

## ACCREDITATION SCOPE

Federal Budgetary Institution "State Regional Center  
for Standardization, Metrology and Testing in Penza region "

*name of the legal entity*

440028, Penza, st. Komsomolskaya, 20

*address of the place of activity*

Calibration of measuring instruments

*calibration stamp ciphret*

Item No.	Measurements, type (group) of measuring instruments	Metrological requirements		Note
		measurement range	uncertainty (error, class, order)	
1	2	3	4	5
1	Measurements of geometric quantities, length measuring instruments	from 0,1 to 10 mm	0,16 μm	
		over 10 to 25 mm	0,2 μm	
		over 25 to 50 mm	0,26 μm	
		over 50 to 75 mm	0,31 μm	
		over 75 to 100 mm	0,37 μm	
		over 100 to 150 mm	0,5 μm	
		over 150 to 200 mm	0,6 μm	
		over 200 to 250 mm	0,71 μm	

1	2	3	4	5
		over 250 to 300 mm	0,83 $\mu\text{m}$	
		over 300 to 400 mm	1,1 $\mu\text{m}$	
		over 400 to 500 mm	1,3 $\mu\text{m}$	
		over 500 to 600 mm	1,5 $\mu\text{m}$	
		over 600 to 700 mm	1,7 $\mu\text{m}$	
		over 700 to 800 mm	1,9 $\mu\text{m}$	
		over 800 to 900 mm	2,1 $\mu\text{m}$	
		over 900 to 1000 mm	2,4 $\mu\text{m}$	
		over 1 to 3 m	0,58 mm	
		over 3 to 10 m	0,58 mm	
		over 10 до 20 m	0,59 mm	
		over 20 to 30 m	0,60 mm	
		over 30 to 40 m	0,63 mm	
		over 40 to 50 m	0,64 mm	
		over 50 to 60 m	0,66 mm	
		over 60 to 70 m	0,67 mm	
		over 70 to 80 m	0,70 mm	
		over 80 to 90 m	0,73 mm	
		over 90 to 100 m	0,75 mm	

1	2	3	4	5
		over 100 to 200 m  over 200 to 800 m  Ra from 0,2 to 1 μm Rz, Rmax from 0,8 to 4 μm  Ra from 1 to 100 μm Rz, Rmax from 4 to 400 μm	1,016 + + 1,96 · 10 <sup>-6</sup> · Lизм mm  1,602 + + 2,02 · 10 <sup>-6</sup> · Lизм mm  0,025 · X μm  0,016 · X μm	
2	Measurements of geometric quantities, measuring instruments of plane angle	from 0 to 360°	0,73"	
3	Measurements of mechanical quantities, mass measuring instruments  weights	0,001 g 0,002 g 0,005 g 0,01 g 0,02 g 0,05 g 0,1 g 0,2 g 0,5 g 1 g 2 g 5 g 10 g 20 g	0,0066 mg 0,0066 mg 0,0066 mg 0,0083 mg 0,010 mg 0,013 mg 0,016 mg 0,020 mg 0,026 mg 0,010 mg 0,013 mg 0,016 mg 0,020 mg 0,026 mg	

1	2	3	4	5
	Balances, scales	50 g 100 g 200 g 500 g 1 kg 2 kg 5 kg 10 kg 20 kg 500 kg from 0,001 to 50 g over 50 to 220 g over 220 to 1200 g over 1200 to 6200 g over 6200 to 64000 g	0,033 mg 0,053 mg 0,10 mg 0,26 mg 0,53 mg 1 mg 2,66 mg 5,33 mg 10 mg 8,33 g 0,0061 mg 0,059 mg 0,58 mg 5,8 mg 57,8 mg	
4	Measurements of mechanical quantities, force measuring instruments	from 0,1 to 1,0 kN  over 1,0 to 10,0 kN  over 10,0 to 50,0 kN  over 50,0 to 500,0 kN	0,018%  0,042%  0,052%  0,057 %	

1	2	3	4	5
		over 500,0 to 700,0 kN	0,041 %	
5	Measurements of mechanical quantities, torque measuring instruments	from 30,0 to 200,0 N·m  over 200,0 to 500,0 N·m  over 500,0 to 1500,0 N·m	2,92 N·m  5,93 N·m  6,21 N·m	
6	Measurements of parameters of flow, consumption, level, volume of substances, volume flow rate gas measuring instruments	from 0,003 to 6,5 m <sup>3</sup> /h	5,8 10 <sup>-3</sup> · X m <sup>3</sup> /h	
7	Measurements of parameters of flow, consumption, level, volume of substances, volume of substances measuring instruments  Metal measures of the 1st category  Metal measures of the 2st category  Pipette dispensers, glass capacity measures	 from 2·10 <sup>3</sup> to 20·10 <sup>3</sup> cm <sup>3</sup>  from 50·10 <sup>3</sup> to 500·10 <sup>3</sup> cm <sup>3</sup>  from 2·10 <sup>3</sup> to 20·10 <sup>3</sup> cm <sup>3</sup>  from 50·10 <sup>3</sup> to 500·10 <sup>3</sup> cm <sup>3</sup>  from 0,0005 to 0,01 cm <sup>3</sup>  over 0,01 to 1,00 cm <sup>3</sup>	 0,0088 cm <sup>3</sup>  4,2 cm <sup>3</sup>  0,46 cm <sup>3</sup>  12 cm <sup>3</sup>  0,0024 cm <sup>3</sup>  0,013 cm <sup>3</sup>	

1	2	3	4	5
		<p>over 1,00 to 5,00 cm<sup>3</sup></p> <p>over 5,00 to 30 cm<sup>3</sup></p> <p>over 30 to 500 cm<sup>3</sup></p> <p>over 500 to 2000 cm<sup>3</sup></p>	<p>0,039 cm<sup>3</sup></p> <p>0,10 cm<sup>3</sup></p> <p>0,024 cm<sup>3</sup></p> <p>1,22 cm<sup>3</sup></p>	
8	Measurements of parameters of flow, consumption, level, volume of substances, anemometers, air flow rate meters	from 0,1 to 30 m/s	$2 \cdot 10^{-3} \cdot X$ m/s	
9	Pressure measurements, vacuum measurements, pressure measuring instruments	<p>from minus 100 to 0 kPa</p> <p>over 0 to 250 kPa</p> <p>over 0,25 to 25 MPa</p> <p>over 25 to 60 MPa</p> <p>over 60 to 250 MPa</p>	<p><math>5,8 \cdot 10^{-5} \cdot X</math> kPa</p> <p><math>5,8 \cdot 10^{-5} \cdot X</math> kPa</p> <p><math>5,8 \cdot 10^{-5} \cdot X</math> MPa</p> <p><math>2,3 \cdot 10^{-4} \cdot X</math> MPa</p> <p><math>5,8 \cdot 10^{-4} \cdot X</math> MPa</p>	
10	Measurements of physicochemical composition and properties of substances, density measuring instruments	from 650 to 2 000 kg/m <sup>3</sup>	$3,6 \cdot 10^{-4} \cdot X$ kg/m <sup>3</sup>	
11	Measurements of physicochemical composition and properties of substances, humidity measuring instruments	from 5 to 95 %	0,58 %	
12	Measurements of physicochemical composition and properties of substances, gas analyzers	<p>from 0 to 30 % of the measured value.</p> <p>over 30 to 100 % of the measured value.</p>	<p>0,004 % of the measured value.</p> <p>0,004 % of the measured value.</p>	
13	Measurements of physicochemical composition and properties of substances, pH measuring instruments	from 1 to 13 pH	0,014 pH	

1	2	3	4	5
14	Measurements of physicochemical composition and properties of substances, fluid analyzers	from 0,01 to 50 mg/dm <sup>3</sup>	0,014·X mg/dm <sup>3</sup>	
15	Thermophysical and temperature measurements, temperature measuring instruments	from minus 60 to 300°C over 300 to 1200 °C	0,02 °C (4,5·10 <sup>-4</sup> ·X+0,17) °C	
16	Time and frequency measurements, frequency measuring instruments	from 5·10 <sup>-3</sup> to 6·10 <sup>9</sup> Hz	5,8·10 <sup>-10</sup> ·X Hz	
17	Time and frequency measurements, time measuring instruments	from 10 ns to 100 µs over 100 µs to 1 s over 1 to 1·10 <sup>6</sup> s	0,72 ns 230 ns 1,2 µs	
18	Time and frequency measurements, signal generators	from 1·10 <sup>-3</sup> to 1·10 <sup>9</sup> Hz	1·10 <sup>-8</sup> ·X Hz	
19	Measurements electrical and magnetic quantities, measuring instruments of electric direct voltage  Voltmeters and meters          Calibrators, installations and measures	from 0 to 329,9999 mV  over 0,33 to 3,29 V  over 3,3 to 32,99999 V  over 33 to 329,9999 V  over 330 to 1 000 V  from 1·10 <sup>-8</sup> to 0,111111 V	23·10 <sup>-6</sup> ·X+1,2·10 <sup>-6</sup> V  13·10 <sup>-6</sup> ·X+2,3·10 <sup>-6</sup> V  14·10 <sup>-6</sup> ·X+23·10 <sup>-6</sup> V  21·10 <sup>-6</sup> ·X+170·10 <sup>-6</sup> V  21·10 <sup>-6</sup> ·X+1,7·10 <sup>-3</sup> V  2,3·10 <sup>-6</sup> ·X+46·10 <sup>-9</sup> V	





1	2	3	4	5
			$1,7 \cdot 10^{-3} \cdot X + 7 \cdot 10^{-5} \text{ V}$	from 400 Hz to 10 kHz
			$2,2 \cdot 10^{-4} \cdot X + 5 \cdot 10^{-5} \text{ V}$	from 10 to 20 kHz
			$3,5 \cdot 10^{-4} \cdot X + 5,8 \cdot 10^{-5} \text{ V}$	from 20 to 50 kHz
			$8,1 \cdot 10^{-4} \cdot X + 1,5 \cdot 10^{-4} \text{ V}$	from 50 to 100 kHz
		over 3,3 to 32,9999 V	$3,5 \cdot 10^{-4} \cdot X + 7,5 \cdot 10^{-4} \text{ V}$	from 10 to 45 Hz
			$1,7 \cdot 10^{-4} \cdot X + 7 \cdot 10^{-4} \text{ V}$	from 400 Hz to 10 kHz
			$2,8 \cdot 10^{-4} \cdot X + 7 \cdot 10^{-4} \text{ V}$	from 10 to 20 kHz
			$4,1 \cdot 10^{-4} \cdot X + 7 \cdot 10^{-4} \text{ V}$	from 20 to 50 kHz
			$1,1 \cdot 10^{-3} \cdot X + 2 \cdot 10^{-3} \text{ V}$	from 50 to 100 kHz
		over 33 to 329,999 V	$2,2 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-3} \text{ V}$	from 400 Hz to 1 kHz
			$2,3 \cdot 10^{-4} \cdot X + 7 \cdot 10^{-3} \text{ V}$	from 1 to 10 kHz
			$2,9 \cdot 10^{-4} \cdot X + 7 \cdot 10^{-3} \text{ V}$	from 10 to 20 kHz
			$3,5 \cdot 10^{-4} \cdot X + 7 \cdot 10^{-3} \text{ V}$	from 20 to 50 kHz
			$2,3 \cdot 10^{-3} \cdot X + 5,8 \cdot 10^{-2} \text{ V}$	from 50 to 100 kHz
		over 330 to 1 020 V	$3,5 \cdot 10^{-4} \cdot X + 1,2 \cdot 10^{-2} \text{ V}$	from 400 Hz to 1 kHz
			$2,9 \cdot 10^{-4} \cdot X + 1,2 \cdot 10^{-2} \text{ V}$	from 1 to 5 kHz
			$3,5 \cdot 10^{-4} \cdot X + 1,2 \cdot 10^{-2} \text{ V}$	from 5 to 10 kHz

1	2	3	4	5	
	Calibrators, installations and measures	from 0 to 520 V	$2,3 \cdot 10^{-4} X V$	from 45 to 400 Hz	
			from 0 до 200 mV	$1,5 \cdot 10^{-4} \cdot X + 1,7 \cdot 10^{-2} mV$	from 10 to 40 Hz
				$1,2 \cdot 10^{-4} \cdot X + 4,6 \cdot 10^{-3} mV$	from 400 Hz to 2 kHz
				$1,2 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-3} mV$	from 2 to 10 kHz
				$1,2 \cdot 10^{-4} \cdot X + 4,6 \cdot 10^{-3} mV$	from 10 to 30 kHz
				$3,5 \cdot 10^{-4} \cdot X + 9 \cdot 10^{-3} mV$	from 30 to 100 kHz
			over 0,2 to 2 V	$1,2 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-5} V$	from 10 to 40 Hz
				$1,0 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-5} V$	from 40 to 100 Hz
				$7,5 \cdot 10^{-5} \cdot X + 2,3 \cdot 10^{-5} V$	from 400 Hz to 2 kHz
				$1,0 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-5} V$	from 2 to 10 kHz
				$2,4 \cdot 10^{-4} \cdot X + 4,6 \cdot 10^{-5} V$	from 10 to 30 kHz
				$5,8 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-4} V$	from 30 to 100 kHz
			over 2 to 20 V	$1,2 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-4} V$	from 10 to 40 Hz
				$1,0 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-4} V$	from 40 to 100 Hz
				$7,5 \cdot 10^{-5} \cdot X + 2,3 \cdot 10^{-4} V$	from 400 Hz to 2 kHz
				$1,0 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-4} V$	from 2 to 10 kHz
			$2,4 \cdot 10^{-4} \cdot X + 4,6 \cdot 10^{-4} V$	from 10 to 30 kHz	

1	2	3	4	5
		over 20 to 200 V	$5,8 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-3} \text{ V}$ $1,2 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-3} \text{ V}$ $1,0 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-3} \text{ V}$ $7,5 \cdot 10^{-5} \cdot X + 2,3 \cdot 10^{-3} \text{ V}$ $1,0 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-3} \text{ V}$ $2,4 \cdot 10^{-4} \cdot X + 4,6 \cdot 10^{-3} \text{ V}$ $5,8 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-2} \text{ V}$	from 30 to 100 kHz from 10 to 40 Hz from 40 to 100 Hz from 400 Hz to 2 kHz from 2 to 10 kHz from 10 to 30 kHz from 30 to 100 kHz
		over 200 to 1 000 V	$1,2 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-2} \text{ V}$ $1,0 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-2} \text{ V}$ $2,4 \cdot 10^{-4} \cdot X + 4,6 \cdot 10^{-2} \text{ V}$ $5,8 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-1} \text{ V}$	from 10 to 40 Hz from 40 Hz to 10 kHz from 10 to 30 kHz from 30 to 100 kHz
21	Measurements electrical and magnetic quantities, kilovoltmeters of voltage of direct and alternating current	from 0 to 100 kV  from 0 to 100 kV	$1,2 \cdot 10^{-3} \cdot X \text{ kV}$  $1,1 \cdot 10^{-3} \cdot X \text{ kV}$	50 Hz
22	Measurements electrical and magnetic quantities, electric direct current measuring instruments  Ammeters and meters	from 0 to 0,329999 mA  over 0,33 to 3,29999 mA	$1,8 \cdot 10^{-4} \cdot X + 0,02 \cdot 10^{-3} \text{ mA}$  $1,2 \cdot 10^{-4} \cdot X + 0,06 \cdot 10^{-3} \text{ mA}$	

1	2	3	4	5
	Calibrators, installations and measures	over 3,3 to 329,999 mA over 3,3 to 1,09999 A over 1,1 to 2,99999 A over 3 to 10,9999 A over 11 to 20,5 A from 0 to 200 $\mu$ A over 0,2 to 2 mA over 2 to 20 mA over 20 to 200 mA over 0,2 to 2 A over 2 to 20 A	$1,2 \cdot 10^{-4} \cdot X + 3 \cdot 10^{-3}$ mA $2,3 \cdot 10^{-4} \cdot X + 4,5 \cdot 10^{-5}$ A $4,4 \cdot 10^{-4} \cdot X + 4,5 \cdot 10^{-5}$ A $5,8 \cdot 10^{-4} \cdot X + 5,8 \cdot 10^{-4}$ A $1,2 \cdot 10^{-3} \cdot X + 8,5 \cdot 10^{-4}$ A $1,4 \cdot 10^{-5} \cdot X + 4,6 \cdot 10^{-4}$ $\mu$ A $1,4 \cdot 10^{-5} \cdot X + 4,6 \cdot 10^{-6}$ mA $1,5 \cdot 10^{-5} \cdot X + 4,6 \cdot 10^{-5}$ mA $4,2 \cdot 10^{-5} \cdot X + 9,2 \cdot 10^{-4}$ mA $2,0 \cdot 10^{-4} \cdot X + 1,8 \cdot 10^{-5}$ A $4,4 \cdot 10^{-4} \cdot X + 4,6 \cdot 10^{-4}$ A	
23	Measurements electrical and magnetic quantities, electric alternating current measuring instruments Ammeters and meters	over 29 to 329,99 $\mu$ A	$2,3 \cdot 10^{-3} \cdot X + 0,12$ $\mu$ A $1,7 \cdot 10^{-3} \cdot X + 0,12$ $\mu$ A $1,4 \cdot 10^{-3} \cdot X + 0,12$ $\mu$ A $3,5 \cdot 10^{-3} \cdot X + 0,17$ $\mu$ A $9,2 \cdot 10^{-3} \cdot X + 0,23$ $\mu$ A $1,9 \cdot 10^{-2} \cdot X + 0,23$ $\mu$ A	from 10 to 20 Hz from 20 to 45 Hz from 400 Hz to 1 kHz from 1 to 5 kHz from 5 to 10 kHz from 10 to 30 kHz

1	2	3	4	5
		over 0,33 to 3,2999 mA	$2,3 \cdot 10^{-3} \cdot X + 0,17 \cdot 10^{-3} \text{ mA}$  $1,4 \cdot 10^{-3} \cdot X + 0,17 \cdot 10^{-3} \text{ mA}$  $1,2 \cdot 10^{-3} \cdot X + 0,17 \cdot 10^{-3} \text{ mA}$  $2,3 \cdot 10^{-3} \cdot X + 0,23 \cdot 10^{-3} \text{ mA}$  $5,8 \cdot 10^{-3} \cdot X + 0,35 \cdot 10^{-3} \text{ mA}$  $1,1 \cdot 10^{-2} \cdot X + 0,69 \cdot 10^{-3} \text{ mA}$	from 10 to 20 Hz  from 20 to 45 Hz  from 400 Hz to 1 kHz  from 1 to 5 kHz  from 5 to 10 kHz  from 10 to 30 kHz
		over 3,3 to 32,999 mA	$2,1 \cdot 10^{-3} \cdot X + 2,3 \cdot 10^{-3} \text{ mA}$  $1,0 \cdot 10^{-3} \cdot X + 2,3 \cdot 10^{-3} \text{ mA}$  $5,0 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-3} \text{ mA}$  $9,0 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-3} \text{ mA}$  $2,3 \cdot 10^{-3} \cdot X + 3,5 \cdot 10^{-3} \text{ mA}$  $4,6 \cdot 10^{-3} \cdot X + 4,6 \cdot 10^{-3} \text{ mA}$	from 10 to 20 Hz  from 20 to 45 Hz  from 400 Hz to 1 kHz  from 1 to 5 kHz  from 5 to 10 kHz  from 10 to 30 kHz
		over 33 to 329,99 mA	$2,1 \cdot 10^{-3} \cdot X + 2,3 \cdot 10^{-2} \text{ mA}$  $1,0 \cdot 10^{-3} \cdot X + 2,3 \cdot 10^{-2} \text{ mA}$  $5,0 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-2} \text{ mA}$	from 10 to 20 Hz  from 20 to 45 Hz  from 400 Hz to 1 kHz

1	2	3	4	5
			$1,2 \cdot 10^{-4} \cdot X + 5,8 \cdot 10^{-2} \text{ mA}$	from 1 to 5 kHz
			$2,3 \cdot 10^{-3} \cdot X + 1,2 \cdot 10^{-1} \text{ mA}$	from 5 to 10 kHz
			$4,6 \cdot 10^{-3} \cdot X + 2,3 \cdot 10^{-1} \text{ mA}$	from 10 to 30 kHz
		over 0,33 to 1,09999 A	$2,1 \cdot 10^{-3} \cdot X + 1,2 \cdot 10^{-4} \text{ A}$	from 10 to 45 Hz
			$6,0 \cdot 10^{-4} \cdot X + 1,2 \cdot 10^{-4} \text{ A}$	from 400 Hz to 1 kHz
			$6,9 \cdot 10^{-3} \cdot X + 1,2 \cdot 10^{-3} \text{ A}$	from 1 to 5 kHz
			$2,9 \cdot 10^{-2} \cdot X + 5,8 \cdot 10^{-3} \text{ A}$	from 5 to 10 kHz
		over 1,1 to 2,99999 A	$2,1 \cdot 10^{-3} \cdot X + 1,2 \cdot 10^{-4} \text{ A}$	from 10 to 45 Hz
			$7,0 \cdot 10^{-4} \cdot X + 1,2 \cdot 10^{-4} \text{ A}$	from 400 Hz to 1 kHz
			$6,9 \cdot 10^{-3} \cdot X + 1,2 \cdot 10^{-3} \text{ A}$	from 1 to 5 kHz
			$2,9 \cdot 10^{-2} \cdot X + 5,8 \cdot 10^{-3} \text{ A}$	from 5 to 10 kHz
		over 3 to 10,9999 A	$1,2 \cdot 10^{-3} \cdot X + 2,3 \cdot 10^{-3} \text{ A}$	from 400 Hz to 1 kHz
			$3,5 \cdot 10^{-2} \cdot X + 2,3 \cdot 10^{-3} \text{ A}$	from 1 to 5 kHz
		over 11 to 20,5 A	$1,7 \cdot 10^{-3} \cdot X + 5,8 \cdot 10^{-3} \text{ A}$	from 400 Hz to 1 kHz
			$3,5 \cdot 10^{-2} \cdot X + 5,8 \cdot 10^{-3} \text{ A}$	from 1 to 5 kHz
		over 0,001 to 120 A	$2,3 \cdot 10^{-4} \cdot X \text{ A}$	from 45 to 400 Hz

1	2	3	4	5
	Calibrators, installations and measures	from 0 to 200 $\mu$ A	$3,2 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-2} \mu\text{A}$	from 10 to 30 kHz
		$7,5 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-2} \mu\text{A}$	from 10 to 30 kHz	
		$4,6 \cdot 10^{-3} \cdot X + 2,3 \cdot 10^{-2} \mu\text{A}$	from 30 to 10 kHz	
		over 0,2 to 2 mA	from 10 to 30 kHz	
		$3,2 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-4} \text{ mA}$	from 10 to 30 kHz	
		$7,5 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-4} \text{ mA}$	from 10 to 30 kHz	
		$4,6 \cdot 10^{-3} \cdot X + 2,3 \cdot 10^{-4} \text{ mA}$	from 30 to 10 kHz	
		over 2 to 20 mA	from 10 to 30 kHz	
		$3,2 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-3} \text{ mA}$	from 10 to 30 kHz	
		$7,5 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-3} \text{ mA}$	from 10 to 30 kHz	
		$4,6 \cdot 10^{-3} \cdot X + 2,3 \cdot 10^{-3} \text{ mA}$	from 30 to 10 kHz	
		over 20 to 200 mA	from 400 Hz to 10 kHz	
		$2,9 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-2} \text{ mA}$	from 10 to 30 kHz	
		$6,9 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-2} \text{ mA}$	from 10 Hz to 2 kHz	
		over 0,2 to 2 A	from 2 to 10 kHz	
		$6,9 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-4} \text{ A}$	from 10 to 30 kHz	
	$8,1 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-4} \text{ A}$	from 10 to 30 kHz		
	$3,5 \cdot 10^{-3} \cdot X + 2,3 \cdot 10^{-4} \text{ mA}$	from 10 to 30 kHz		
	over 2 to 20 A	from 10 to 30 kHz		
	$3,5 \cdot 10^{-3} \cdot X + 2,3 \cdot 10^{-4} \text{ mA}$	from 400 Hz to 2 kHz		
	$9,2 \cdot 10^{-4} \cdot X + 2,3 \cdot 10^{-3} \text{ A}$	from 400 Hz to 2 kHz		

1	2	3	4	5
		over 0,001 to 120 A	$2,9 \cdot 10^{-3} \cdot X +$ $+2,3 \cdot 10^{-3} \text{ A}$  $2,3 \cdot 10^{-4} \cdot X \text{ A}$	from 2 to 10 kHz  from 45 to 400 Hz
24	Measurements electrical and magnetic quantities, electric power measuring instruments	from 0 до 108 kW	$2,3 \cdot 10^{-4} \text{ X kW}$	
25	Measurements electrical and magnetic quantities, electric energy measuring instruments	from 0 to 108 kW	$2,3 \cdot 10^{-4} \text{ X kW}$	
26	Measurements electrical and magnetic quantities, shunts	from $1,5 \cdot 10^{-5} \Omega$ to $2,5 \cdot 10^{-3} \Omega$  over $2,5 \cdot 10^{-3} \Omega$ to $7,5 \cdot 10^{-3} \Omega$  over $7,5 \cdot 10^{-3} \Omega$ to $15 \cdot 10^{-3} \Omega$	$4,4 \cdot 10^{-10} \Omega$  $3,4 \cdot 10^{-9} \Omega$  $4,4 \cdot 10^{-8} \Omega$	
27	Measurements electrical and magnetic quantities, electrical resistance measuring instruments  measures	$1 \cdot 10^{-3} \Omega$  $1 \cdot 10^{-2} \Omega$  $1 \cdot 10^{-1} \Omega$  $1 \Omega$  $10 \Omega$  $1 \cdot 10^2 \Omega$  $1 \cdot 10^3 \Omega$  $1 \cdot 10^4 \Omega$  $1 \cdot 10^5 \Omega$  $1 \cdot 10^6 \Omega$  $1 \cdot 10^7 \Omega$	$4,1 \cdot 10^{-9} \Omega$  $2,3 \cdot 10^{-8} \Omega$  $1,1 \cdot 10^{-7} \Omega$  $8,7 \cdot 10^{-7} \Omega$  $8,9 \cdot 10^{-6} \Omega$  $1,9 \cdot 10^{-4} \Omega$  $9,9 \cdot 10^{-4} \Omega$  $9,4 \cdot 10^{-3} \Omega$  $9,4 \cdot 10^{-2} \Omega$  $8,2 \cdot 10^{-1} \Omega$  $8,2 \Omega$	



1	2	3	4	5
	multi-valued measures of resistance	$1 \cdot 10^8 \Omega$ from $1 \cdot 10^{-3}$ to $1 \cdot 10^{-2} \Omega$  over $1 \cdot 10^{-2}$ to $1 \cdot 10^{-1} \Omega$ over $1 \cdot 10^{-1}$ to $1 \Omega$ over $1$ to $1 \cdot 10^6 \Omega$ over $1 \cdot 10^6$ to $1 \cdot 10^8 \Omega$ over $1 \cdot 10^8$ to $1 \cdot 10^{10} \Omega$  over $1 \cdot 10^{10}$ to $1 \cdot 10^{11} \Omega$  over $1 \cdot 10^{11}$ to $1 \cdot 10^{12} \Omega$	$8,2 \cdot 10^1 \Omega$ $1,2 \cdot 10^{-3} \cdot X \Omega$  $5,8 \cdot 10^{-4} \cdot X \Omega$ $2,3 \cdot 10^{-4} \cdot X \Omega$ $6,0 \cdot 10^{-5} \cdot X \Omega$ $8,2 \cdot 10^{-7} \cdot X \Omega$ $1,0 \cdot 10^{-6} \cdot X \Omega$ $1,2 \cdot 10^{-3} \cdot X \Omega$ $5,8 \cdot 10^{-3} \cdot X \Omega$	
	Ohmmeters and resistance meters	$1 \cdot 10^{-4} \Omega$  $1 \cdot 10^{-3} \Omega$ $1 \cdot 10^{-2} \Omega$ $1 \cdot 10^{-1} \Omega$ $1 \Omega$ $10 \Omega$ $1 \cdot 10^2 \Omega$ $1 \cdot 10^3 \Omega$ $1 \cdot 10^4 \Omega$ $1 \cdot 10^5 \Omega$ $1 \cdot 10^6 \Omega$ $1 \cdot 10^7 \Omega$ $1 \cdot 10^8 \Omega$ $1 \cdot 10^9 \Omega$ $1 \cdot 10^{10} \Omega$	$5,8 \cdot 10^{10} \Omega$  $5,8 \cdot 10^{-9} \Omega$ $5,8 \cdot 10^{-8} \Omega$ $5,8 \cdot 10^{-7} \Omega$ $5,8 \cdot 10^{-6} \Omega$ $5,8 \cdot 10^{-5} \Omega$ $5,8 \cdot 10^{-4} \Omega$ $5,8 \cdot 10^{-3} \Omega$ $5,8 \cdot 10^{-2} \Omega$ $5,8 \cdot 10^{-1} \Omega$ $5,8 \Omega$ $5,8 \cdot 10^1 \Omega$ $5,8 \cdot 10^2 \Omega$ $5,8 \cdot 10^3 \Omega$ $5,8 \cdot 10^4 \Omega$	

1	2	3	4	5
28	<p>Measurements electrical and magnetic quantities, inductance measuring instruments</p> <p>multi-valued inductance measures</p> <p>Inductance Meters</p>	<p>from <math>1 \cdot 10^{-3}</math> to <math>1 \cdot 10^3</math> H</p> <p>from <math>1 \cdot 10^{-4}</math> to <math>1 \cdot 10^2</math> H</p> <p>from <math>2 \cdot 10^{-5}</math> to 10 H</p> <p>from <math>4 \cdot 10^{-6}</math> to <math>2 \cdot 10^{-1}</math> H</p> <p><math>5 \cdot 10^{-5}</math> H</p> <p><math>1 \cdot 10^{-4}</math> H</p> <p><math>5 \cdot 10^{-4}</math> H</p> <p><math>1 \cdot 10^{-3}</math> H</p> <p><math>5 \cdot 10^{-3}</math> H</p> <p><math>1 \cdot 10^{-2}</math> H</p> <p><math>5 \cdot 10^{-2}</math> H</p> <p><math>1 \cdot 10^{-1}</math> H</p> <p><math>5 \cdot 10^{-1}</math> H</p> <p>1 H</p> <p>10 H</p> <p><math>1 \cdot 10^{-5}</math> H</p> <p><math>5 \cdot 10^{-5}</math> H</p> <p><math>1 \cdot 10^{-4}</math> H</p> <p><math>5 \cdot 10^{-4}</math> H</p> <p><math>1 \cdot 10^{-3}</math> H</p> <p><math>5 \cdot 10^{-3}</math> H</p>	<p><math>5,8 \cdot 10^{-4} \cdot X</math> H</p> <p><math>5,8 \cdot 10^{-4} \cdot X</math> H</p> <p><math>5,8 \cdot 10^{-4} \cdot X</math> H</p> <p><math>2,3 \cdot 10^{-3} \cdot X</math> H</p> <p><math>5,8 \cdot 10^{-9}</math> H</p> <p><math>5,8 \cdot 10^{-9}</math> H</p> <p><math>5,8 \cdot 10^{-8}</math> H</p> <p><math>5,8 \cdot 10^{-8}</math> H</p> <p><math>5,8 \cdot 10^{-7}</math> H</p> <p><math>5,8 \cdot 10^{-7}</math> H</p> <p><math>5,8 \cdot 10^{-6}</math> H</p> <p><math>5,8 \cdot 10^{-6}</math> H</p> <p><math>5,8 \cdot 10^{-5}</math> H</p> <p><math>5,8 \cdot 10^{-5}</math> H</p> <p><math>5,8 \cdot 10^{-3}</math> H</p> <p><math>5,8 \cdot 10^{-9}</math> H</p> <p><math>5,8 \cdot 10^{-8}</math> H</p> <p><math>5,8 \cdot 10^{-8}</math> H</p> <p><math>5,8 \cdot 10^{-8}</math> H</p> <p><math>5,8 \cdot 10^{-7}</math> H</p> <p><math>5,8 \cdot 10^{-7}</math> H</p>	<p>100/120 Hz</p> <p>1000 Hz</p> <p>10 kHz</p> <p>100 kHz</p> <p>1000 Hz</p> <p>1000 Hz</p> <p>1000 Hz</p> <p>1000 Hz</p> <p>1000 Hz</p> <p>1000 Hz</p> <p>1000 Hz</p> <p>1000 Hz</p> <p>1000 Hz</p> <p>1000 Hz</p> <p>1000 Hz</p> <p>1000 Hz</p> <p>300 kHz</p> <p>300 kHz</p> <p>100 kHz; 300 kHz</p> <p>100 kHz</p> <p>30 kHz; 100 kHz</p> <p>30 kHz; 100 kHz</p>



1	2	3	4	5
		from $1 \cdot 10^{-9} \text{ F}$ to $9 \cdot 10^{-9} \text{ F}$	$1,2 \cdot 10^{-3} \cdot X \text{ F}$	1000 Hz
		from $1 \cdot 10^{-8} \text{ F}$ to $9 \cdot 10^{-8} \text{ F}$	$1,2 \cdot 10^{-3} \cdot X \text{ F}$	1000 Hz
		from $1 \cdot 10^{-7} \text{ F}$ to $9 \cdot 10^{-7} \text{ F}$	$1,2 \cdot 10^{-3} \cdot X \text{ F}$	1000 Hz
		from $1 \cdot 10^{-6} \text{ F}$ to $1,11 \cdot 10^{-4} \text{ F}$	$5,8 \cdot 10^{-3} \cdot X \text{ F}$	1000 Hz
30	Radioelectronic measurements, pulse generators	from $5 \cdot 10^{-10}$ to 10 s	0,72 ns	
		from 0,1 to $5 \cdot 10^8$ Hz	$2,3 \cdot 10^{-7} \cdot X \text{ Hz}$	
		from $1 \cdot 10^{-2}$ to $1 \cdot 10^2$ V	$0,017 \cdot X \text{ V}$	
31	Radioelectronic measurements, alternating voltage measuring instruments	from 0,1 to 0,9 mV	$0,015 \cdot X \text{ mV}$	from 0,2 to 3 MHz
		from 1 to 90 mV	$0,009 \cdot X \text{ mV}$	from 0,2 to 3 MHz
		from 0,1 to 1,5 V	$0,0058 \cdot X \text{ V}$	from 0,2 to 3 MHz
		from 2 to 3 V	$0,0035 \cdot X \text{ V}$	from 0,2 to 3 MHz
		from 0,1 to 0,9 mV	$0,023 \cdot X \text{ mV}$	(5, 10) MHz
		from 1 to 3 mV	$0,015 \cdot X \text{ mV}$	(5, 10) MHz
		from 3,16 to 300 mV	$0,009 \cdot X \text{ mV}$	(5, 10 MHz)
		from 1 to 3 V	$0,0058 \cdot X \text{ V}$	(5,10) MHz
		from 0,1 to 0,3 mV	$0,035 \cdot X \text{ mV}$	from 15 to 30 MHz
		from 1 to 3 mV	$0,023 \cdot X \text{ mV}$	from 15 to 30 MHz
		from 10 to 30 mV	$0,015 \cdot X \text{ mV}$	from 15 to 30 MHz

1	2	3	4	5
		from 100 to 300 mV	$0,015 \cdot X \text{ mV}$	from 15 to 30 MHz
		from 1 to 3 V	$0,009 \cdot X \text{ V}$	from 15 to 30 MHz
		3 mV	$0,023 \cdot X \text{ mV}$	30 MHz
		10 mV	$0,017 \cdot X \text{ mV}$	30 MHz
		from 30 to 300 mV	$0,012X \text{ mV}$	30 MHz
		from 1 to 3 V	$0,0058 \cdot X \text{ V}$	30 MHz
		1 mV	$0,035 \cdot X \text{ mV}$	50 MHz
		3 mV	$0,023 \cdot X \text{ mV}$	(50; 75) MHz
		from 10 to 30 mV	$0,017 \cdot X \text{ mV}$	(50; 75) MHz
		from 0,1 to 3 V	$0,012 \cdot X \text{ V}$	(50; 75) MHz
		from 3 to 30 mV	$0,023 \cdot X \text{ mV}$	100 MHz
		100 mV	$0,017 \cdot X \text{ mV}$	100 MHz
		from 0,3 to 3 V	$0,012 \cdot X \text{ V}$	100 MHz
		3 mV	$0,035 \cdot X \text{ mV}$	150 MHz
		from 10 to 30 mV	$0,023 \cdot X \text{ mV}$	150 MHz
		from 0,3 to 3 V	$0,017 \cdot X \text{ V}$	150 MHz
		from 3 to 30 mV	$0,035 \cdot X \text{ mV}$	300 MHz
		from 0,1 to 3 V	$0,023 \cdot X \text{ V}$	300 MHz
		from 3 до 30 mV	$0,058 \cdot X \text{ mV}$	600 MHz
		from 0,1 to 3 V	$0,035 \cdot X \text{ V}$	600 MHz
		3 mV	$0,069 \cdot X \text{ mV}$	700 MHz
		from 10 to 30 mV	$0,058 \cdot X \text{ mV}$	700 MHz
		from 0,1 to 3 V	$0,035 \cdot X \text{ V}$	700 MHz
		from 3 to 30 mV	$0,069 \cdot X \text{ mV}$	(800; 1000) MHz
		from 0,1 to 3 V	$0,058 \cdot X \text{ V}$	(800; 1000) MHz
		from 3,3 to 32,9999 V	$3,5 \cdot 10^{-4} \cdot X + 7,5 \cdot 10^{-4} \text{ V}$	from 10 to 45 Hz

1	2	3	4	5
		from 33 to 329,999 mV	$1,7 \cdot 10^{-4} \cdot X + 7 \cdot 10^{-4} \text{ V}$ $2,8 \cdot 10^{-4} \cdot X + 7 \cdot 10^{-4} \mu\text{V}$ $4,1 \cdot 10^{-4} \cdot X + 7 \cdot 10^{-4} \mu\text{V}$ $1,1 \cdot 10^{-3} \cdot X + 2 \cdot 10^{-3} \text{ V}$ $2,2 \cdot 10^{-4} \cdot X + 2,3 \text{ mV}$ $2,3 \cdot 10^{-4} \cdot X + 7 \text{ mV}$ $2,9 \cdot 10^{-4} \cdot X + 7 \text{ mV}$ $3,5 \cdot 10^{-4} \cdot X + 7 \text{ mV}$ $2,3 \cdot 10^{-3} \cdot X + 58 \text{ mV}$	from 400 Hz to 10 kHz  from 10 to 20 kHz  from 20 to 50 kHz  from 50 to 100 kHz  from 400 Hz to 1 kHz  from 1 to 10 kHz  from 10 to 20 kHz  from 20 to 50 kHz  from 50 to 100 kHz
32	Radioelectronic measurements, pulse voltage measuring instruments	from 0,1 to 100 V	$0,0012 \cdot X + 1,2 \cdot 10^{-5} \text{ V}$	from 20 Hz to $1 \cdot 10^5$ Hz
33	Vibroacoustic measurements, sound level meters	94, 104, 114 dB	0,30 dB  0,50 dB  0,60 dB  0,90 dB	1 kHz  from 31,5 Hz to 4 kHz  8 kHz  from 12,5 Hz to 16 kHz
34	Vibroacoustic measurements, vibration measuring instruments	from 0 to 196 m/s <sup>2</sup>  from 0 to 380 mm/s  from 0 to 1,27 mm	$0,01 \cdot X \text{ m/s}^2$ $0,03 \cdot X \text{ m/s}^2$  $0,15 \cdot X \text{ m/s}^2$  $0,03 \cdot X \text{ mm/s}$  $0,03 \cdot X \text{ mm}$	100 Hz from 30 to 2000 Hz from 7 to 10000 Hz  from 30 to 500 Hz  from 30 to 150 Hz

1	2	3	4	5
35	Optical and optical-physical measurements, directional transmittance spectral measuring instruments	from 0 to 100 %	0,3 %	
36	Optical and optical-physical measurements, spectrometers, atomic absorption spectrophotometers	from $5 \cdot 10^{-6}$ to $50 \text{ mg/dm}^3$	$0,014 \cdot X \text{ mg/dm}^3$	
37	Optical and optical-physical measurements, light meters	from 100 to 6500 lx	$3 \cdot 10^{-2} \cdot X \text{ lx}$	
Note: X – measured value				

Director

A.A. Danilov

Перевод является верным

Директор ФБУ «Пензенский ЦСМ»

А.А. Данилов

10.06.2020