

## SMALL-SIZE METEOROLOGICAL COMPLEX "CMS-1"

### PURPOSE

**Small-size meteorological complex "CMS-1"** is designed for measurement of atmosphere parameters by means of aerological sounding at altitudes up to 40 km and automated meteorological station, as well as observation of weather phenomena (including hazardous ones – thunderstorms, hail and squall) within a radius of up to 150 km from the deployment site of "CMS-1".

"CMS-1" can be deployed in areas of airdromes, helicopter pads, ports, etc. with the purpose of provision the corresponding infrastructure facilities with meteorological radar data.

**"CMS-1" is capable to:**

- » observe weather phenomena (including hazardous ones) within a radius of up to 150 km;
- » significantly reduce the time necessary for warning of the public about hazardous weather phenomena;
- » enhance reliability and quality of meteorological observations;
- » reduce operating expenses of the systems and facilities susceptible to the impact of hazardous meteorological phenomena.

**Economic efficiency of using "CMS-1" is defined by the following:**

- » considerable reduction in operating expenses of meteorological support services through the use of the latest technologies (ultrasonic automated meteorological stations, aerological sounders based on GPS/GLONASS navigation systems, solid-state transmitters of high reliability integrated into the Doppler meteorological radar "DMRL-3");
- » deployment of the small-size meteorological complex "CMS-1" without any necessity to carry out major construction work.

**The small-size meteorological complex "CMS-1" provides the consumers with meteorological data, which includes:**

- » generation of maps of cloud top, horizontal and vertical cross-section of radar parameters of meteorological phenomena (reflectivity, velocity, spectrum width, differential reflectivity, differential phase and cross-polarization factor);
- » calculation of wind profile with present radar reflectivity from atmospheric boundary level up to the radar cloud cover detection boundary and evaluation of wind shear in clouds with present radar reflectivity with resolution not lower than 15 meters with preliminary filtration of clutter reflections;



- » sounding of atmosphere parameters (temperature, pressure, relative humidity) using a radio sounder launched into the airspace;
- » determination of coordinates and measuring of velocity of the launched radio sounder using the signals of satellite navigation system GLONASS and (or) GPS;
- » storage and output of the obtained meteorological radar data to the consumers in required codograms, including in the form of meteorological reports.

### COMPOSITION

- » solid-state Doppler meteorological radar of 3 cm band equipped with a radome;
- » aerological sounding system based on radio sounders;
- » meteorological measurement system based on automated meteorological station;
- » meteorologist's workstation;
- » auxiliary systems (including power supply system, temperature control system);
- » truck chassis of KAMAZ-5350 type;
- » emergency SPTA set.

## BASIC SPECIFICATIONS OF "CMS-1"

### Basic specification of Doppler meteorological radar "DRML-3"

Operating frequency band, MHz	9550-9650
Coverage zone:	
» instrumented range, km, at least	150
» maximum detection altitude, km, at least	20
Antenna:	
» type	parabolic, reflector
» width in two planes, deg, at most (reflector size, at least)	$1.6 \pm 0.1$ (1.65)
» polarization	horizontal and vertical
» angle setting accuracy, deg.	0.1
» maximum rotation speed, rpm	24
Transmitter:	
» type	transistorized
» pulse power, kW, at least	0.3
» signal duration, $\mu$ s	0.15-100.0
» pulse repetition frequency, Hz	300-5000
» signal modulation type	MONO/LFM
Receiver:	
» noise factor, units	2.2
» intermediate frequency, MHz	300
» sounding signal stability, dB	50

### Basic specifications of meteorological measurement system (based on the automated meteorological station)

Measured temperature range, °C	from -50 to +50
Measuring tolerance, within, °C	$\pm 0.5$
Horizontal wind velocity, m/s	from 0.1 to 30
Measuring tolerance, within, m/s	$\pm (0.1 + 0.02 V)$
Wind direction, deg.	from 0 to 360
Measuring tolerance, within, deg.	$\pm 4$
Relative ambient air humidity, %	from 10 to 100
Measuring tolerance, within, %	$\pm 3$
Atmospheric pressure, hPa	from 693 to 1067
Measuring tolerance, within, hPa	$\pm 1$

### Basic specifications of aerological sounding system

Measured temperature range, °C	from -90 to +50
Measuring tolerance, °C	$\pm 0.8$
Relative ambient air humidity, %	from 0 to 100
Measuring tolerance, %	$\pm 8$
Atmospheric pressure, hPa	from 1100 to 10
Average wind velocity, m/s	from 0 to 200
RMSE of average wind measurement, m/s	0.7
Wind direction, deg.	from 0 to 360
RMSE of wind direction measurement, deg.	1.5