

# **OPC SERVER FOR DEVICES AIST AND IMLDC**

Version 1.01

User's Manual

2012

OPC server for devices AIST and IMLDC.  
User's Manual/1<sup>st</sup> edition.

This manual is for those who learn the functions and working principles of the OPC server for devices **AIST** (Device receiving the control and management of fire) and **IMLDC** (Isothermal Module for storage of Liquid Dioxide of Carbon).

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## CONTENTS

	Page
<b>1 GENERAL INFORMATION</b> _____	<b>3</b>
<b>2 SYSTEM REQUIREMENTS</b> _____	<b>4</b>
<b>3 INSTALLATION OF THE OPC SERVER</b> _____	<b>5</b>
<b>4 DESCRIPTION OF THE PRODUCT REGISTRATION PROCEDURE</b> _____	<b>8</b>
<b>5 UNINSTALLING THE OPC SERVER</b> _____	<b>10</b>
<b>6 BASIC FEATURES AND WORKING PRINCIPLES</b> _____	<b>10</b>
<b>6.1 Features of the OPC server</b> _____	<b>10</b>
<b>6.2 OPC server's operations</b> _____	<b>11</b>
6.2.1 Work modes _____	11
<b>6.3 User's interface</b> _____	<b>11</b>
6.3.1 Toolbar items _____	12
<b>6.4 Configuring the OPC server</b> _____	<b>13</b>
6.4.1 Creating a communication channel _____	13
6.4.2 Adding a device to the configuration _____	14
6.4.3 Adding a unit to the configuration (for <b>AIST</b> devices) _____	15
6.4.4 Searching for devices and units _____	15
6.4.5 Deleting a configuration element _____	16
6.4.6 Changing settings for a configuration element _____	17
6.4.7 Viewing parameter values of a configuration element _____	17
6.4.8 Saving configuration _____	17
6.4.9 Closing the configuration window _____	17
<b>6.5 OPC server's functioning description</b> _____	<b>17</b>
6.5.1 The main working algorithm of the OPC server _____	17
<b>APPENDIX A. DEVICE PARAMETERS, PROVIDED BY THE OPC SERVER</b> _____	<b>19</b>
<b>A.1 List of device parameters provided by the OPC server</b> _____	<b>19</b>
A.1.1. List of parameters for <b>AIST</b> devices. _____	19
A.1.2. List of parameters for device <b>IMLDC</b> _____	21



## 1 GENERAL INFORMATION

The purpose of this manual is to explain to users the working principles of the **OPC server for devices AIST and IMLDC**, version 1.01 (hereinafter referred to as **OPC server**).

The document contains the description of the OPC server installation and uninstallation, its modes and its user's interface along with the configuration procedure for its proper operation and full use of technical capabilities of devices AIST and IMLDC, either independently or as part of multilevel automated systems.

The OPC server is implemented as an executable COM module ([OPCAISTSrv.exe](#)). The OPC server supports the OPC DA specification, version 2.05a.

## **2 SYSTEM REQUIREMENTS**

In order to work with the OPC server, the computer must meet the following requirements:

- Processor Pentium 2 – 200 MHz
- RAM 64 MB
- Free hard disk space 3 MB
- Serial port
- Operating system: Windows XP/7.

### 3 INSTALLATION OF THE OPC SERVER

To install the OPC server run **setup.exe**. You will be shown the window, presented in figure 3.1.

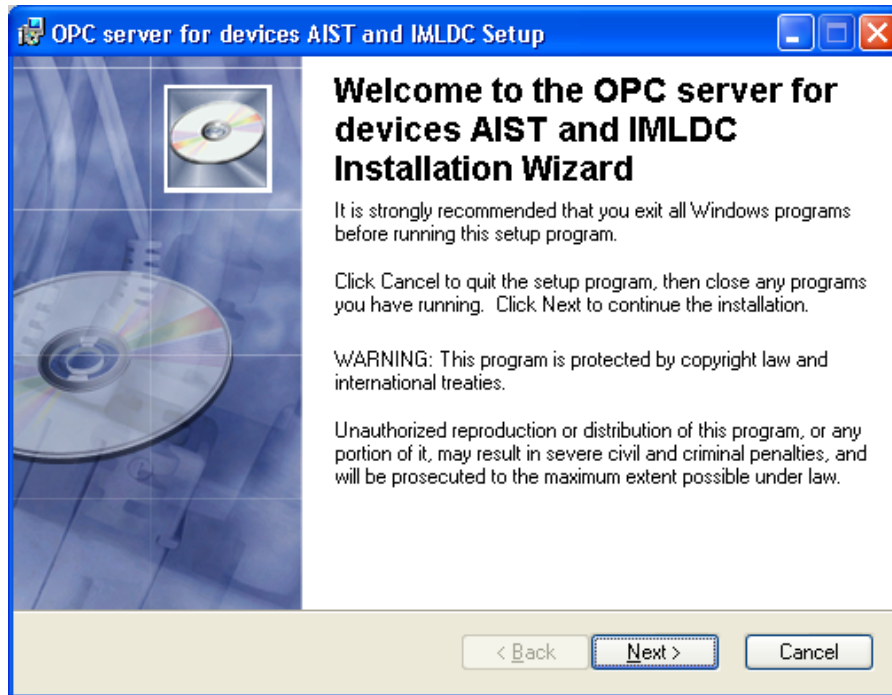


Figure 3.1 – Installer window

Click the “**Next>**” button. You will be shown the window with the license agreement, presented in figure 3.2.

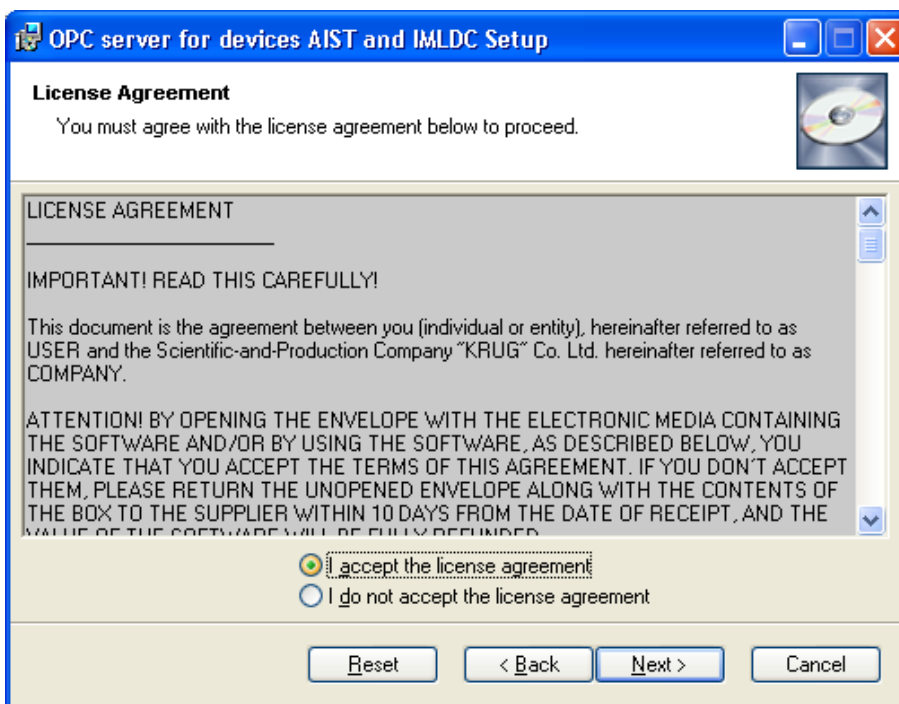


Figure 3.2 – License agreement

To continue the installation you must accept the license agreement. In order to do this you should set the radio button to the item **"I accept the terms of the license agreement"**. To exit the program, please, click the **"Cancel"** button. To continue installation please click the **"Next>"** button. You will be shown the window, presented in figure 3.3.

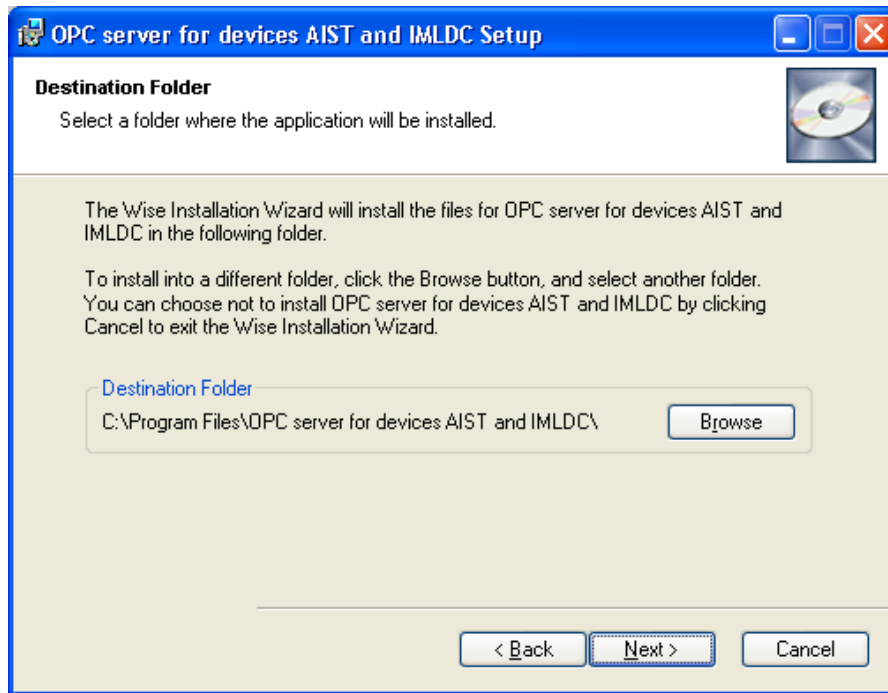


Figure 3.3 – Install path selection window

After selecting the installation path please click the **"Next>"** button to continue installation.

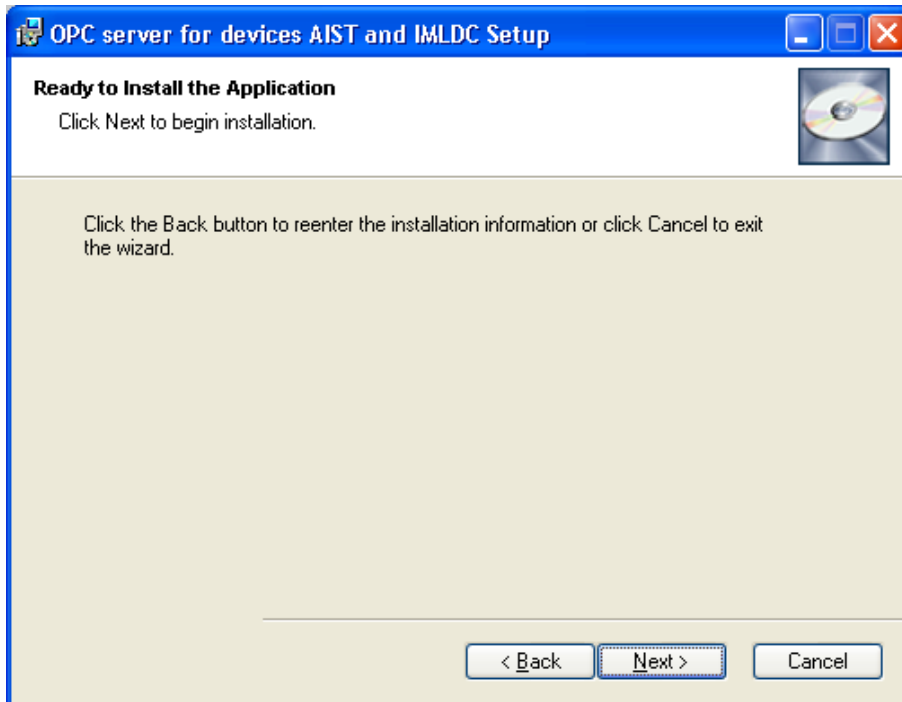


Figure 3.4 – Setup parameters summary



If some parameters (figure 3.4) do not satisfy you, click “<Back” to return to one the previous pages and make appropriate modifications. If you agree with all the specified values, click the button “Next>”.

After finishing the procedure of copying the files, you will be shown the window, displayed in Figure 3.5.

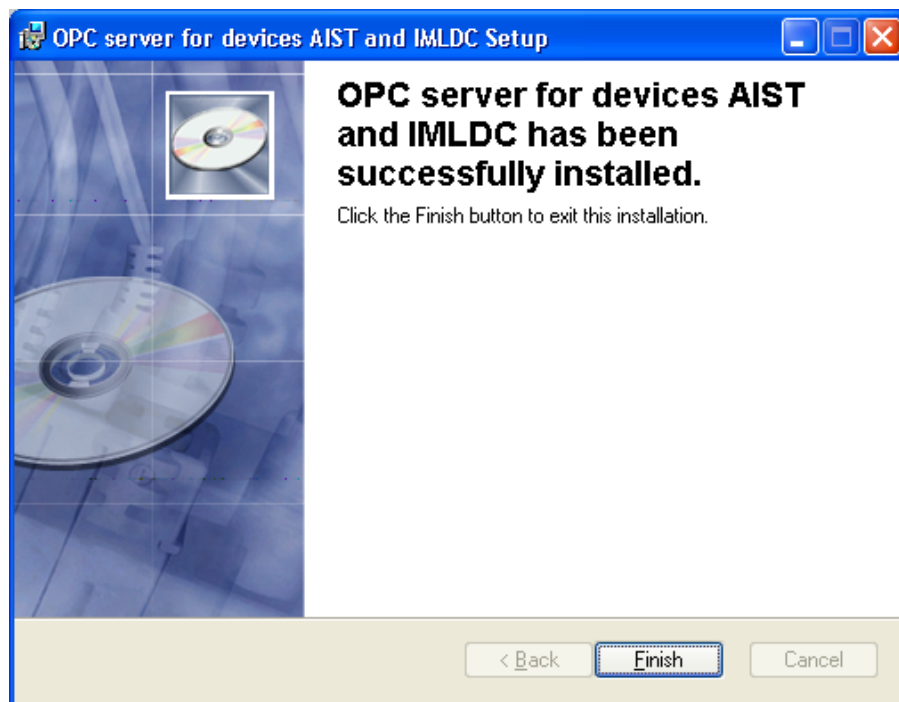


Figure 3.5 – Installation completed.

#### 4 DESCRIPTION OF THE PRODUCT REGISTRATION PROCEDURE

When starting an unregistered copy of the software, the user is offered to register his or her copy of the OPC server. Registration is undertaken by means of the dialog box, presented in Figure 4.1. Also the OPC server allows calling the registration dialog box by using the “**Help/Registration**” menu command, when the server is running in configuration mode.

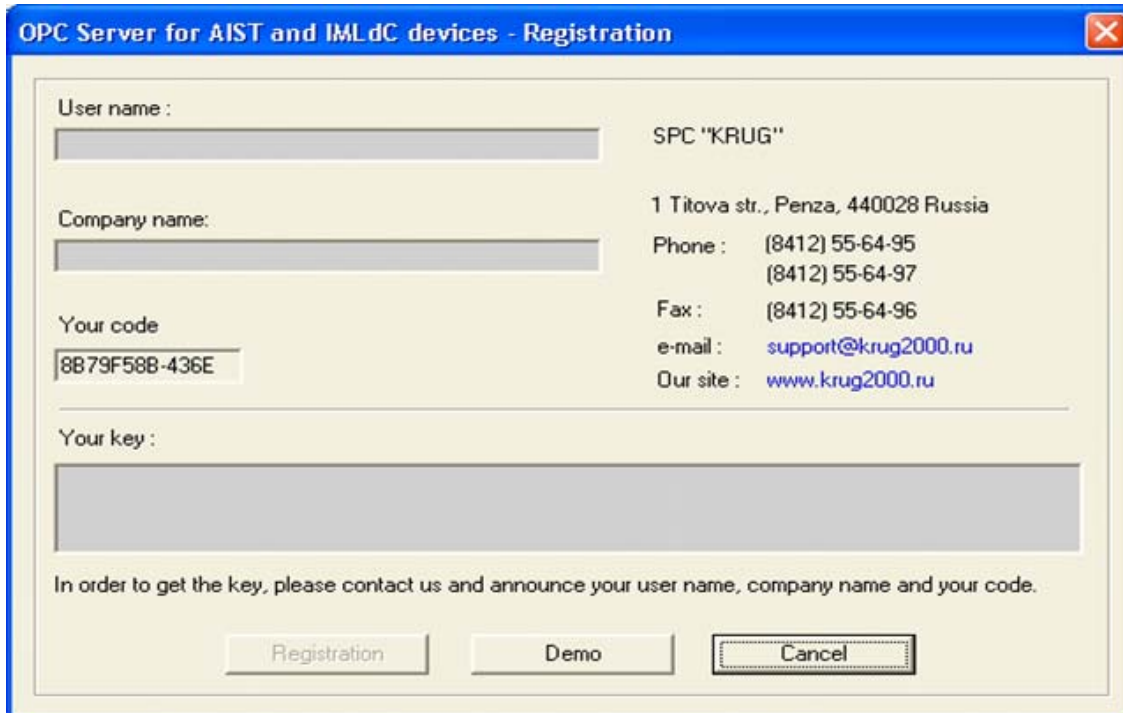


Figure 4.1 – Product registration dialog box

To register the copy of the software you should contact SPC “KRUG” either by phone, fax or email (the relevant information is presented in the dialog box) and report the following data:

- “**User name**”;
- “**Company name**”;
- “**Your code**”. The value of this field is generated automatically based on the hardware configuration of the workstation.

After registering your copy, SPC “KRUG” will deliver to you the key allowing you to use the OPC server. You need to specify it in the field “**Your key**” of the dialog box and afterwards fill all other fields of the form and click the button “**Register**”.

The OPC server can also be used in demo mode. To run the server in this mode you should click the button “**Demo**” in the registration dialog box. In this case you will be shown the window presented in figure 4.2. When running the server in demo mode, you can use all the features of the OPC server, but there is a time limitation.



Figure 4.2 – Starting demo mode dialog box

## 5 UNINSTALLING THE OPC SERVER

To uninstall the OPC server please use the “**Settings/Control panel**” menu item from the “**Start**” menu. Please select “**Add/remove programs**” (Figure 5.1).

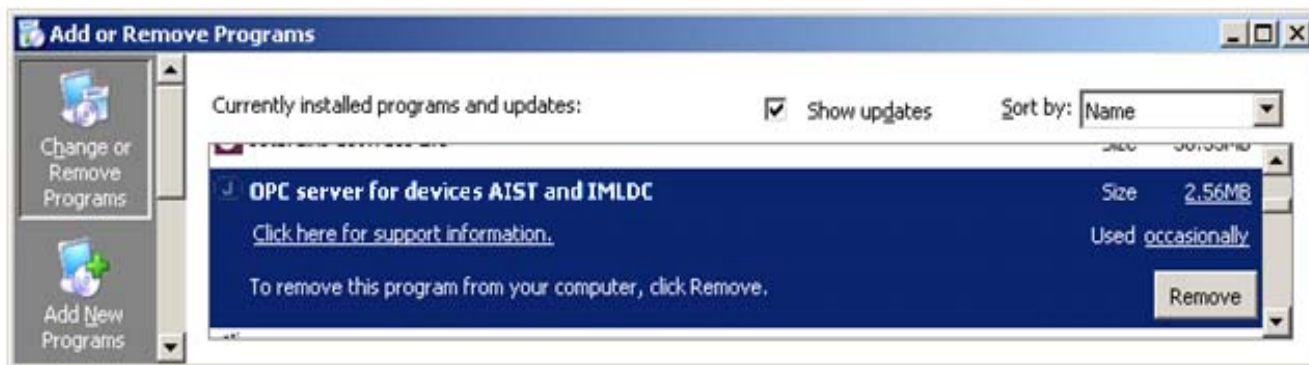


Figure 5.1 – “Add/remove program” window

Select the item “**OPC server for devices AIST and IMLDC**”, click “**Remove**”. You will be shown the dialog box, presented in figure 5.2.



Figure 5.2 – Uninstall confirmation window

If you click the button “**Yes**” the uninstall procedure will be started. If you click “**No**”, the operation will be cancelled.

## 6 BASIC FEATURES AND WORKING PRINCIPLES

### 6.1 Features of the OPC server

The OPC server implements the following main functions:

- Exchange of operative data with devices **AIST** and **IMLDC**. The full list of device parameters, provided by the OPC server, is given in the “**Appendix A**”
- The OPC server can use multiple channels simultaneously, allowing to minimize overall time needed for the data exchange

- The OPC server can poll multiple devices connected to one communication channel (simultaneous connection of both **AIST** and **IMLDC** devices is not allowed due to incompatibility of their data protocols)
- Interaction with OPC clients according to specification OPC Data Access, version 2.05a.

### 6.2 OPC server's operations

#### 6.2.1 Work modes

There are three work modes:

- Registration / Unregistration mode
- Configuration mode (with configuration window)
- Main mode (without configuration window).

**Registration / Unregistration mode** – this mode is started by running the OPC server with */RegServer* or */UnRegServer* command line arguments for registering or unregistering the server respectively.

The server is run in these modes automatically while installing and uninstalling the OPC server, that is why you most probably will not have to run the server with these arguments, if the installer is available.

**Configuration mode (with configuration window)** – this mode started by the OPC server with */Cfg* command line argument. This mode is designed for setting up working parameters for the OPC server.

You can start the OPC server in this mode by running the “**Start**” menu item corresponding to the OPC server.

The configuration parameters are saved in the file *AIST.cfg*, which is located in the same directory as the OPC server's executable file.

**Main mode (without configuration window)** – this mode is started automatically as the first OPC client sends request to the OPC server using COM infrastructure.

### 6.3 User's interface

When the OPC server is launched in configuration mode, the window presented in figure 6.1 is displayed on the screen.

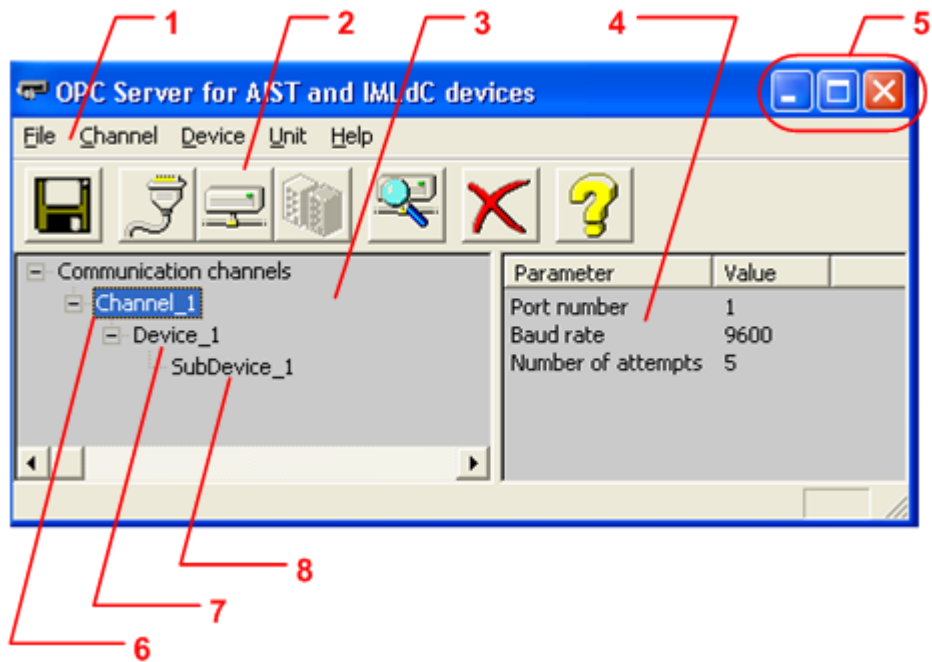


Figure 6.1 – The OPC server's configuration window

The window contains the following elements:

1. Main menu
2. Toolbar with command buttons, which replicate the main menu items
3. The tree view for displaying the hierarchy of devices
4. The area for displaying device's parameter values. There will be displayed the values for the currently selected tree view item
5. System menu. It is designed for minimizing, maximizing and closing the application window
6. Tree view item – communication channel
7. Tree view item – a device connected to the communication channel
8. Tree view item – a unit connected to the device.

### 6.3.1 Toolbar items

In the upper part of the window underneath the main menu there is located the toolbar, containing a set of command buttons. You can invoke functions corresponding to toolbar items by clicking the appropriate button. A tooltip containing additional information is displayed as the mouse cursor is hovering over a button.

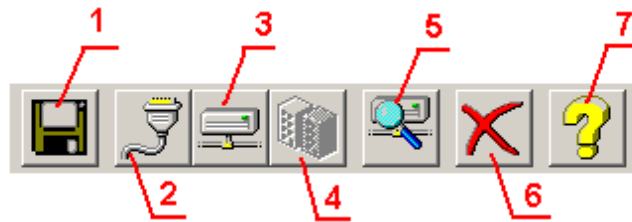


Figure 6.2 – The toolbar

The toolbar contains the following items:

1. Save configuration
2. Add/modify channel
3. Add/modify device
4. Add/modify unit
5. Search for devices and units
6. Delete configuration item
7. Show help.

## 6.4 Configuring the OPC server

Before connecting to the OPC server using an OPC client, you should configure the OPC server. In order to do it you must start it in configuration mode (please refer to section 6.2.1 of this text). While configuring the server you should specify the communication channels along with devices and units connected to them.

### 6.4.1 Creating a communication channel

In order to create a communication channel you must select the menu item “**Channel\Add/Modify**” or click the button “**Add/modify channel**” from the toolbar. You will see the dialog box, presented in Figure 6.3.

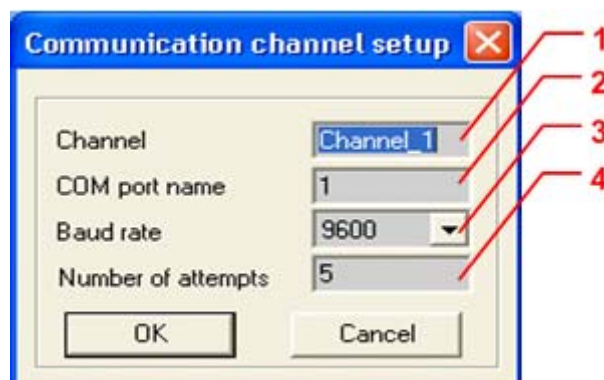


Figure 6.3 – Communication channel setup dialog box

The dialog box has the following fields:

1. Channel name
2. Number of COM port

3. Baud rate
4. Number of attempts. This parameter indicates the number of unsuccessful polling attempts after which the device is considered to be unavailable. If you happen to experience frequent communication faults, please try to augment this value.

When you click the button “**OK**”, the specified channel will be added to the configuration. If you click “**Cancel**” the channel will not be added.

### 6.4.2 Adding a device to the configuration

In order to add a device, you must specify the channel to which the device is connected by selecting an appropriate element from the configuration tree view and either select the menu item “**Device\Add/Modify**” or click the button “**Add/modify device**” on the toolbar. You will be shown the dialog box presented in Figure 6.4.

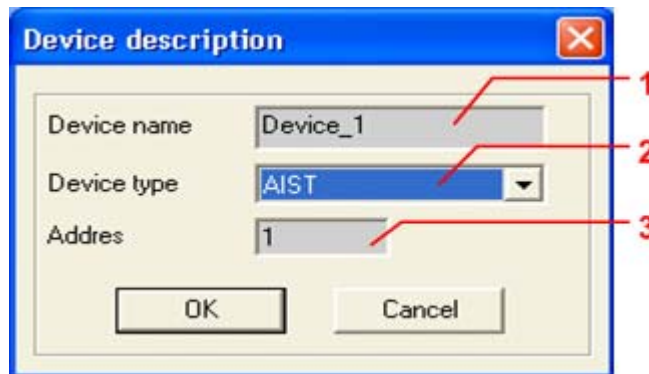


Figure 6.4 – Device properties dialog box

The dialog box contains the following fields:

1. Device name
2. A drop-down list of supported devices (**AIST** and **IMLDC**)
3. Device address (1 to 16).

**Note 1.** Because devices of both types cannot be used simultaneously on the same channel, selection of device type is available only when the first device is added to a certain communication channel.

**Note 2.** Only one **IMLDC** device can be connected to a certain channel.

When you click “**OK**” the device will be added to the OPC server configuration. If you click the button “**Cancel**”, the device will not be added.



### 6.4.3 Adding a unit to the configuration (for **AIST** devices)

To add a unit you should specify an **AIST** device to which the unit is attached, by selecting the appropriate tree view item. After doing this you should select the menu item “**Unit\Add/Modify**” or click the button “**Add/modify unit**” on the toolbar. You will be shown the dialog box, presented in Figure 6.5.



Figure 6.5 – Unit properties dialog box

The dialog box contains the following fields:

1. Device name
2. Drop-down list of supported units for **AIST** device
3. Fields for unit address.

Depending on the device type, some of the fields for unit address can be disabled. All fields accept values from 1 to 4.

When you click “**OK**” the unit will be added to the configuration of the OPC server. If you click “**Cancel**” the unit will not be added.

### 6.4.4 Searching for devices and units

To search for connected devices and units you should select the required communication channel in the configuration tree view, select the “**Device/Search**” menu item or click the button “**Search**” on the toolbar. You will be shown the window presented in figure 6.5.

When you click the button “**Start search**”, the OPC server will try to detect **AIST** devices and units or a single **IMLDC** device. The type of device being searched is determined by the switch 1. Devices are searched for at baud rate which is specified for the selected channel. The resulting list will be updated as new devices and units are found. If no devices or units were found, the program will display a message informing about it.

If the search was successful, you should select the devices which are to be added to the configuration and click the button “**Add**” (refer to figure 6.6). If you click the button “**Cancel**” no devices or units will be added to the configuration.

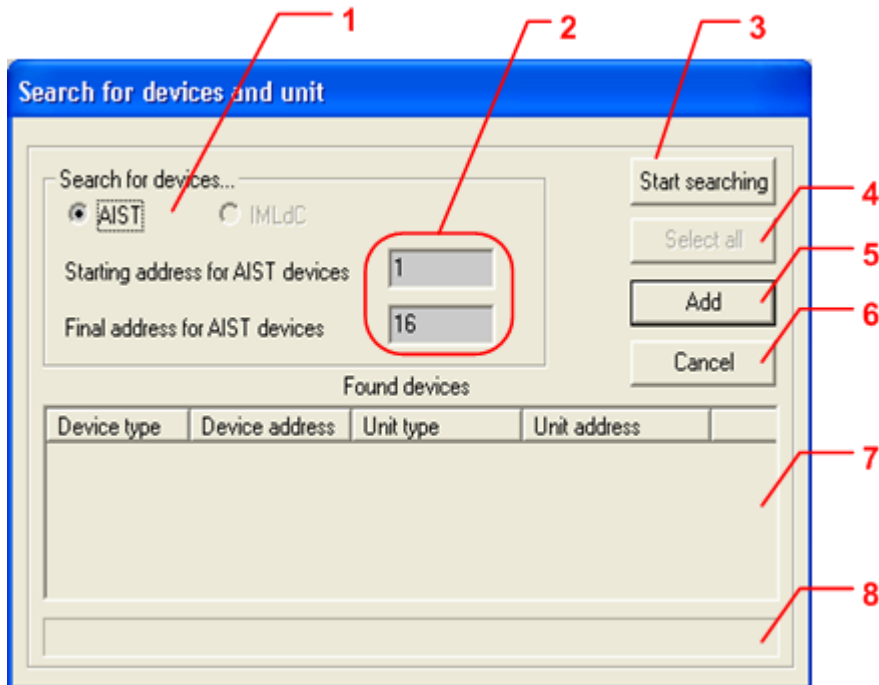


Figure 6.6 – Search for devices and units dialog box

The dialog box contains the following fields:

1. Device type switch (**AIST** or **IMLDC**)
2. Fields for specifying the address range for **AIST** devices
3. Start/stop search button
4. Button for selecting all found devices in the list
5. Button for adding found devices to the configuration of the OPC server
6. Button for cancelling the search and closing the dialog box
7. List of found devices
8. Search progress indicator

### 6.4.5 Deleting a configuration element

To delete a channel/device/unit from the configuration you should select it in the tree view and select the menu item “**Channel/Delete**” / “**Device/Delete**” / “**Unit/Delete**” accordingly or click the button “**Delete**” on the toolbar.

#### 6.4.6 Changing settings for a configuration element

To change parameters for a certain tree view item you should double-click it. Depending on the type of the item, you will be shown either the communication channel properties dialog box (Figure 6.3) or the device properties dialog box (Figure 6.4) or the unit properties dialog box (Figure 6.5).

#### 6.4.7 Viewing parameter values of a configuration element

To view parameter values for channels, devices and units you should select the corresponding item in the tree view. The information about the item will automatically be displayed in the view area.

#### 6.4.8 Saving configuration

In order to save configuration you should either select the menu item "**File/Save**" or click the button "**Save**" on the toolbar.

#### 6.4.9 Closing the configuration window

The configuration window can be closed either by selecting the appropriate item from the system menu or by selecting the menu item "**File/Exit**".

### **6.5 OPC server's functioning description**

#### 6.5.1 The main working algorithm of the OPC server

When an OPC client addresses the OPC server for the first time via COM infrastructure, the server is started automatically. Each subsequent OPC client connects to the already started process. Therefore, an OPC server can handle requests from multiple clients. When all OPC clients have disconnected, the server is automatically unloaded in 5 seconds.

The OPC server starts polling a unit only after an OPC client has requested at least one tag from that device. While doing this the server creates a special thread for polling devices connected to the given port.

If a predefined number of attempts to poll the device resulted in failure, the device is supposed to be either missing or disconnected. If the device answers some of the later polls from the OPC server, then the connection with this device is supposed to be restored.

The value of the field "**Number of attempts**" determines the time it takes the server to react to connection breakdown with a certain device.

The full list of device parameters, provided by the OPC server, is given in "**Appendix A**".

In addition the OPC server provides for each tag a number of standard attributes, described below. Detailed description of these attributes is given in the OPC Data Access specification, version 2.05a.

Tag's attributes:

- Current value
- Access rights
- Measurement units
- Description
- Value type
- Value authenticity
- Timestamp.

**APPENDIX A. DEVICE PARAMETERS, PROVIDED BY THE OPC SERVER**

Device's tags are presented as follows:

**<Communication channel>.<Device>.<Unit>.<Parameter>** (for AIST devices)

**<Communication channel>.<Device>.<Parameter group>.<Parameter>** (for IMLDC devices),

where :

- <Communication channel>** – COM port to which the device is connected. This value corresponds to the value of the field “**Channel name**”, specified while configuring
- <Device>** – the device to which the unit is connected. This value corresponds to the value of the field “**Unit name**”, specified while configuring
- <Unit>** – the unit with which the data exchange is performed (for AIST devices). The value corresponds to the value of the field “Unit name”, specified when configuring
- <Parameter group>** – parameter group (for IMLDC devices)
- <Parameter>** – device's parameter.

Possible value of the fields **<Parameter group>** and **<Parameter>** are listed in tables A.1.1 and A.1.2.

**A.1 List of device parameters provided by the OPC server**

A.1.1. List of parameters for AIST devices.

Table A.1.1

List of parameters for AIST devices				
No	Unit name	Parameter name	OPC server's tag name	Remarks
1.	DCMF (Device receiving the Control and Management of Fire)	Fault	ER	
2.		Powered by a backup source	REZP	
3.		general “Fault” signal for all AFAS and AFES	ER_GL	
4.		general “Attention” signal for all AFES	VNIM_PT	
5.		general “Fire” signal for all AFES	POG_PT	
6.		general “Start” signal for all AFES	PUSK_PT	
7.		general “Fire” signal for all AFAS	POG_PS	

Continuation of table A.1.1

<b>List of parameters for AIST devices</b>				
<b>№</b>	<b>Unit name</b>	<b>Parameter name</b>	<b>OPC server's tag name</b>	<b>Remarks</b>
8.	<b>FAD</b> (Fire Alarm Device)	Alarm loop 1 fault	ER_SL1	
9.		"Fire" alarm from the loop 1	POG_SL1	
10.		Alarm loop 2 fault	ER_SL2	
11.		"Fire" alarm from the loop 2	POG_SL2	
12.		Alarm loop 3 fault	ER_SL3	
13.		"Fire" alarm from the loop 3	POG_SL3	
14.		Alarm loop 4 fault	ER_SL4	
15.		"Fire" alarm from the loop 4	POG_SL4	
16.	<b>FFD</b> (Fire Fighting Device)	Fault	ER	
17.		Powered by a backup source	REZP	
18.		"Leakage of the extinguishing agent" alarm	UT_OTV	
19.		The door to the protected premises is opened	DV_O	
20.		Mode	MODE	0 – automatics ON 1 – automatics OFF
21.		"Attention" alarm	VNIM	
22.		"Fire" alarm	POG	
23.		"extinguishing agent filed" alarm	OTV_POD	
24.	<b>RCD</b> (Remote Control Device )	Fault	ER	
25.		"DD closed" alarm	RU_CLSD	
26.		"DD opened" alarm	RU_OPND	
27.	<b>SD</b> (Station Device)	Fault	ER	
28.		Powered by a backup source	REZP	
29.		"Leakage of the extinguishing agent" alarm	UT_OTV	
30.		Reduction of pressure in the motive cylinder (motive flow)	DPBLOW	
31.	<b>RCDPE</b> (Remote Control Device of Processing Equipment)	Fault	ER	
32.		"PE off" signal	PE_OFF	
33.		"PE on" signal	PE_ON	

A.1.2. List of parameters for device **IMLDC**

Table A.1.2

List of parameters for the control cabinet of IMLDC				
No	Parameter type	Parameter name	OPC server's tag name	Remarks
1.	<b>BVS Data</b>	TCD is faulty	BVS_PTR_BAD	
2.		Tubular heater is faulty	BVS_TEN_BAD	
3.		Refrigeration unit is faulty	BVS_XA_BAD	
4.		P<1.95 MPa	BVS_P_LOW	
5.		P>2.15 MPa	BVS_P_HIGH	
6.		Weight control unit is faulty	BVS_PVK_BAD	
7.		The motive cylinder is faulty	BVS_PB_BAD	
8.		The shut-off and starting device is faulty	BVS_ZPU_BAD	
9.		The shut shut-off and starting device is stopped	BVS_ZPU_CLOSE	
10.		The starting device is started	BVS_ZPU_OPEN	
11.		Leakage	BVS_LEEK	
12.		The accumulator battery is faulty	BVS_AKB_BAD	
13.		The network is faulty	BVS_NET_BAD	
14.		Interface type	BVS_INTERF	
15.	<b>CP/PU</b> (Central panel/ Power Unit) <b>Errors</b>	Error 0	E0	
16.		Error 1	E1	
17.		Error 2	E2	
18.		Error 3	E3	
19.		Error 4	E4	
20.		Error 6	E6	
21.		Error 7	E7	
22.		Error 8	E8	
23.		Error 9	E9	
24.		Error 10	E10	
25.		Error 11	E11	
26.	<b>WCD</b> (Weight Checking Device) <b>Errors</b>	Error 16	E16	
27.		Error 17	E17	
28.		Error 18	E18	
29.		Error 19	E19	
30.		Error 20	E20	
31.		Error 21	E21	
32.		Error 22	E22	
33.		Error 23	E23	
34.	Error 24	E24		

## USER'S MANUAL

Continuation of table A.1.2

List of parameters for the control cabinet of IMLDC				
No	Parameter type	Parameter name	OPC server's tag name	Remarks
35.	<b>TCD</b> (Temperature Control Device) <b>Errors</b>	Error 25	E25	
36.		Error 26	E26	
37.		Error 30	E30	
38.		Error 31	E31	
39.		Error 33	E33	
40.		Error 34	E34	
41.		Error 35	E35	
42.		Error 36	E36	
43.		Error 37	E37	
44.		Error 38	E38	
45.		Error 39	E39	
46.		Error 40	E40	
47.		Error 41	E41	
48.		Error 42	E42	
49.		Error 43	E43	
50.		Error 44	E44	
51.		Error 45	E45	
52.	<b>TCD</b> (Temperature Control Device) <b>Pressure and Flags</b>	Gas gryogen pressure	PTR_P_GOS	Maximum value 5.11 MPa
53.		Error 46	E46	
54.		Error 47	E47	
55.		Error 48	E48	
56.		Error 49	E49	
57.		P<1.95 MPa	PTR_P_LOW	Emergency pressure fall
58.		P>2.15 MPa	PTR_P_HIGH	Emergency pressure rise
59.		Mode	PTR_REJIM	TRD work mode: 0 – automatic; 1 – manual
60.	<b>WCD</b> (Weight Checking Device) <b>Mass and Flags</b>	Gas gryogen mass	PVK_M_GOS	Maximum value 40.95 tons
61.		Start	PVK_PUSK	Gas cryogen emission mode (1 – active status)
62.		The stop-starting device is stopped	PVK_ZPU_CLOSE	SSD status (1 – active)
63.		The stop-starting device is started	PVK_ZPU_OPEN	SSD status (1 – active)
64.		Mode	PVK_REJIM	Weight control unit mode: 0 – automatic; 1 – manual
65.	<b>AB</b> (Accumulator Battery) <b>Voltage and GC</b> (Gas cryogen) <b>Leakage</b>	Gas cryogen leakage	LEEK_GOS	Maximum value 2.55 tons
66.		Battery voltage	U_AKB	Maximum value 25.5 V



Continuation of table A.1.2

List of parameters for the control cabinet of IMLDC				
No	Parameter type	Parameter name	OPC server's tag name	Remarks
67.	<b>The number of AB (Accumulator Battery)cycles and PU(Power Unit) Flags</b>	The number of battery cycles	AM_PWR	Maximum value 8191
68.		The number of the battery connected to the resistor	NUMBER	0 – battery 1; 1 – battery 2
69.	<b>TCD (Temperature Control Device) Flags</b>	E20 is faulty	E20_BAD	
70.		E20 is on	E20_ON	
71.		E10 is on	E10_BAD	
72.		E10 is faulty	E10_ON	
73.		A1 is on	A1_ON	Status of refrigeration units
74.		A1 is faulty	A1_BAD	
75.		A2 is on	A2_ON	
76.		A2 is faulty	A2_BAD	