Federal Agency on Technical Regulation and Metrology

CERTIFICATE

On approval of measuring instrument type

US.C.34.004.A № 55636

Valid through November 12, 2019

Measuring instrument type name
Measuring and computing complex, control complex OC 6000e,
OC 6000e Nexus

PRODUCERS
GE Drives & Controls, Inc, USA;
GE Hungary Kft, Hungary;
GE Measurement & Control, China

Registration No **58998-14**

DOCUMENT FOR EXAMINATION
МИ 2539-99

INTER-EXAMENATION PERIOD **2 years**

Measuring instrument type approved by order of Federal Technical Regulation and Metrology Agency from **November 12, 2014 No 1803**

Deputy Director
of the Federal Agency /signature/ F. V. Bulygin

November 24, 2014

Serie СИ No **017639**

MEASURING INSTRUMENTS TYPE DESCRIPTION

Measuring and computing complex, control complex OC 6000e, OC 6000e Nexus

Measuring instrument purpose

Measuring and computing complexes as well as control complexes OC 6000e, OC 6000e Nexus (hereinafter - MCC) are designed to measure electrical voltage signals, direct and alternate current, frequency, resistance to the current, their transformation into digital signals, corresponding to the measuring physical parameter and distribution of commands for failure prediction and protection.

Measuring instrument description

MCC operating principle is based on measuring input electrical signals, their digitazing, processing of input signals received according to predetermined algorithm with the following transmission thereof to the plant, as well as transformation of digital signals into analogue commands.

MCC architecture can be divided into 3 levels:

1st level - automated work station (hereinafter - AWS)

AWS provides a possibility of control of a process through Windows-based workstations, including operator, engineer, data archive storage stations and a station for process optimization. All AWSs are redundant in relation to one another. AWS level and the level of technological process control interact via a redundant UDH real time process control network. All network nodes use NTP protocol.

2nd level - level of process control based on logical controllers.

Logical controllers are integrated autonomous computer, collecting and processing measuring information, formulating commands for primary elements (converters) and actuation mechanisms in the form of analogue and discrete signals.

3rd level - level of process input/output data based on I/O modules.

I/O modules are used for conversion of the data obtained from primary elements (converters) (not included in MCC) and its transfer to the 2nd level and vice versa.

Interaction between the 2nd and 3rd level is carried out through Ethernet, IONet via protocol IEC1588 (for MCC OC 6000e) and serial port for communication with connector DB-9 (for MCC OC 6000e Nexus).

There are also distributed modules within MCC. It gives the user an opportunity to place I/O modules anywhere at the plant, which minimizes signal cable requirements and lowers significantly electromagnetic interference level.

MCCs are project-configurable and composable product and are designed as cabinets.

Functionally MCCs consist of four types of measuring channels (hereinafter - MC):

- MC for measuring and reproducing DC,
- MC for measuring and reproducing AC/DC voltage,
- Frequency MC

- Temperature MC

Each MC consists of:

- Logic controllers;
- I/O measuring analogue modules;
- Discrete I/O modules
- Linking components: data connection buses and network components.

MCC are produced in two modifications: OC 6000e and OC 6000e Nexus, which differ by transmission rate, components included, power consumption.

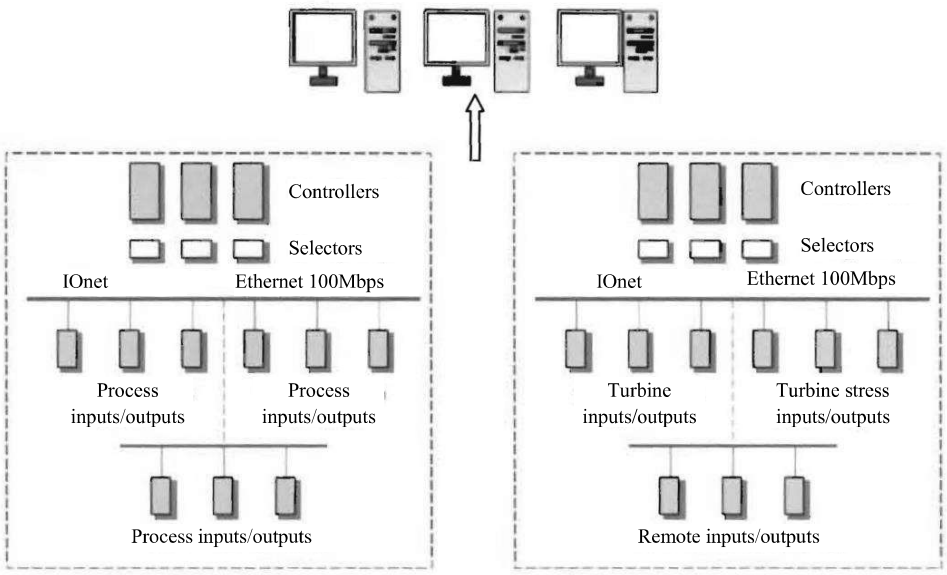

Figure 1 - Architecture diagram of measuring and computing and control complexes OC 6000e, OC 6000e Nexus.

Figure 2 - Exterior of MCC OC 6000e, OC 6000e Nexus instrumental cabinet.

Figure 3 MCC components

Figure 4 - Automated work station of system operator

Software

MCC software provides interaction between control room and process control system of MCC OC 6000e, OC 6000e Nexus, via a local Ethernet network.

MCC Software is divided into 2 parts - built-in and autonomous. Built-in software part is fixed and can be altered only by manufacturer.

All the MCC software parts are considered metrologically significant.

Software functions provide:

- Graphic display of the dynamics;
- Alarm signals display;
- Process pulsation;
- Points control panel menu;
- Access Security.

Degree of MCC software protection from unintended and intended changes is according to the recommendation МИ 3286-2010 - “C” of Federal Agency on Technical Regulating and Metrology.

To protect software from unintended and intended changes in MCC the following measures are implemented:

- Differentiation of access levels for different user categories;
- Protection by means of passwords, card-keys and other special means;
- Event Logging;

- Organization of all user actions archive;
- Antivirus software availability;

Software identification characteristics are presented in table 1.

Table 1 - identification characteristics.

Software name	Software identification name	Software release number (identification number)*	Software digital identifier (executable code checksum)	Software digital identifier algorithm
MPC	MPC	2.5.0	-	CRC16
OC QNX	OC QNX	6.3.0	-	-
BASELOAD-P2-V010305B	BASELOAD-P2-V010305B	-	-	-
FIRMWARE P2 _V010002B	FIRMWARE P2 _V010002B	-	-	-

(*) and later releases.

Metrological characteristics and Specifications

Metrological characteristics and specifications of MCC are shown in tables 2, 3, 4.

Table 2 - Metrological characteristics of input measuring channels of MCC OC 6000e, OC 6000e Nexus.

MC type	Input signal range	Maximum permissible error	Module type
MCC OC 6000e			
DC MC	0(4) to 20 mA	γ = ±0,1 %	MAI10 MVP10 MVP11 MAI12
	0 to 20 mA		MSP10
Temperature MC (from thermocouples of types T, J, E, K, N, B, R, S)	-60 to +60 mV	γ = ± 0,2 %	MAI20 MAI22
Temperature MC (from resistance temperature devices of types Pt10, Pt100, Cu50, Cu100)	-200 to +850 °C		
DC Voltage MC	0(1) to 5 V	γ = ±0,1 %	MAI10 MVP10 MVP11 MAI12
	0 to 5 V		MSP10
	-5 to 5 V		MAI10 MVP10 MVP11 MAI12
	-10 to 10 V		MAI10 MAI12
AC voltage MC	5 to 20 V	γ = ±0,1 %	MVP 10 MVP 11
	40mV to 110 V	15 through 135 Hz Δ = ± 0,002 Hz 0.01 through 340 Hz Δ = ±0,01 Гц	MSP 10
Frequency MC	0 Hz to 20 kHz	γ = ±0,01 %	MSP 10
MCC OC 6000e Nexus			
DC MC	0(4) to 20 mA	γ = ±0,1 %	MAI50 MAI52 MSP50 MVP 50 MHT50

MC type	Input signal range	Maximum permissible error	Module type
DC Voltage MC	-5 to 5 V	γ = ± 0,1 %	MAI50 MAI52 MVP50 MHT50
	-10 to 10 V		MAI50 MAI52 MSP50 MVP50 MHT50
Temperature MC (from thermocouples of types T, J, E, K, N, B, R, S)	0 to 128 mV	γ = ± 0,2 %	MA I51
Temperature MC (from resistance temperature devices of types Pt10, Pt100, Cu10, Cu50, Cu100)	-200 to +850 °C	γ = ± 0,2 %	MAI51
Frequency MC	50 mV RMS through 40 V RMS	γ = ±0,01%	MSP50
	1 Hz through 20 kHz	γ = ± 0,25 %	MLP50
		1 through 10 Hz Δ = ±0,01 Hz	
		10 through 500 Hz Δ = ±0,05 Hz	
		500 through 1000 Hz Δ = ± 0,5 Hz	
		1000 through 5000 Hz Δ = ± 1 Hz	
		5000 through 10000 Hz Δ = ± 2 Hz	
		More than 10000 Hz A = ± 5 Hz	

Table 3 - Metrological characteristics of MCC output measuring channels OC 6000e, OC 6000e Nexus.

MC type	Output range	Maximum permissible error	Module type
MCC OC 6000e			
DC realization MC	0(4) to 20 mA	γ = ± 0,2 %	MAO10
	-40 through +40 mA	γ = ± 0,2 %	MVP10
	-400 through +400 mA	γ = ± 0,2 %	MVP11
DC voltage realization MC	0 to 5 V	γ = ± 0,2 %	MAO10 MVP10 MVP11
	0 to 10 V	γ = ± 0,2 %	MAO10
Frequency realization MC	0 Hz to 20 kHz	γ = ± 0,01 %	MSP10
MCC OC 6000e Nexus			
DC realization MC	0(4) to 20 mA	γ = ±0,1 %	MAO50
DC realization MC	-40 through +40 mA	γ = ± 0,5 %	MVP50
DC voltage realization MC	0(1) to 5 V	γ = ± 0,1 %	MAO50
	0 to 5 V	γ = ±0,01%	MVP50
AC voltage realization MC	-10 to 10 V	γ = ± 0,5 %	MVP50

Permissible error is shown without consideration of primary elements (converters) error.

Table 4 - Specifications of MCC OC 6000e, OC 6000e Nexus.

	MCC OC 6000e	MCC OC 6000e Nexus
Operating Conditions:		
- ambient temperature, °C		
controllers	0 to +65	0 to +60
modules	-30 to +65	-30 to +60
- relative air humidity, %	10 to 95 (Non condensing)	5 to 95 (Non condensing)
Supply voltage, V		
DC Current	24	
AC current Frequency, Hz	110-240 50/60	
Overall dimensions (w*d*h), mm, max	800 × 600 × 2200	
Weight, kg, max	200	
Power required, W, max	720	480
Failure interval, hours	400000	

Pattern approval mark

Pattern approval mark is applied as a sticker on instrumental cabinet, and typographically on manual title page.

Measuring device comprehensiveness

Measuring-computing and control system OC 6000e, OC 6000e Nexus	1 pc.
Operation Manual	1 copy
Hardware manual	1 copy
Display	1 pc.
Software on a CD	1 pc.

Verification

Is carried out according to the document МИ 2539-99 “State System for Ensuring Uniform Measurement. Measuring channels of controllers, measuring and computing, control, software and hardware complexes. Verification Methodology”, approved by Federal State Unitary Enterprise All-Russian Research Institute of Metrological Service on November 28, 2011

Main verification tools:

Multifunctional digital calibration device Additel (ГР № 54357-13):

- DC realization within 0 to 22 mA range, Maximum permissible error ± (0,0002xI_{meas} + 0,0011) mA;
- Electrical signals frequency measurement within 1 to 50000 Hz range, Maximum permissible error ± (0,000005x F_{meas} + 0,1) Hz;

Process parameters measuring device Fluke 787 (ГР № 52020-12):

- DC measurement within -1 to +1 A range, Maximum permissible error ± (0,002x1 + 0,002 A), where I is a measuring device reading.

Multifunctional digital calibration device Fluke 725, 726 (ГР № 52221-12):

- DC voltage realization within -10 to 10 B range, Maximum permissible error ± (0,0002xI+0,002 V), where I is a calibration device reading.
- DC voltage measurement within -30 to 30 V range, Maximum permissible error ± (0,000 I x U+0,002 V), where U is a calibration device reading.
- DC voltage measurement and realization within -20 to 20 V range, maximum permissible error ± (0,0001 x U+0,002 V), where U is a calibration device reading.
- Electrical resistance within 0 to 400 Om range, maximum permissible error ± (0,00015x R+0,05 Om), where R is a calibration device indictor.

Multifunctional digital calibration device Fluke 5700A, 5720A with amplifier Fluke 5725A (ГР 52495-13):

- AC voltage realization within 0 to 220 V range, 40 Hz to 20 kHz frequency, maximum permissible error ±(10^{-6} x U+52+60 μV), where U is a calibration device reading.

Information on measuring methodology (methods)

can be found in corresponding Operating Manual section.

Regulatory and specification documents, setting requirements for measuring-computing and control complexes OC 6000e, OC 6000e Nexus

Manufacturers’ technical documentation.

Recommendations on applications in the sphere of state regulation of measurement uniformity assurance

Production supervision of regulatory compliance with Russian Federation industrial safety requirements for hazardous production facility operation (as a part of measuring systems and complexes).

Manufacturer

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Testing facility

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Accreditation certificate FGUP "VNIIMS" for testing measuring devices for the purpose of type approval № 30004-13 from July 26, 2013.

Deputy Director
of the Federal Technical
Regulation and Metrology Agency /signature/ Bulygin

LS November 24, 2014

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