

Application manual IRC5 OPC Server help

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Application manual
IRC5 OPC Server help

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Overview

About this manual

This manual contains instructions for daily operation of ABB IRC5 OPC Server.

Usage

This manual should be used during operation, installation and configuration of ABB IRC5 OPC Server.

Who should read this manual?

This manual is intended for:

- Users of the product ABB IRC5 OPC Server.

Prerequisites

The reader should.

- use the manual as an online help and
- have OPC Server installed.

References

Reference	Document ID
<i>Technical reference manual - System parameters</i>	<i>3HAC050948-001</i>
<i>Technical reference manual - RAPID kernel</i>	<i>3HAC050946-001</i>

Revisions

Version	Description
7	Information on how to get and install a license key was added. Information on multi dimensional arrays was added.
8	Minor corrections. Licensing informations removed.
9	Added the new section, Adding remote controller.

Product documentation, IRC5

Categories for user documentation from ABB Robotics

The user documentation from ABB Robotics is divided into a number of categories. This listing is based on the type of information in the documents, regardless of whether the products are standard or optional.

All documents listed can be ordered from ABB on a DVD. The documents listed are valid for IRC5 robot systems.

Product manuals

Manipulators, controllers, DressPack/SpotPack, and most other hardware is delivered with a **Product manual** that generally contains:

- Safety information.
- Installation and commissioning (descriptions of mechanical installation or electrical connections).
- Maintenance (descriptions of all required preventive maintenance procedures including intervals and expected life time of parts).
- Repair (descriptions of all recommended repair procedures including spare parts).
- Calibration.
- Decommissioning.
- Reference information (safety standards, unit conversions, screw joints, lists of tools).
- Spare parts list with exploded views (or references to separate spare parts lists).
- Circuit diagrams (or references to circuit diagrams).

Technical reference manuals

The technical reference manuals describe reference information for robotics products.

- *Technical reference manual - Lubrication in gearboxes*: Description of types and volumes of lubrication for the manipulator gearboxes.
- *Technical reference manual - RAPID overview*: An overview of the RAPID programming language.
- *Technical reference manual - RAPID Instructions, Functions and Data types*: Description and syntax for all RAPID instructions, functions, and data types.
- *Technical reference manual - RAPID kernel*: A formal description of the RAPID programming language.
- *Technical reference manual - System parameters*: Description of system parameters and configuration workflows.

Continues on next page

Application manuals

Specific applications (for example software or hardware options) are described in **Application manuals**. An application manual can describe one or several applications.

An application manual generally contains information about:

- The purpose of the application (what it does and when it is useful).
- What is included (for example cables, I/O boards, RAPID instructions, system parameters, DVD with PC software).
- How to install included or required hardware.
- How to use the application.
- Examples of how to use the application.

Operating manuals

The operating manuals describe hands-on handling of the products. The manuals are aimed at those having first-hand operational contact with the product, that is production cell operators, programmers, and trouble shooters.

The group of manuals includes (among others):

- *Operating manual - Emergency safety information*
- *Operating manual - General safety information*
- *Operating manual - Getting started, IRC5 and RobotStudio*
- *Operating manual - Introduction to RAPID*
- *Operating manual - IRC5 with FlexPendant*
- *Operating manual - RobotStudio*
- *Operating manual - Trouble shooting IRC5, for the controller and manipulator.*

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1 Getting started

Overview

The ABB IRC5 OPC Server displays OPC items for robots with configured aliases. You must use the ABB IRC5 OPC Configuration tool to create aliases for the robots you wish to monitor. If you do not create any aliases before you launch the browser, you will not see any items in the Data Access namespace:

- First, the robot must be connected to the same computer network as the PC running the OPC Server.
- Second, the ABB IRC5 OPC Server only displays data for ABB IRC5 robots with configured aliases (a descriptor that identifies a particular robot; see [Aliases on page 24](#)). Configuration entries are stored in the id(63786)The OPC Alias Configuration file_en.xml.
- Third, the system running on the controller that the alias refers to must have the PC Interface RobotWare option installed. Otherwise, the alias will still be created, but no communication with the controller will be possible.
- In order to access the IRC5 OPC server remotely, you must allow the installation setup to configure your DCOM settings, see section [Security settings on page 58](#).

Follow the steps below to set up and view data from an ABB IRC5 robot controller.

Create alias

Step	Action
1	Create aliases for those robots you want to connect to the OPC Server. For more details, see How to add new IRC5 robot aliases on page 29
2	If you are using an OPC Data Access client, point it to the OPC server named ABB IRC5 OPC Server DA . This is the ABB IRC5 OPC Server's registered Program ID for Data Access in the Windows Registry. If you are using an OPC Alarm & Event client, point it to the OPC server named ABB IRC5 OPC Server AE . This is the ABB IRC5 OPC Server's registered Program ID for Alarms & Events.
3	If you are using an OPC Data Access client capable of browsing an OPC DA Server namespace, a list of tags exposed by the IRC5 OPC Data Access Server for each defined robot alias will appear. Similarly, if you are using an OPC Alarms & Events client capable of browsing an OPC Alarms & Events Server, you should be able to browse each robot's event space.

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2 ABB IRC5 OPC Server Configuration Application

2.1 Welcome

Overview

The ABB IRC5 OPC Server Configuration application is used to create and manage Aliases for ABB IRC5 robot controllers. An Alias is a user-friendly descriptor that represents a communications interface to an ABB IRC5 robot controller. You need to create Aliases for each robot controller that will be accessed by the ABB IRC5 OPC Server.

What do you want to do?

I want to:

- learn about the ABB IRC5 OPC Server Configuration Application User Interface, see [Main screen components on page 14](#).
- learn about Aliases, see [Aliases on page 24](#)
- create some robot Aliases, see [How to add new IRC5 robot aliases on page 29](#).

2 ABB IRC5 OPC Server Configuration Application

2.2.1 Main screen components

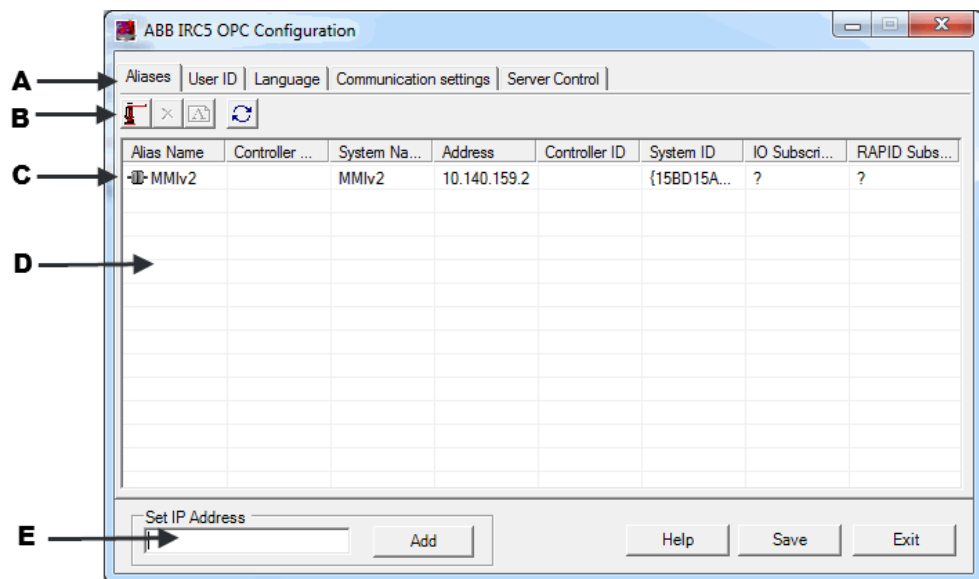
2.2 About the ABB IRC5 OPC Server Configuration Application

2.2.1 Main screen components

Server configuration

The ABB IRC5 OPC Server Configuration application main screen shows a list of [Aliases on page 24](#) that you have created. The main screen displays important information about created Aliases, such as assigned name, Controller Name, System Name, Address, etc.

ABB IRC5 OPC Server Configuration application Main Screen



en0400001177




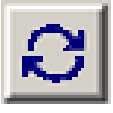
A	Function tab
B	Toolbar buttons
C	Device status icons
D	Device pane
E	Add remote controller

Function tabs

Component	Function
Alias Tab	The ABB IRC5 OPC Server Configuration application " main screen ".
User ID Tab	Enter the user name and password for OPC Server access to the robot. For more information, see OPC Server username/password on page 22 .
Language	Selection of language used in OPC Server see Language on page 23 .

Continues on next page

Toolbar buttons

Button	Function
Add Alias 	Opens the Add IRC5 Robot Alias dialog see Add New Alias dialog screen components on page 17 .
Delete Alias 	Deletes the highlighted alias from the device pane.
Edit Alias 	Opens the Edit IRC5 Robot Alias dialog see Edit Alias dialog components on page 19 .
Refresh Main Screen 	Click to update the status of the robot aliases in the device pane.

Device pane

The device pane displays a list of robot aliases and their associated attributes.

Component	Function
Alias Name	A user-friendly descriptor of a communication interface to an IRC5.
Controller Name	The name of the IRC5 controller.
System Name	The RobotWare system name running on the IRC5 controller.
Address	The IP-address of the IRC5 controller.
Controller ID	The ID of the IRC5 controller.
System ID	The ID of the RobotWare system running on the IRC5 controller.
IO Subscriptions	The number of I/O signal "change-evnets" subscribed to the IRC5 controller (currently subscribed / maximum number of subscriptions allowed). Note: This value is only updated when a Refresh button is pressed.
RAPID Subscriptions	The number of RAPID variable "change-events" subscribed to the IRC5 controller (currently subscribed / maximum number of subscriptions allowed). Note: This value is only updated when a Refresh button is pressed.




Continues on next page

2 ABB IRC5 OPC Server Configuration Application

2.2.1 Main screen components

Continued

Device status icons

Icon	Description
Connected Alias 	The indicated alias is attached to and communicating over the network.
Disconnected Alias 	The indicated alias is disconnected from the network.
Unaccessable Alias 	The indicated alias is connected to the network, but the PC Interface RobotWare option is missing.

2.2.2 Add New Alias dialog screen components

Add New Alias dialog components

Add New Alias dialog

en0400001186

Component	Description
Alias Name field	This field allows you to enter the Alias name.
Create button	Click to create a new Alias. This button becomes active after selecting any connection criterion.
Connection Criteria check boxes	<ul style="list-style-type: none"> Controller Name - This is the name assigned to the robot controller. System Name - This is the name assigned to the currently active BaseWare system in the robot controller. Address - This is the robot controller's IP address. If the controller is a Virtual Controller (VC), this is the path to the VC system directory. Controller ID- -This is the robot controller's unique hardware ID. System ID - This is the ID assigned to the currently active BaseWare system in the robot controller.
Scan button	Displays the Scan Results list box.

Continues on next page

2 ABB IRC5 OPC Server Configuration Application

2.2.2 Add New Alias dialog screen components

Continued

Scan Feature screen components

The Add New Alias dialog changes as shown below after you click **Scan**.

Scan Feature screen components




Controller Name	System Name	Address	Controller ID	System ID
rel5_xx	rel5_xx	192.168.8.59	3HAC14431-1	{19048F68-0D4A-...
FTP_5.05_61	FTP_5.05_61	192.168.8.142		{79DA4AC4-0248-...
sys_ida	sys_ida	192.168.8.247		{984DE954-6FD4-...
ibs_pbus	ibs_pbus	192.168.8.4	14M-50042	{511154A6-BB64-...
DEMO_CELL	DEMO_CELL	192.168.8.251	DemoCell	{B7393FFC-8CBC-...
System59_beta	System59_beta	192.168.8.117	123456	{F0614C0F-C0CB-...

en0400001187

Component	Description
Scan Results list box	Shows a list of all of the IRC5 robots detected on the network.
Show ...Alias check box	Click to show only those robots that do not have an Alias assigned.
Show ...criteria check box	Click to show only those robots whose criteria match the criteria selected in the Connection Criteria fields.
Alert Message	Appears any time one or more robots match the connection criteria selected.

Add New Alias dialog icons

The following icons can be displayed in the Controller Name list in the Scan Feature dialog.

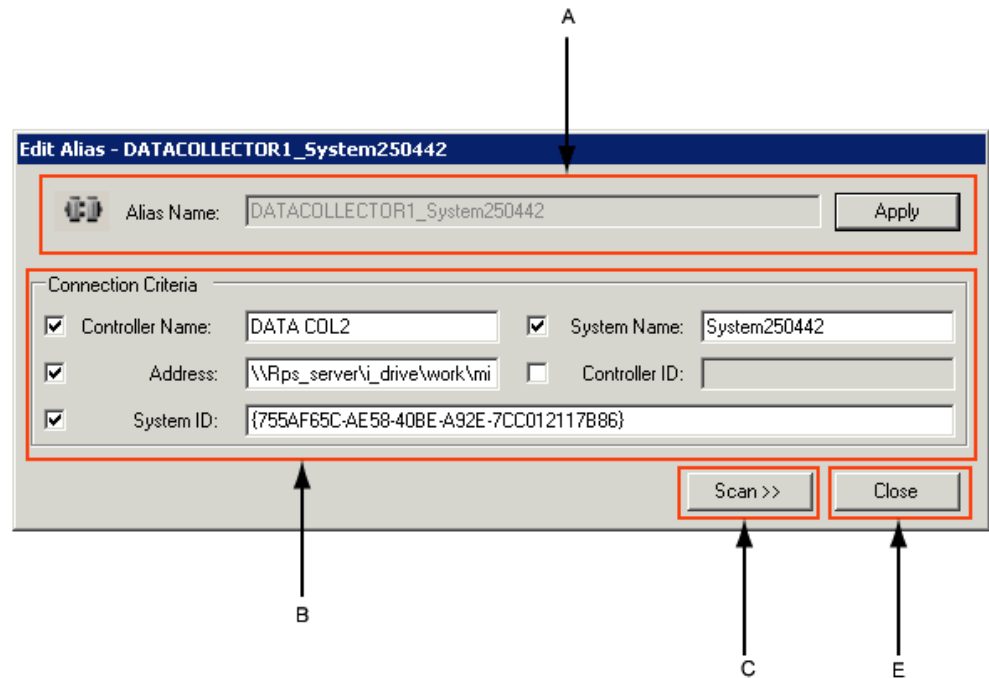
Icon	Description
	Unaccessible Alias. The alias is connected to the network, but the PC Interface RobotWare option is missing.
	Field locked. When one of the fields is modified manually, a small lock will appear next to it. This indicates that from now on, the configuration tool will not modify these fields automatically, but let the user enter the values manually.
	Accessible Alias. The alias is connected to the network, and the PC Interface RobotWare option is present.

2.2.3 Edit Alias dialog components

Overview

This section describes how to edit an alias dialog.

Illustration



en0400001189

A	Alias Name field
B	Connection Criteria
C	Scan button
D	Close button

Edit Alias dialog

Component	Function
Alias Name field	This field is disabled by default.
Connection Criteria check boxes	Criteria: <ul style="list-style-type: none"> Controller Name - This is the name assigned to the robot controller. System Name - This is the name assigned to the currently active RobotWare system in the robot controller. Address - This is the robot controller's IP address. If the controller is a Virtual Controller (VC), this is the path to the VC system directory. Controller ID- -This is the robot controller's unique hardware ID. System ID - This is the ID assigned to the currently active RobotWare system in the robot controller.
Scan button	Displays the Scan Results list box.

Continues on next page

2 ABB IRC5 OPC Server Configuration Application

2.2.3 Edit Alias dialog components

Continued

Component	Function
Close button	Close the Display.

Scan Feature Screen Components

Alias Name:

Connection Criteria

☐ Controller Name:

☒ Address:

☐ System Name:

☐ Controller ID:

☐ System ID:

Scan results: 49 found. 49 of 49 displayed.

Controller Name	System Name	Address	Controller ID	System ID
rel5_xx	rel5_xx	192.168.8.59	3HAC14431-1	{19048F68-0D4A-...
FTP_5.05_61	FTP_5.05_61	192.168.8.142		{79DA4AC4-0248-...
sys_ida	sys_ida	192.168.8.247		{984DE954-6FD4-...
ibs_pbus	ibs_pbus	192.168.8.4	14M-50042	{511154A6-BB64-...
DEMO_CELL	DEMO_CELL	192.168.8.251	DemoCell	{B7393FFC-8CBC-...
System59_beta	System59_beta	192.168.8.117	123456	{F0614C0F-C0CB-...

☐ Show only robots with no assigned Alias

☐ Show only robots that match connection criteria

en0400001190

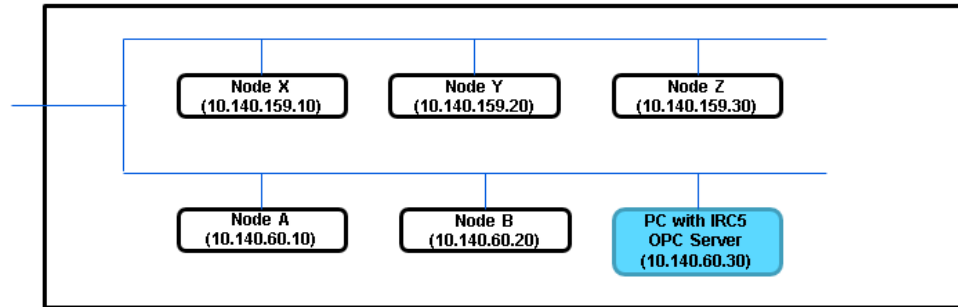
Component	Function
Scan Results list box	Shows a list of all of the IRC5 robots detected on the network.
Show ...Alias check box	Click to show only those robots that do not have an Alias assigned.
Show ...criteria check box	Click to show only those robots whose criteria match the criteria selected in the Connection Criteria fields.

2.2.4 Add remote controller

Adding remote controller

You can add a remote controller from multiple subnets.

The following image is a representation of remote controllers in different subnets:

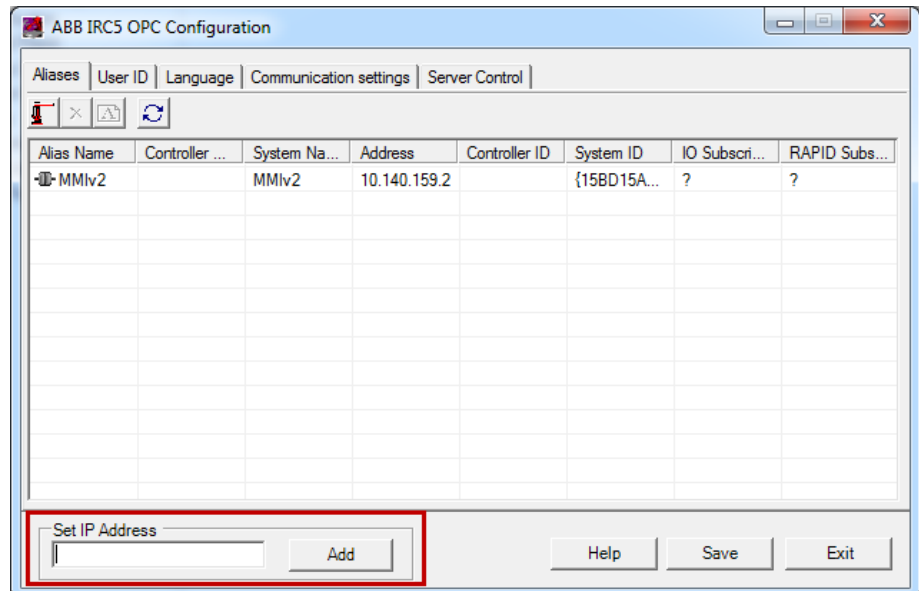


xx1500000086

Node	Description
A,B	Controllers in same subnet.
X,Y,Z	Controllers in another subnet.

To add a remote controller:

- 1 Type the IP address of the remote controller in the **Set IP Address** text box.



xx1500000100

- 2 Click **Add**.

The controller is added to the IRC5 OPC Server.

2 ABB IRC5 OPC Server Configuration Application

2.2.5 OPC Server username/password

2.2.5 OPC Server username/password

Enter the username

Enter the username and password that the ABB IRC5 OPC Server uses to obtain privileges to read and write data to the robot controllers.

Note: that the ABB IRC5 OPC Server uses the same username and password combination for each and every robot controller that is accessed.

Username settings

The screenshot shows the 'ABB IRC5 OPC Configuration' dialog box with the 'User ID' tab selected. The dialog has three tabs: 'Aliases', 'User ID', and 'Language'. The 'User ID' tab contains a text area with the instruction: 'Enter the Username and Password that the OPC Server uses to obtain privileges to read and write data to the robot controllers.' To the right of this text area are two input fields: 'Username:' with the value 'Default User' and 'Password:' with the value 'robotics'. At the bottom right of the dialog are three buttons: 'Help', 'Save', and 'Exit'.

en0400001201

User settings

To set the user settings:

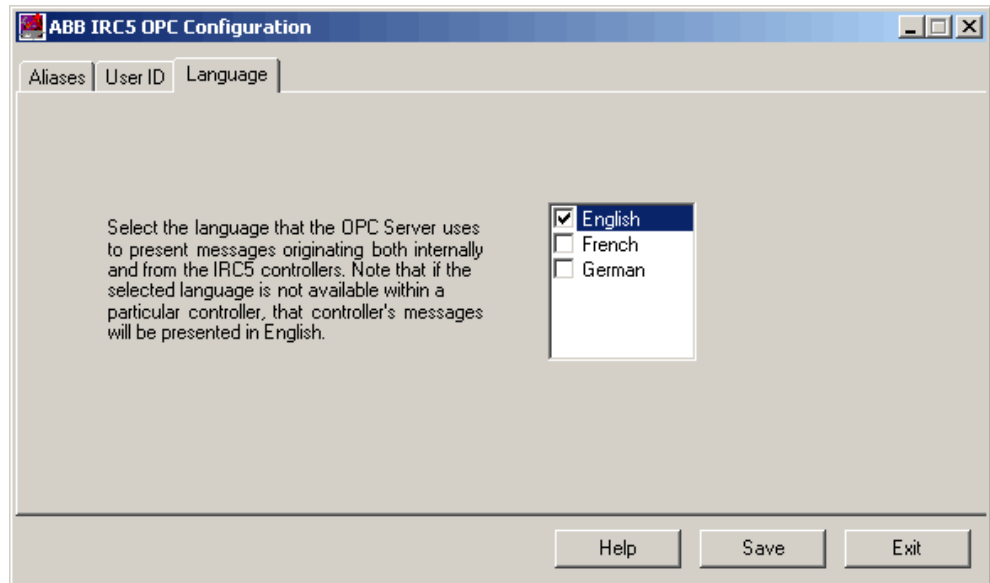
Step	Action	Info
1	Enter a Username	
2	Enter a Password	
3	Click Save to save the information entered	

2.2.6 Language

Overview

The selection of language provides the user with messages in the selected language.

Language selection view



en0400001202

Selection

Step	Action	Information
1	Select language in the selection box	
2	Save the selection	Save button

2.2.7 Aliases

Overview

To define an Alias, you need to associate it with one or more of the parameters. Alias and parameters and how to use them are described in this section.

Aliases

An Alias is a user-friendly descriptor that represents a communications interface to a single device such as an ABB robot controller. You need to create Aliases for each robot controller that will be accessed by an application such as the ABB IRC5 OPC Server.

Applications such as the IRC5 OPC Server use Aliases to address particular robot controllers on a network, so that the application can send commands and data to the controllers and receive data from the controllers.

Parameters

When an IRC5 robot controller is connected to a network, it identifies itself by broadcasting certain information onto the network. This information includes parameters containing:

- Controller Name
- Controller ID
- System Name
- System ID
- IP address

Duplicated controller names

If the Alias reference to the robot controller cannot be resolved, the application will not be able to communicate with the robot. You must carefully consider the type of association you wish to define for an Alias, as various associations behave differently.

Example

IRC5 OPC Server uses an Alias to reference a specific robot controller. Alias can only use one Controller Name to uniquely identify a robot controller, to ensure that every robot controller on your network has a unique combination of parameter settings. Duplicated Controller Names and parameters will cause ambiguousness, and the IRC5 OPC Server can no longer distinguish between the duplicated names.



Note

Duplicated controller names causes problem to the network, as the Alias resolves to the controller which is online at the moment. If one controller is disconnected and a second one brought online using the same parameter settings, the Alias will resolve to the new controller. However, only the OPC items already existing in the namespace will be updated with the new values. The new variables will not be added to the namespace unless the OPC Server is restarted.

Continues on next page

Address

If...	Then...
you associate an Alias with only one IP address	you should make sure that the IP address is statically assigned to the robot controller.
you use DHCP	your DHCP server must be carefully configured in order to guarantee repeatable assignments of the IP address.
the IP addresses are re-assigned	the Alias might resolve to a different controller.

System name

If...	Then...
you associate an Alias with only one System Name	<p>you must ensure that the System Name is unique for each robot controller.</p> <p>This can be inconvenient if you have several robots that could otherwise be loaded with the same RobotWare system (and thus be given the same System Name). The same resolution difficulties exist as in the case of duplicate Controller Names.</p>

Controller ID

If...	Then...
you associate an Alias only with one Controller ID	<p>you can be sure that the Controller ID is unique.</p> <p>A Controller ID is permanently assigned to a specific robot controller.</p>
you replace the robot controller hardware	the Controller ID will change, and you must then redefine the Alias to associate it with the new controller.

System ID

If...	Then...
you associate an Alias with only one System ID, and you are certain that the System ID is unique	<p>you must remember that the System ID will change the next time you load a RobotWare system to the robot controller.</p> <p>If you need to make any modifications to the RobotWare system configuration that would result in a subsequent reload, the System ID will change and you must redefine the Alias.</p>

Recommended associations

ABB recommends that you define Aliases in such a way as to ensure stability of the association of the Alias to a particular robot.

If you use static IP addressing or your DHCP server is configured in such a way that its IP address assignment is repeatable, you should associate Alias definitions with both Controller Name and IP address. Using this approach, you can download new RobotWare systems, or replace an entire controller without the need to redefine the Alias.

If you cannot guarantee stable IP addresses, then you should define Aliases using both the Controller Name and Controller ID Connection Criteria. With this approach, you can change the IP address, or you can download new BaseWare systems without the need to redefine the Alias. However, if you replace controller hardware, the Controller ID will change and you must redefine the Alias.

Continues on next page

2 ABB IRC5 OPC Server Configuration Application

2.2.7 Aliases

Continued

Either approach reliably ensures that an Alias will always resolve to a unique, well-known robot controller.

2.2.8 The OPC Alias Configuration file

Overview

As discussed in the [Getting started on page 11](#), each IRC5 robot you wish to communicate to the ABB IRC5 OPC Server must contain an Alias definition in the OPC Alias Configuration file.

During installation of the ABB IRC5 OPC Server, the installation program places a file called *OPCConfig.xml* in a subdirectory of the Common Application Data directory. Typically, the Common Application Data directory is “C:\Documents and Settings\All Users\Application Data”.

The *OPCConfig.xml* file is in a subdirectory of this location, typically “C:\Documents and Settings\All Users\Application Data\ABB Industrial IT\Robotics IT\IRC5 OPC”.

OPCConfig.xml

```
<ABB_IRC5_OPC_Configuration version="1">
  <UAS Username="Default User" Password="robotics" />
  <OPCServerLanguage Language="en" />
  <AliasList>
    <Alias Name="GRUMPY" PCI="Connected">
      <Address IP="192.168.8.105" CTRLID="" SID="" NAME=""
        SYSNAME="RW5_05_032" />
    </Alias>
    <Alias Name="Duck" PCI="Connected">
      <Address IP="" CTRLID="" SID="" NAME="" SYSNAME="ROL_505_31"
        />
    </Alias>
    <Alias Name="Elvis" PCI="NoPCI">
      <Address IP="192.168.8.111" CTRLID="" SID="" NAME=""
        SYSNAME="eio__test" />
    </Alias>
  </AliasList>
</ABB_IRC5_OPC_Configuration>
```

UAS tag stands for User Authorization System. It stores the username and the password used to log on to the robot controller.

Alias definition

Each alias definition within this file consists of the following three lines of XML syntax:

```
<Alias Name="Elvis" PCI="NoPCI">
  <Address IP="192.168.8.111" CTRLID="" SID="" NAME=""
    SYSNAME="eio__test" />
</Alias>
```

PCI value

Each alias definition has a PCI value, which specifies one of the following:

- **Connected** - the specified robot controller is connected and has the PC Interface RobotWare option installed.

Continues on next page

2 ABB IRC5 OPC Server Configuration Application

2.2.8 The OPC Alias Configuration file

Continued

- Disconnected - either the alias cannot be resolved to a single robot controller on the network, or there is no such robot controller connected to the network.
- NoPCI - PC Interface RobotWare option is not installed.

Parameters

Each alias definition consists of five parameters, which are specified as XML element attributes; these parameters correspond to:

- The alias name is the Name attribute of the Alias element; e.g. "ELVIS". This is the name you want the robot to be identified as by the OPC Server.
- The robot's IP Address (the IP attribute of the Address element); e.g. "130.110.69.254"
- The robot's Controller ID (the CTRLID attribute of the Address element); none in this example
- The robot's SystemID (the SID attribute of the Address element); none in this example.
- The robot's Controller Name (the NAME attribute of the Address element); e.g. "GRUMPY"
- The robot's System Name (the SYSNAME attribute of the Address element); none in this example.

Note that not all parameters necessarily need to contain values, according the association rules described in the section [Aliases on page 24](#).

2.3 How to...

2.3.1 How to add new IRC5 robot aliases

Entering information manually


Follow the steps below to add a new IRC5 Robot Alias to the ABB IRC5 OPC Sever Configuration application main screen. In this procedure, you enter an Alias name and the Connection Criteria necessary to reliably identify the controller for which you are creating the Alias.



Tip


See ABB's Recommended Associations in section [Aliases on page 24](#) to reliably identify controllers.

Add new alias

Step	Action	Information
1	Click the Add New Alias button.  en0400001178	The Add New Alias dialog appears.
2	Enter an Alias name in the Alias Name field.	
3	Enter the robot's controller name in the Controller Name field.	
4	Enter the robot's controller IP address in the Address field.	
5	Enter any other information that you have (System ID, Controller ID, etc.) to further identify the controller for which you are creating the Alias.	
6	Click Create . The Alias you created now appears on the Aliases tab.	

Using the Scan Feature

Follow the steps below to use the IRC5 Robot Scan feature to detect IRC5 robots connected to the network.

Step	Action	Information/Illustration
1	Click the Add New Alias button.  en0400001178	The Add New Alias dialog appears.
2	Click Scan .	The Scan Results list box will appear, showing a list of robots detected on the network. You can filter the list as shown here.

Continues on next page

2 ABB IRC5 OPC Server Configuration Application

2.3.1 How to add new IRC5 robot aliases

Continued

Step	Action	Information/Illustration
3	Select the controller that you wish to create an Alias for from the list. The ABB IRC5 OPC Server Configuration application proposes a default name for the Alias in the Alias Name field, based on the Controller Name and System Name.	
4	Select the Connection Criteria that you wish to use to identify the robot. You may select more than one criterion.	Note: see ABB's Recommended Associations to reliably identify controllers in Aliases on page 24 .
5	If necessary, change the Alias Name to one that will have meaning for you when you look at the main screen.	
6	Click Create . The Alias you created now appears on the ABB IRC5 OPC Server Configuration application main screen.	

Related information

- [Aliases on page 24](#).
- [How to filter robot scan results on page 32](#).

2.3.2 How to edit an IRC5 robot alias

Edit an alias

Follow the steps below to change the association parameters for the selected robot Alias.

Step	Action	Information
1	On the main screen, double click an IRC5 Robot Alias or right click an Alias and select Edit Alias from the pop-up menu.	The Edit Alias dialog will appear. Note: that the Alias name field is not editable.
2	Click on one or more Connection Criteria check boxes and enter the required information.	
3	Click Apply .	

Edit Alias dialog

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Related information

- [Aliases on page 24.](#)

2.3.3 How to filter robot scan results

Scan feature

You use the Scan feature to identify robots currently connected to the network.

You can apply filters to the scan results to see:

- robots that do not already have an assigned Alias.
- robots whose Connection Criteria matches the Alias you are currently adding or editing.

Scan dialog

Step	Action	Information
1	From either the Add or Edit Alias dialogs, click Scan .	The lower half of the dialog opens, displaying the Scan Results list box.
2	To see: <ul style="list-style-type: none">• all of the robots detected on the network.• only robots associated with the selected Connection Criteria.• all robots that have no Alias assigned.	Click: <ul style="list-style-type: none">• de-select both "Show..." check boxes.• select Show only robots that match Connection Criteria.• select Show only robots with no assigned Alias.
3	Click Apply or Create when finished (depending upon whether you are editing or adding an Alias).	

Related information

[Aliases on page 24.](#)

3 ABB IRC5 OPC Server

3.1 Data Access

3.1.1 Data Access implementation

Overview

You use the Data Access function of the ABB IRC5 OPC Server to read and write data managed by the ABB IRC5 robot controller. Data items in ABB IRC5 OPC Server are referred to by their tag names.

The ABB IRC5 OPC Server presents various predefined tags that provide information concerning the robot controller's current state. In addition to these predefined tags, the OPC Server presents up to 1000 additional tags that contain the values of the IRC5's I/O signals, as well as up to 200 tags that contain the values of the IRC5's RAPID data values.

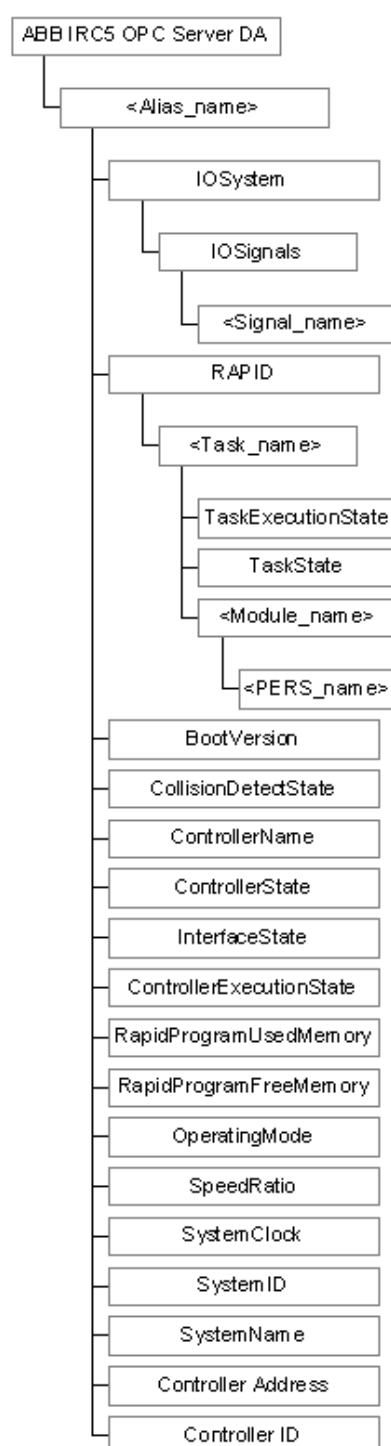
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3 ABB IRC5 OPC Server

3.1.1 Data Access implementation

Continued

IRC5 controller object namespace



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The OPC DA namespace

The tags exposed by the ABB IRC5 OPC Server follow the hierarchical structure of the IRC5 Controller object model. However, not all of the information contained in the object model is exposed. Only those portions of the ABB IRC5 Robot Controller object model that are exposed via the ABB IRC5 OPC Server are shown in the namespace diagram.

Tag name syntax

The tag names exposed by the ABB IRC5 OPC Server have a specific syntax, as follows:

- `<Alias_Name>.IOSYSTEM.IOSIGNALS.<Signal_Name>`

Where the individual field identifiers are described as:

- `<Alias_Name>` - This is the name defined in the Alias Configuration File that identifies a specific IRC5 robot controller.
- `<Signal_Name>` - This identifies the specific item to be accessed.

For RAPID variables, the syntax is:

- `<Alias_Name>.RAPID.<Task_Name>.<Module_Name>.<Pers_Name>`

Where `<Task_Name>` specifies the RAPID task name and `<Module_Name>` specifies the RAPID module in which the variable `<Pers_Name>` is defined.

Event-driven vs. polled tags

In your client application, you may see the time stamp of certain tags change at a rapid rate, even though the value of the tags remains the same. This is because the ABB IRC5 OPC Server polls the value of some tags while other tags notify the server when they change value.

The latter behavior is referred to as event-driven. The ABB IRC5 OPC Server updates the time stamp of event-driven tags only when their value changes. The time stamp of polled tags is updated every time the OPC client application requests an update from the server. Different clients poll at different rates.

The following tags in the Controller domain in the IRC5 Controller object model namespace diagram are event-driven:

- All of the RAPID and IOSYSTEM tags
- OperatingMode
- ControllerState
- SpeedRatio

The following tags are polled from the controller once per second:

- SystemClock
- ControllerExecutionState
- RapidProgramFreeMemory
- RapidProgramUsedMemory
- CollisionDetectState

Other items are updated only at the controller restart.

3 ABB IRC5 OPC Server

3.1.2.1 BootVersion

3.1.2 Item Reference

3.1.2.1 BootVersion

Overview

This is a read-only string that contains the value of the robot controller's RobotWare operating system version.

Item syntax

<Alias_Name>.**BootVersion**

3.1.2.2 CollisionDetectState

Overview

This is a read-only short that contains the state of the collision detection mechanism in the robot controller.

Item values

The item values are as follows:

- 1 - Collision detection has been initiated.
 - 2 - Collision detection has been started.
 - 3 - Collision detected/confirmed.
 - 4 - Collision detected and acknowledged.
-

Item syntax

<Alias_Name>.CollisionDetectState

3 ABB IRC5 OPC Server

3.1.2.3 ControllerAddress

3.1.2.3 ControllerAddress

Overview

This read-only string specifies:

- the IP network address of the Real Controller (RC)
- the directory path to the RobotWare system active in the Virtual Controller (VC) running on the PC.

Item syntax

<Alias_Name>.ControllerAddress

3.1.2.4 ControllerExecutionState

Overview

This is a read-only short that contains the execution state of the robot controller.

Item values

The item values are as follows:

- 1 - Running
 - 2 - Stopped
-

Item syntax

<Alias_Name>.ControllerExecutionState

3 ABB IRC5 OPC Server

3.1.2.5 ControllerID

3.1.2.5 ControllerID

Overview

This is a read-only string that contains the value of the robot controller's identification.

Item syntax

<Alias_Name>.ControllerId

3.1.2.6 ControllerName

Overview

This is a read-only string that contains the value of the robot controller's name.

Item syntax

<Alias_Name>.ControllerName

3 ABB IRC5 OPC Server

3.1.2.7 ControllerState

3.1.2.7 ControllerState

Overview

This item is a short that contains the state of the robot controller.

Item values

The item values are as follows:

- 0 - Init State
 - 1 - Motors Off
 - 2 - Motors On
 - 3 - Guard Stopped State
 - 4 - Emergency Stopped State
 - 5 - Emergency Stop Reset State
 - 6 - System Failure State
-

Item syntax

<Alias_Name>.ControllerState

3.1.2.8 InterfaceState

Overview

This read only short indicates the state of the interface to the robot controller.

Item values

Possible values are

- 0 - The interface to the robot controller is disconnected and non-functional.
- 1 - The interface to the robot controller is connected and operational.
- 2 - The robot controller does not have the PC Interface RobotWare option that creates the interface to the controller.
- 3 - The system cannot resolve the indicated alias to a single robot controller on the network.

Item syntax

<Alias_Name>.InterfaceState

3 ABB IRC5 OPC Server

3.1.2.9 I/O Signal

3.1.2.9 I/O Signal

Overview

The tag names exposed by the ABB IRC5 OPC Server have a specific syntax.

Item syntax

`<Alias_Name>.IOSYSTEM.IOSIGNALS.<IOSignal_Name>`

Individual fields

Individual field identifiers are described as follows:

- `<Alias_Name>` - This is the name defined in the Alias Configuration File that identifies a specific IRC5 robot controller.
- `<IOSignal_Name>` - This identifies the specific item to be accessed.

Setting an I/O signal

To enable OPC Server to write to an I/O signal, the I/O signal's Access Level must be set to ALL. Access Level is a system parameter for the I/O signal and can be set either in the I/O configuration file before loading it into the system, or using RobotStudio or the FlexPendant.



Note

It is only possible to write to output signals. You must not write to input signals.

For more information on system parameters and the parameter Access Level, please refer to *Technical Reference Manual - System parameters*, section *I/O*.

Examples

Example 1

This is an example of an ABB IRC5 OPC Server tag name (diDoorOpen is defined through I/O configuration):

- **Robot2.IOSYSTEM.IOSIGNALS.diDoorOpen**

Example 2

This is an example of a digital input named **diDoorOpen**:

- **Robot2.IOSYSTEM.IOSIGNALS.diDoorOpen**

Example 3

This is an example of a digital output named **doDoorClosed**:

- **Robot2.IOSYSTEM.IOSIGNALS.doDoorClosed**

3.1.2.10 OperatingMode

Overview

This is a read-only short that contains the robot controller operational mode.

Item values

The item values are as follows:

- 0 - Auto
- 1 - Initialization
- 2 - Manual Reduced Speed
- 3 - Manual Full Speed
- 4 - Going to Auto Full Speed
- 5 - Going to Manual Full Speed
- 6 - Undefined Mode

Item syntax

<Alias_Name>.OperatingMode

3 ABB IRC5 OPC Server

3.1.2.11 SpeedRatio

3.1.2.11 SpeedRatio

Overview

This is a read-only short that defines the speed ratio of the robot controller in percent.

Item syntax

`<Alias_Name>.SpeedRatio`

3.1.2.12 SystemClock

Overview

This is a read-only string that contains the robot controller's system clock value. It is only valid when the interface to the controller is operational.

Item syntax

<Alias_Name>.SystemClock

3.1.2.13 SystemID

Overview

This is a read-only string that contains the identifier that globally and uniquely identifies this particular robot controller/system combination.

Item syntax

`<Alias_Name>.CurrentSystemID`

3.1.2.14 SystemName

Overview

This is a read-only string that contains the name of the RobotWare system currently loaded.

Item syntax

<Alias_Name>.SystemName

3.1.2.15 TaskExecutionState

Overview

This is a read-only short that contains the execution state of the robot controller's current task.

Item values

The item values are as follows:

- 0 - Ready - The task has no PCP or execution context.
- 1 - Stopped - PCP and execution context is defined in task.
- 2 - Started - Task is executing.
- 3 - Uninitiated - The program server is not initialized. State only assumed during startup.

Item syntax

<Alias_Name>.RAPID.<Task_Name>.TaskExecutionState

3.1.2.16 TaskState

Overview

This is a read-only short that contains the task state of the robot controller's main program.

Item values

The item values are as follows:

- 0 - Empty - No modules are loaded in the task.
- 1 - Loaded - Modules are loaded, but not linked.
- 2 - Linked - Modules are loaded and linked.
- 3 - Initiated - Modules are loaded, linked and initialized, i.e., the declaration list in each module has been executed.

Item syntax

<Alias_Name>.**RAPID**.<Task_Name>.**TaskState**

3.1.2.17 RAPID Persistent Data

Overview

The IRC5 OPC Server can read or write any RAPID persistent (PERS) data. The IRC5 is limited to 200 subscriptions on RAPID data per robot. This limit applies to all processes subscribing to data on a robot.

This means that if another process has subscribed to 100 items on a robot, the IRC5 OPC Server cannot subscribe to more than 100 additional RAPID data items on the same controller.

The IRC5 OPC Server handles RAPID arrays by presenting them in two ways:

- Each array element as a separate tag
- All array elements as one single tag

These are described below.

Separate tags

Presenting each array element as a separate tag. For example, a one-dimensional array of five items named "MyNum" would be presented as five individual tags as MyNum{1}, MyNum{2}, etc.

One single tag

Presenting all array elements as one single tag. In this example, the tag name would be MyNum. RAPID can handle arrays with up to three dimensions, but the OPC specification supports one-dimensional arrays only. In order to solve this problem, and be able to show two- and three-dimensional arrays, the IRC5 OPC Server presents the different dimensions as these data types:

Dimensions	Description
One-dimensional: Variant Array <data type>	For example, Subscription on one-dimensional array of Boolean would have the data type Bool Array
Two-dimensional: Variant Array <data type>	The Array is embedded in a Variant array.
Three-dimensional: Variant Array <data type>	The Array is embedded in a Variant array, which is embedded in a Variant array.

It's not recommended to subscribe to or write too large string arrays tags. String arrays require many roundtrips to the robot controller and may result in poor performance by the subscribed array and other subscriptions on the IRC5 OPC Server. In this case it's better to use the separate tag for each of the array elements, as detailed under section "Separate tags" above.

Item syntax

<Alias_Name>.**RAPID**.<Task_Name>.<Module_Name>.<Pers_Name>

Syntax descriptions

<Task_Name> specifies the RAPID task name.

<Module_Name> specifies the RAPID module in which the variable <Pers_Name> is defined.

Continues on next page



Note

Do not use extra quotes (""") when writing to RAPID strings. According to RAPID rules, the quotation marks are required as a part of the string (as the first and the last character) when writing to RAPID string data types. Otherwise, a syntax error will be returned. Requiring quotes makes the IRC5 OPC Server fail the OPC compliance test. For this reason the string handling is modified so that quotes are not needed, i.e. the normal Microsoft manner. The IRC5 OPC Server will automatically add the extra quotes when sending string data to the controller and remove them when reading strings from the controller. If you need to have the quotes as a part of your RAPID string, please refer to *RAPID reference manual - RAPID kernel*, and look up *String Literals* for syntax.

Setting a RAPID persistent variable

The IRC5 controller needs to be in Auto mode when writing to RAPID variables.

Examples

See the following examples of use:

Example 1

This is an example of the task MyRobot where num1 is defined in the task MAIN in module MainModule:

MyRobot.RAPID.MAIN.MainModule.num1

Example 2

This is an example of the task MyRobot where MyNumArray(2) is defined in the task MAIN in module MainModule:

MyRobot.RAPID.MAIN.MainModule.MyNumArray{2}

3 ABB IRC5 OPC Server

3.1.2.18 RapidProgramUsedMemory

3.1.2.18 RapidProgramUsedMemory

Overview

This is a read-only unsigned long that defines the amount of memory in bytes being used by the robot controller's RAPID program.

Item syntax

<Alias_Name>.RapidProgramUsedMemory

3.1.2.19 RapidProgramFreeMemory

Overview

This is a read-only unsigned long that defines the amount of memory in bytes available to the robot controller's RAPID program.

Item syntax

<Alias_Name>.RapidProgramFreeMemory

3.2 Alarms and Events implementation

Overview

The IRC5 OPC Alarms and Events Server presents OPC Simple Events for event logs generated by the IRC5 robot controller. The IRC5 OPC AE Server provides a separate category for each type of event log.

Event log event

All IRC5 OPC event log events are OPC Simple Events. Some of the parameters included in the event structure that may have special meaning in the IRC5 context are described below. (This is not a comprehensive list. Please refer to OPC Alarms and Events specification for a complete list.)

- **Source**– The alias name of the controller that generated the event.
- **Message**– The title or brief explanation of the event.
- **Event Category** – The IRC5 Event Log category.
- **Severity**– The severity of the event.

The following parameters contain event data if attribute values are requested by the client.

- **Number of Event Attributes**– The length of the event attribute array.
- **Event Attributes** – A pointer to the ABB specific event attributes as requested by the client according to the OPC specification.

Category ID

The IRC5 Event Log categories are shown in the table below.

Category ID	Category description
= 1	Operational Events
= 2	System Errors
= 3	Hardware Errors
= 4	RAPID Program Events
= 5	Motion Control Events/Errors
= 6	Operator Events
= 7	IO and Communications Errors
= 8	User Defined Events
= 9	Optional Product Events
= 10	Internal Errors
= 11	Process Events
= 12	Spot weld Events
= 13	Paint Events
= 14	Picker Application Events

Continues on next page

Event severity level

The IRC5 OPC Alarms & Events Server automatically translates ABB IRC5 event log types to specific severity levels as shown in the table below.

Event log type	Severity
State Change	100
Warning	300
Error	600

Event log attributes

In addition to the standard attributes required by the OPC Alarms and Events specification, the IRC5 OPC Alarms & Events Server can provide the attributes defined in the table below.

Attribute	Attribute ID
Number	1
Description	2
Action	3

Summary

- **Number**– The message number is calculated by multiplying 10000 by the category id and then adding the event message ID. For example: If we have a category id of 1 (operational events) and the message ID is 51, the message number is $1 * 10000 + 51 = 10051$.
- **Description**– A detailed description of the event. This attribute will be empty if there is no description for a specific event log.
- **Action** – description of actions related to the event. This attribute will be empty if there is no description for a specific event log.
- **NOTE:** The event log messages will be displayed in the language previously selected in the ABB IRC5 OPC Configuration Utility. If the message text is missing in the language file, the text field indicates that there is no text; however, the source and priority values will be correct. If the language file for the requested message is missing, the message text will be displayed in English. Additionally, if the attribute for the message number is requested, its attribute field will contain the valid message number.

3.3 Security settings

Overview

To be able to use the IRC5 OPC server, some Windows security settings need to be adjusted. Most of the changes mentioned here are made by default by the OPC server installation but in some cases, for example if you use a third party firewall, you may need to make manual adjustments.

Firewall settings

If a firewall is shielding the computer running the OPC server, the following components need to be granted permission to communicate through it.

In the locations mentioned below, **<Program Files>** refers to the default program installation folder on your system, and **<System Folder>** refers to the system folder in your Windows installation (usually something like C:\Windows\System32\)

Name	Executable	Location
ABB Industrial Robot Communication Server	RobComCtrlServer.exe	<Program Files>\Common Files\ABB Industrial IT\Robotics IT\RobAPI
ABB Industrial Robot Discovery Server	RobNetScanHost.exe	<Program Files>\Common Files\ABB Industrial IT\Robotics IT\RobAPI
ABB IRC5 OPC Server	RobOPC.exe	<Program Files>\ABB Industrial IT\Robotics IT\IRC5 OPC Server

In addition, if clients need to connect to the server remotely the following settings are needed:

- Port 135 should be open for TCP traffic (used for DCOM communication).
- OpcEnum.exe (located in <System Folder>) should be granted access through the firewall.

DCOM settings

If clients need to connect to the server remotely some of the DCOM security settings should be adjusted. This can be done with the tool dcomcnfg.exe located in windows system folder. In the settings mentioned below the Everyone group can be substituted with a group dedicated for OPC users if a higher level of security is desired.

- The Everyone group should be granted both Launch and Access permissions to the components ABB IRC5 OPC Server DA and ABB IRC5 OPC Server AE.

If your system is running Windows XP with service pack 2 or higher you must also make the following changes to the DCOM default security limits:

- The ANONYMOUS LOGON account should be granted both local and remote permissions for Access.
- The Everyone group should be granted both local and remote permissions for Launch and Activation.

Continues on next page

If you experience problems with reading properties remotely you may also need to change the default DCOM authentication level on the client computer to 'None' since some OPC clients fail to do this themselves.

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