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Public Corporation RUSSIAN SPACE SYSTEMS

RESEARCH CENTER FOR EARTH OPERATIONAL MONITORING

SPI-1.8, SPI-2.4, AND SPI-3.6 DATA RECEIVING STATIONS FOR REMOTE SENSING SPACECRAFT

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Family of Proposed Stations

The receiving stations for the SPI-1.8, SPI-2.4, and SPI-3.6 data are designed for acquiring data from both the Russian and foreign remote sensing spacecraft.

The SPI-1.8 station receives data in L-band.

The SPI-2.4 and SPI-3.6 stations receive data in L- and X-bands.

The SPI-1.8, SPI-2.4, and SPI-3.6 stations have the radar dome to release a wind load and to stretch an operation life.

The receiving stations use two-elevation drives (X/Y) enabling the elimination of signal loss in zenith and lowering of the requirements for a maximum speed of the driver angular displacement up to 3÷4 deg/s. This in turn releases the loads on drivers and improves both the operation reliability and operation life.

The use of cycloidal reducers in rotary support of the SPI-1.8 station provides the following:

- High precision of positioning (±1 angular minute);
- High specific power (2.5 times that of involute reducers);
- High efficiency (~95%);
- High load capacity (allows short-term overloads by torsion torque up to 500%)
- Low level of vibration and noise
- Low power consumption
- Long operation life and high reliability

The receiver (RPU) allows for elimination of a wind load and precipitation effects that provides a long operation life and high operation reliability.

Areas of Application

The stations presented provide data receiving from the following spacecraft:

SPI-1.8 – provides data receiving in L-band from METEOR-M 1 and NOAA;

SPI-2.4 and SPI-3.6 receive data from:

- METEOR-M 1 in L-band with data rate of 0.665 Mbps, in X-band – with data rate of between 15 and 30 Mbps;

- RESURS-DK with data rate of up too 300 Mbps and from RESURS-P in the coming years;

- Foreign TERRA and AQUA spacecraft and others.

The main technical characteristics of the receiving stations are given in Table 1

Table 1: Main Characteristics of SPI-1.8, SPI-2.4, and SPI-3.6 Stations

The SPI-1.8 receives data from spacecraft operating in L-band with a bit rate of from 0.25 to 3.0 Mbps. The SPI-2.4 and SPI-3.6 receive data from spacecraft operating in L –band with a bit rate of from 0.25 to 3.0 Mbps and in X-band with a bit rate of from 5 to 300 Mbps.

Name	SPI-1.8	SPI-2.4	SPI-3.6
Antenna type	Axisymmetrical grid mirror	Prime-focal, axisymmetrical, sectionalized, grid	Prime-focal, axisymmetrical
Rotary support type	Biaxial (X-Y)	Biaxial (X-Y)	Biaxial (X-Y)
Mirror diameter, m	1.8	2.4	3.65
Polarization	Right circular	Right circular (L-band). Right, left circular (X-band)	Right circular (L-band). Right, left circular (X-band)
Frequency range, MHz	1670 ... 1710	L-band - 1670 ... 1710 X-band 8OOO ... 8400	L-band - 1670 ... 1710 X-band - 8000 ... 8400
Bit rate, Mbps	between 0.25 and 3.0	L-band - between 0.25 and 3.0 X-band – between 5 and 300 (two channels)	L-band - between 0.25 and 3.0 X-band - between 5 and 300 (two channels)
Modulation type	PM-2. PM-4	PM-2. PM-4	PM-2. PM-4
Noise temperature of low-noise frequency converter (LFC), K	65	60	65
Range of rpm by axes X and Y, deg	0...180	0...180	0...180
Maximal rate of rotation by axes X, Y (no less than), deg/s	4	4	4
Dynamic errors of tracking (no more than), angular minutes	6	2	2
Antenna system weight (no more than), kg	60 (without rotary support) Rotary support weight is 90kg	60 (without rotary support) Rotary support weight is 150kg	70 (without rotary support) Rotary support weight is 250kg
Operating-temperature range of antenna system, C	-40...+50	-40...+50	-40...+50
Primary power supply	220W, 50Hz, single-phase	220W, 50/60 Hz, single-phase	220W, 50Hz, single-phase
Maximal power consumption, вА	100	150	200
Antenna gain, dB	L-band - 27	L-band - 30 X-band-43	L-band - 3 3 X-band - 46

Base Complete Equipment

SPI-1.8:

- Antenna post (mirror, rotary support, drive control unit, RPU);
- Radio path (low-noise amplifier-converter, receiver-demodulator, cable network);
- Operator workplace being a part of PC for antenna control and data receiving;
- Software for antenna control and the METEOR-M 1 and NOAA data receiving, visualization and recording;
- Maintenance documentation on the station;
- ЗИП (agreed by consumer).

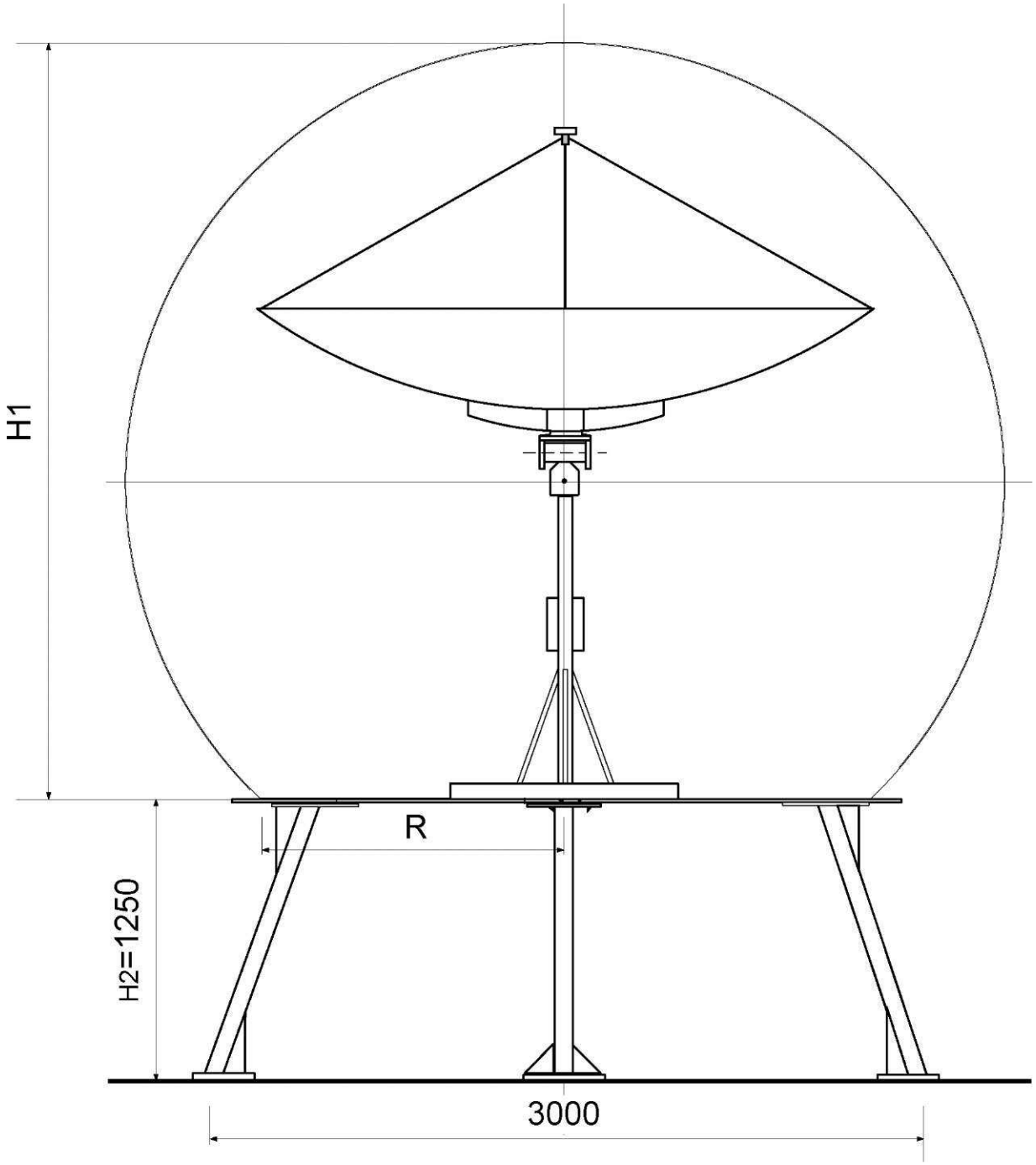
Before the station delivery, a consumer will be provided with the installation instructions including the schematic of «проставки» required for its production and installation by consumer. Then the METEOR-M 1 and NOAA station will be installed, adjusted, and tested.

SPI-2.4, SPI-3.6

The equipment of these stations is similar to that of the SPI-1.8 station. Additional elements are:

- Rack for three PCs designed for antenna control, L-band recording, X-band recording by one channel;
- Two channel collectors, and
- One secondary power supply.

Note: The RESURS-DK data receiving is provided by adding the radio channel of X-band of left polarization, the data structure recovery unit, and two PCs.



PK - 2.4: PK - 3.6:

H1=3382mm
R=1360mm

H1=5000mm
R=1600mm

Overall Dimensions of PK-2.4 and PK-3.6 Stations

'Rack-mountableequipmentforSPI-2.4andSPI-3.6