
5.3.	3 1/8" EIA directional coupler	6

<i>Record of Changes</i>			
<i>Rev. No.</i>	<i>Data</i>	<i>Pages</i>	<i>Descriptions of changes</i>

1. Scope of delivery

The subject of the order particularly includes: the integration of two (2) complete, high power RF systems for feeding cavities in 1.5 GeV storage ring together with warranty service for the Jagiellonian University in connection with the realization of the National Centre of Electromagnetic Radiation for Research Purposes, placed at the Campus of the 600th Anniversary of the Jagiellonian University Revival in Kraków, the project co-funded by European Union within the frame of the Innovative Economy Operational Program.

2. Definitions

The purpose of the Storage Rings RF system is to replace the energy lost by the electron beam. In this document, the following definitions apply:

- The **RF** means radio frequency.
- The **RF Cavity** replaces energy lost by the electrons when they traverse the cavity.
- The RF power fed to the cavity is delivered by the **RF Transmitter**.
- The RF transmitter is isolated from the reflected RF power from the RF cavity by a **Circulator**.
- The **Transmission Lines** connect the RF transmitter, circulator and the RF cavity
- Each circulator is equipped with a **Dummy Load**, where the reflected power is absorbed.
- A **Low Level RF system (LLRF)** controls the RF cavity.
- An **RF Plant** consists of one RF Transmitters, Transmission lines, Circulator with Dummy Load.
- An **RF unit** consists of an RF Plant, RF Cavity and a LLRF System

3. Technical parameters of devices installed on site

3.1.RF transmitter

Center frequency: 99,93 MHz

Output power: 120 kW CW

RF port: 6 1/8" EIA flanged

3.2.Dummy load

Center frequency: 99,93 MHz

Nominal power: 120 kW CW

RF ports: 6 1/8" EIA flanged

Weight: 20kg

3.3.Circulator

Center frequency: 99,93 MHz

Nominal power: 120 kW CW

RF ports: 6 1/8" EIA flanged

Weight: 1300kg

3.4.RF Cavity

Center frequency: 99,93 MHz

Nominal power: 120 kW CW

RF port: 6 1/8" EIA flanged

4. Description and scope

The scope of the present procurement is the integration of two (2) RF systems for feeding cavities which include design, manufacturing, installation and measurement of components covered by this procurement. All designs have to be coordinated with existing infrastructure in the facility.

The Supplier is responsible for delivery of following services:

Id.	Component/service	Amount
1	Design and manufacturing of radiation shielding inside service gallery, proposal in drawing "1.Radiation protection in service gallery.PDF and DXF"	2 pieces
2	Design and manufacturing of radiation shielding inside storage ring, proposal in drawing "2.Radiation protection in storage ring.PDF and DXF"	2 pieces
3	Design and manufacturing of stand for 6 1/8" EIA 120kW coax dummy load, proposal in drawing "3.Dummy load stand.PDF and DXF"	1 piece
4	Design and manufacturing of non-magnetic stand for circulator, proposal in drawing "4.Non-magnetic stand for circulator.PDF and DXF"	2 pieces
5	Design and manufacturing of stand for 6 1/8" EIA coax line inside storage ring, , proposal in drawing "5.Support for coax rigid line in storage ring.PDF and DXF"	1 piece
6	Installation and RF measurement of 6 1/8" EIA coax line after installation on site	2 sets
7	Design of routing and delivery of 6 1/8" EIA coax line from RF transmitter to cavity together with directional coupler and all assembly materials, routing presented in drawing "6.Coax rigid line TX-circulator-cavity.PDF and DXF"	2 sets
8	Design of routing and delivery of 6 1/8" EIA coax line from RF transmitter to dummy load together with 6 1/8" EIA directional coupler and all assembly materials, routing presented in drawing "7.Coax rigid line TX-dummy load.PDF and DXF"	1 set
9	Design of routing and delivery of 6 1/8" 6 1/8" EIA coax line from RF circulator to 120kW dummy load with all assembly materials, routing presented in drawing "8.Coax rigid line circulator-dummy load.PDF and DXF"	1 set
10	Delivery of RF adapter set for 6 1/8" EIA coax line (adapter flanged/unflanged, 6 1/8" EIA unflanged to N, 6 1/8" EIA short) covering all needs	1 set
11	Participation in SAT of two (2) circulators through three (3) days together with delivery of 6 1/8" coax line required for performing of tests (0λ, 1/8λ, 1/4λ, 3/8λ)	1 set
12	Directional Coupler 3 1/8" EIA with 2 coupling kit for 3 1/8" EIA unflanged coax line	2 sets

5. Technical parameters of components for delivery.

5.1. 6 1/8" EIA coax rigid line

- 5.1.1.Center frequency: 99,93 MHz
- 5.1.2.Impedance: 50Ω
- 5.1.3.Bandwidth: minimum +/- 20MHz
- 5.1.4.Power rating: minimum 130kW CW at 40°C ambient
- 5.1.5.Material: minimum 99,9% of Copper
- 5.1.6.Return loss: better than -32dB at center frequency
- 5.1.7.Inner conductor support plate material: PTFE®

5.2. 6 1/8" EIA directional coupler

- 5.2.1.Measurement ports: power forwarded and power reflected simultaneously
- 5.2.2.Center frequency: 99,93 MHz
- 5.2.3.Coupling for power forwarded port: 50dB at center frequency
- 5.2.4.Coupling for power reflected port: 50dB at center frequency
- 5.2.5.Impedance: 50Ω
- 5.2.6.Power rating: minimum 130kW CW at 40°C ambient
- 5.2.7.Directivity: minimum 40dB at center frequency
- 5.2.8.Connector type on measurement ports: N female

5.3. 3 1/8" EIA directional coupler

- 5.3.1.Measurement ports: power forwarded and power reflected simultaneously
- 5.3.2.Center frequency: 99,93 MHz
- 5.3.3.Coupling for power forwarded port: 50dB at center frequency
- 5.3.4.Coupling for power reflected port: 50dB at center frequency
- 5.3.5.Impedance: 50Ω
- 5.3.6.Power rating: minimum 40kW CW at 40°C ambient
- 5.3.7.Directivity: minimum 40dB at center frequency
- 5.3.8.Connector type on measurement ports: N female