



Logix 5000™ Controllers Program Parameters

1756 ControlLogix®, 1756 GuardLogix®, 1769
CompactLogix™, 1769 Compact GuardLogix®, 1789
SoftLogix™, 5069 CompactLogix™, 5069 Compact
GuardLogix®, Studio 5000® Logix Emulate™

Rockwell Automation Publication 1756-PM021E-EN-P - March 2022
Supersedes Publication 1756-PM021D-EN-P - September 2020



Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

Reproduction of the contents of this manual, in whole or in part, without written permission of Rockwell Automation, Inc., is prohibited.

Throughout this manual, when necessary, we use notes to make you aware of safety considerations.



WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.



ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.

IMPORTANT Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.



SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.



BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.



ARC FLASH HAZARD: Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

Rockwell Automation recognizes that some of the terms that are currently used in our industry and in this publication are not in alignment with the movement toward inclusive language in technology. We are proactively collaborating with industry peers to find alternatives to such terms and making changes to our products and content. Please excuse the use of such terms in our content while we implement these changes.

This manual includes new and updated information. Use these reference tables to locate changed information.

Grammatical and editorial style changes are not included in this summary.

Global changes

This table identifies changes that apply to all information about a subject in the manual and the reason for the change. For example, the addition of new supported hardware, a software design change, or additional reference material would result in changes to all of the topics that deal with that subject.

Change	Topic
New Studio 5000 Logix Designer® application branding	Studio 5000® environment on page 7

New or enhanced features

None in this release.

Summary of changes	Studio 5000 environment	7
Preface	Additional resources	7
	Legal Notices	8
	Important terminology	9
	Chapter 1	
Connecting program parameters	Introduction	11
	Program parameters	11
	Program parameter connection methods	12
	Program parameter connection syntax	14
	User-defined type sub-element connection considerations	15
	Input parameters	15
	Input parameter connection types and uses	15
	General rules for using Input parameters	15
	Connect an Input parameter to a controller scope tag	15
	Output parameters	18
	Output parameter connection types and uses	18
	General rules for using Output parameters	19
	Connect an Output parameter to a controller scope tag	19
	Connect an Output parameter to another program	20
	InOut parameters	23
	InOut parameter connection types and uses	23
	General rules for using InOut parameters	24
	Connect an InOut parameter to a controller scope tag	24
	Public parameters	25
	Public parameter connection types and uses	25
	General rules for using Public parameters	26
	Connect a Public parameter to another program	26
	Safety program parameters	28
	General rules for connecting parameters for safety programs	28
	Program parameter connection rules	29
	Standard program to standard program connection rules	29
	Safety program to safety program connection rules	30
	Safety program to standard program connection rules	30
	Chapter 2	
Directly accessing program parameters	Introduction	33
	Direct access	33
	Behavior of direct access in logic	33
	Access program parameters when editing ladder logic	33

Index

This manual shows how to create and configure program parameters. This manual is one of a set of related manuals that show common procedures for programming and operating Logix 5000™ controllers.

For a complete list of common procedures manuals, refer to the [Logix 5000™ Controllers Common Procedures Programming Manual](#), publication 1756-PM001.

The term Logix 5000™ controller refers to any controller based on the Logix 5000™ operating system.

Studio 5000® environment

The Studio 5000 Automation Engineering & Design Environment® combines engineering and design elements into a common environment. The first element is the Studio 5000 Logix Designer® application. The Logix Designer application is the rebranding of RSLogix 5000® software and will continue to be the product to program Logix 5000™ controllers for discrete, process, batch, motion, safety, and drive-based solutions.



The Studio 5000® environment is the foundation for the future of Rockwell Automation® engineering design tools and capabilities. The Studio 5000® environment is the one place for design engineers to develop all elements of their control system.

Additional resources

These documents contain additional information concerning related Rockwell Automation products.

Resource	Description
Industrial Automation Wiring and Grounding Guidelines , publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.

Resource	Description
Product Certifications webpage, available at http://ab.rockwellautomation.com	Provides declarations of conformity, certificates, and other certification details.

View or download publications at <http://www.rockwellautomation.com/literature>. To order paper copies of technical documentation, contact the local Rockwell Automation distributor or sales representative.

Legal Notices

Rockwell Automation publishes legal notices, such as privacy policies, license agreements, trademark disclosures, and other terms and conditions on the [Legal Notices](#) page of the Rockwell Automation website.

End User License Agreement (EULA)

You can view the Rockwell Automation End User License Agreement (EULA) by opening the license.rtf file located in your product's install folder on your hard drive.

The default location of this file is:

C:\Program Files (x86)\Common Files\Rockwell\license.rtf.

Open Source Software Licenses

The software included in this product contains copyrighted software that is licensed under one or more open source licenses.

You can view a full list of all open source software used in this product and their corresponding licenses by opening the index.html file located your product's [OPENSOURCE folder](#) on your hard drive.

The default location of this file is:

C:\Program Files (x86)\Common Files\Rockwell\Help\<product name>\Release Notes\OPENSOURCE\index.htm

You may obtain Corresponding Source code for open source packages included in this product from their respective project web site(s).

Alternatively, you may obtain complete Corresponding Source code by contacting Rockwell Automation via the **Contact** form on the Rockwell Automation website:

<http://www.rockwellautomation.com/global/about-us/contact/contact.page>.

Please include "Open Source" as part of the request text.

Important terminology

This table defines the terms that are important to understanding the concepts described in this manual.

Term	Definition
Argument	An argument is assigned to a parameter and contains the specification of the data used by an instruction in a user program. An argument can contain the following: • A simple tag (for example, L101) • A literal value (for example, 5) • A tag structure reference (for example, Recipe.Temperature) • A direct array reference (for example, Buffer[1]) • An indirect array reference (for example, Buffer[Index+1]) • A combination (for example, Buffer[Index+1].Delay)
InOut parameter	An InOut parameter is a special usage program parameter that represents a reference to data that can be used both as input and output during the execution of a program. Because InOut parameters pass by reference rather than by value, they are merely a pointer to the original data and closely resemble the behavior of an alias tag. With that in mind, it is possible that the InOut parameter values could change during the execution of a program. Depending on your task structure, this behavior may be necessary.
Input parameter	An Input parameter is a parameter that defines the data that is passed by value into an executing program. Since Input parameters are passed by value, their values cannot change from external sources during the execution of the program. An Input parameter supports a maximum of one sourcing connection.
Output parameter	An Output parameter is a parameter that defines the data that is produced as a direct result of executing a program. Since Output parameters are always passed by value, their values only change at the end of the scan of a program when the copy of the parameters has executed.  Tip: If using direct access another program can be a source for an Output parameter.
Passed by reference	When an argument is passed to a parameter by reference, the logic directly reads or writes the value that the tag uses in controller memory. External code or HMI interaction that changes the argument's value can change the value during execution of a program.

Passed by value	When an argument is passed to a parameter by value, the value is copied in or out of the parameter during execution of a program. The value of the argument does not change from external code or HMI interaction.
Public parameter	A Public parameter is an encapsulated version of a controller scope tag, and typically it is used for large data structures that need to be shared among programs.

Connecting program parameters

Introduction

This chapter provides an overview of program parameters and then further defines each type of program parameter. Explanations are provided on when to use each type of program parameter and the general rules to follow, and example procedures are provided for connecting each type of program parameter.

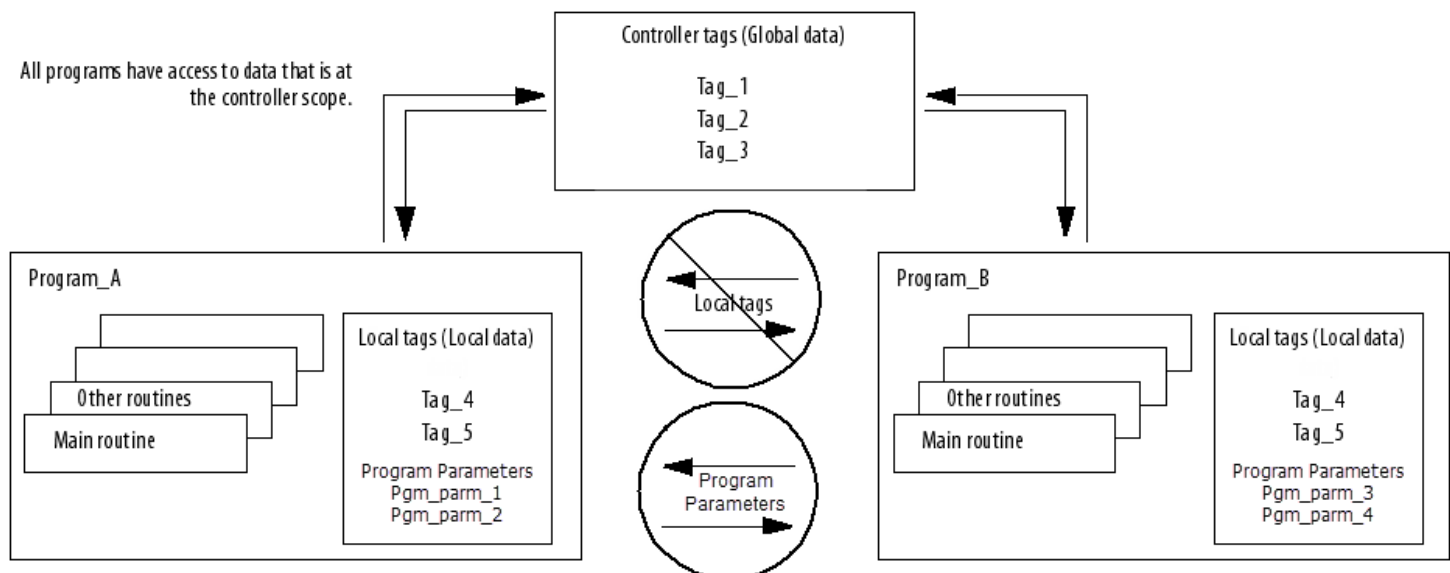
Program parameters

A program parameter is an argument that is exposed for external access by a program. Unlike local tags, all program parameters are publicly accessible outside of the program. Additionally, HMI external access can be specified for each parameter. Data sharing between programs can be achieved either through pre-defined connections between parameters or directly accessed through a special notation.

There are four types of program parameters.

- Input
- Output
- InOut
- Public

Among other benefits, program parameters allow you to clearly define the inputs to the routines in a program, and the outputs from those routines. Input and Output (I/O) parameters also automatically buffer data, so that you do not need to create separate tags to buffer I/O data (although if desired, you can still buffer data using the Synchronous Copy File [CPS] instruction).



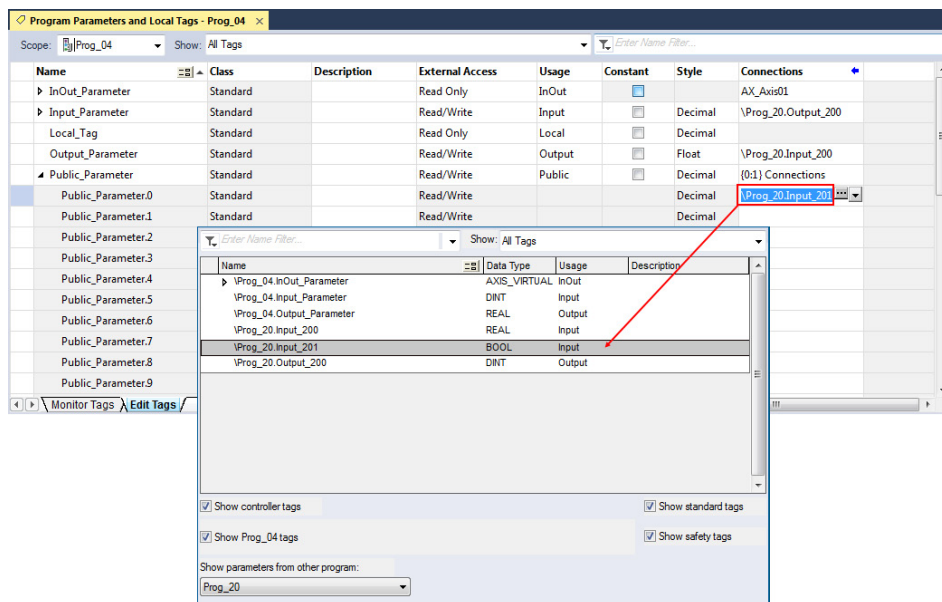
Program parameter connection methods

You can use any of the following methods to connect program parameters in the Logix Designer application.

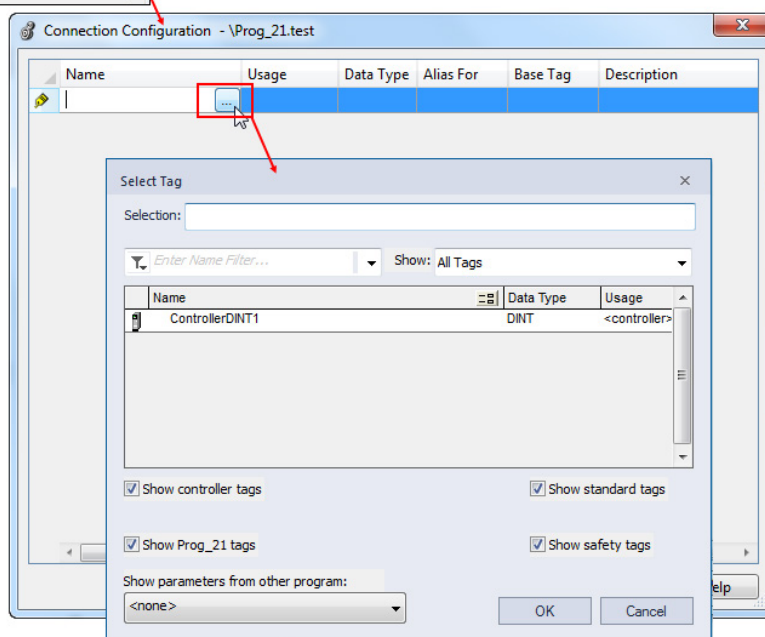
- **Connections** column on the **Program Parameters and Local Tags** dialog box



Tip: To show the **Connections** column select **View > Toggle Columns > Connections**.



- Ellipses button (...) in the **Connections** cell on the **Program Parameters and Local Tags** dialog box



- **Properties** pane on the **Program Parameters and Local Tags** dialog box

Properties

Extended Properties...

General

Name	Prog_InOut
Description	
Usage	InOut
Type	Base
Alias For	
Base Tag	
Data Type	DINT
Scope	Prog_02
External Access	Read Only
Style	Decimal
Constant	Yes
Required	
Visible	

▶ **Data**

▶ **Produced Connection**

▶ **Consumed Connection**

Parameter Connections (1:0)

Connection	\\Prog_02.Output
------------	------------------

- **Parameters** tab on the **Program Properties** dialog box

Program Properties - Prog_01

General Configuration Parameters Monitor

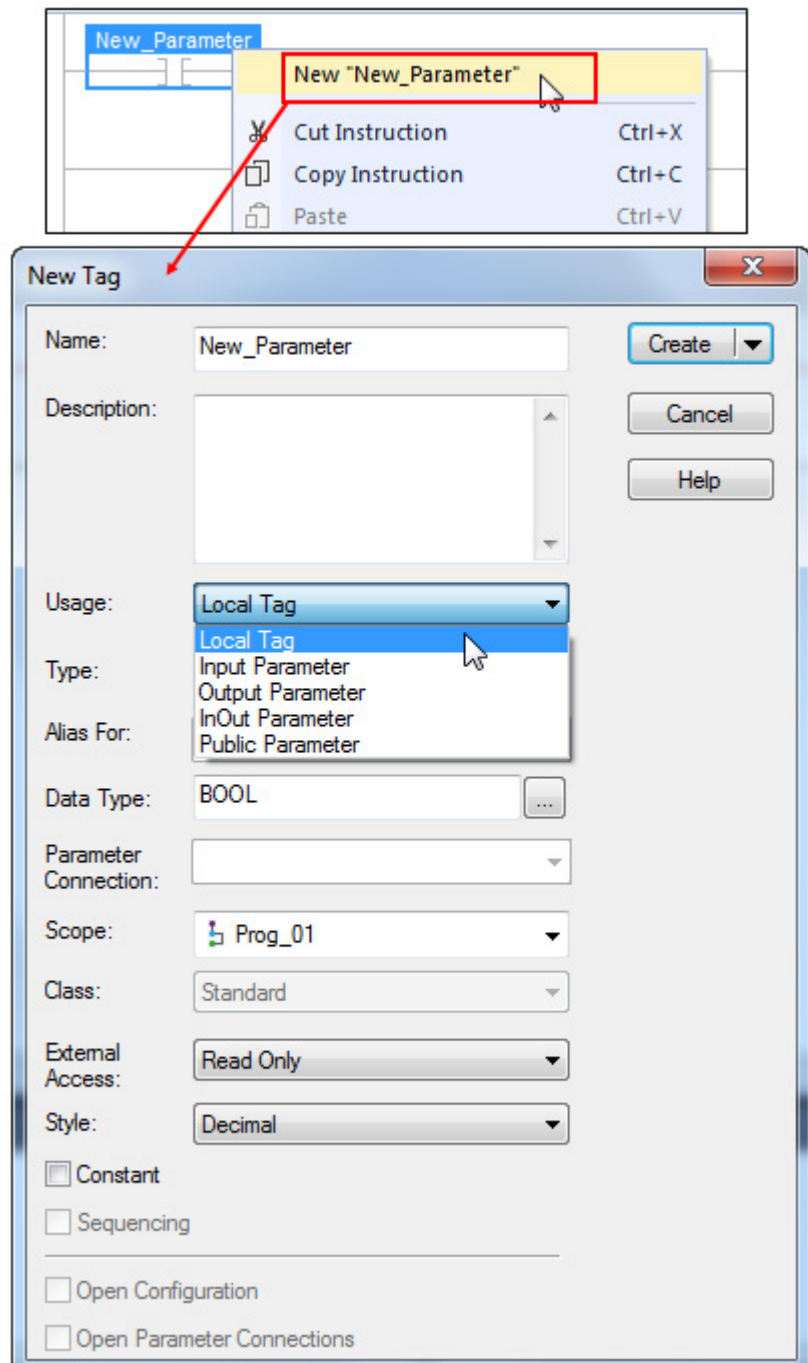
Name	Usage	Data Type	Alias For	Base Tag	Description	External Access	Constant	Connections
Prog_InOut	InOut	DINT				Read Only	☒	\\Prog_02.Output
New Parameter							☐	

Connections

Name	Usage	Data Type	Alias For	Base Tag	Description	External Access	Constant
------	-------	-----------	-----------	----------	-------------	-----------------	----------

OK Cancel Apply Help

- New Parameter or Tag dialog box



Program parameter connection syntax

The syntax {x:y} is used to connect program parameters where:

x = the number of full connections, meaning connections at the word or user-defined data type level

y = the number of partial connections, meaning connections at the bit or member level

User-defined type sub-element connection considerations

User-defined types (UDTs) used as parameters can contain member-specific connections. To ensure proper data flow, the base Usage can only be specified at the base of the UDT, and not at the member level, as the following example shows.

Name	Alias For	Data Type	Class	Description	External Access	Usage	Constant	Connections
▲ Safety_UDT		Safety_UDT	Safety		Read Only	Input	☐	{0:2} Connections
Safety_UDT.GuardDoorOK		BOOL	Safety		Read Only		☐	Safety_Input.Points.0
Safety_UDT.AllGuards		DINT	Safety		Read Only		☐	Safety_Rack

Input parameters

An Input parameter is a parameter that defines the data that is passed by value into an executing program. Since Input parameters are passed by value, their values cannot change from external sources during the execution of the program. An Input parameter supports a maximum of one sourcing connection.

Input parameter connection types and uses

Input parameters can be connected to Output parameters, Public parameters, InOut parameters, and controller scope tags. This makes Input parameters a great option for connecting input card data to a code module or object. It also is a good option for code module or object commands that are point-to-point.

General rules for using Input parameters

The following are general rules when using Input parameters.

- Input parameters (including members) can only support one sourcing connection. This means that only one source can be delivering the value to the input parameter.
- Input parameter values are refreshed before each scan of a program. The values do not change during the logic execution, so you do not need to write code to buffer inputs.
- A program can write to its own Input parameters.
- Data values for Output parameters that are connected to controller scope tags or Public parameters are copied after the scan of a program. In a project with multiple tasks, the data copy for a parameter that is of type BOOL, SINT, INT, DINT, LINT, or REAL will not be interrupted. The data copy from an Output parameter to a controller scope tag or Public parameter or any other predefined or user-defined data type may be interrupted by a task switch.

For more information on the Input parameter connections that can be made, see [Program parameter connection rules](#) on [page 29](#).

Connect an Input parameter to a controller scope tag

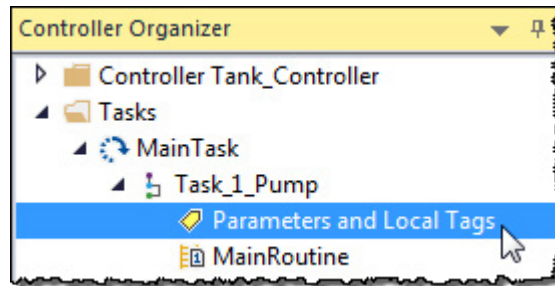
A parameter can be connected to another parameter or controller scope tag. As an example, connecting an Input parameter to an Output parameter ensures that data is copied to the Input parameter from the Output parameter on every scan. The following procedure explains how to connect an Input parameter to a controller scope tag.



Tip: This procedure demonstrates the use of the **Properties** pane on the **Program Parameters and Local Tags** dialog box. You can alternatively connect parameters using any of the other methods shown in [Program parameter connection methods](#) on [page 12](#).

To connect an Input parameter to a controller scope tag

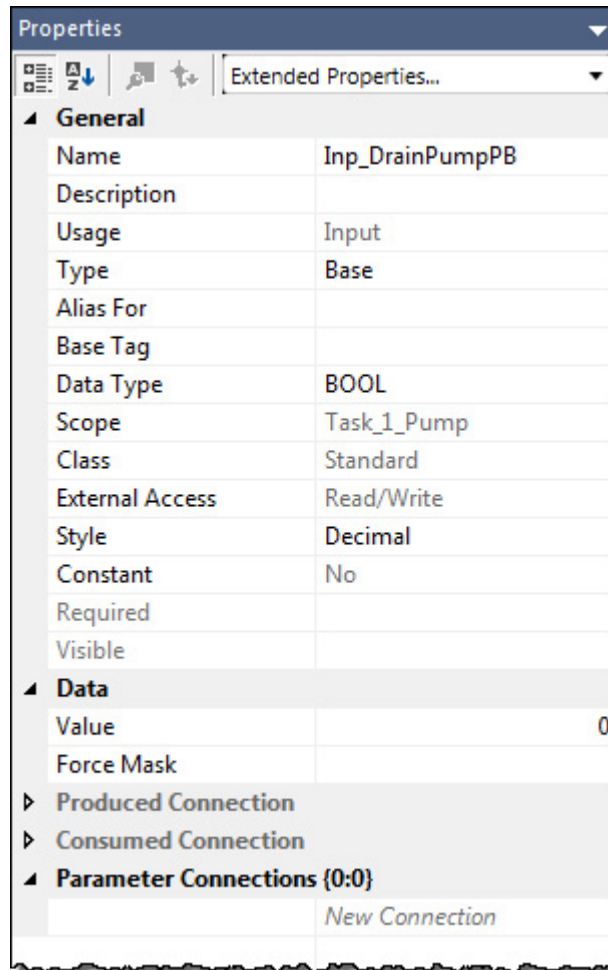
1. In the **Controller Organizer**, expand the folder for the program for which you are connecting an Input parameter, and double-click **Parameters and Local Tags**.



2. On the **Program Parameters and Local Tags** dialog box, choose the Input parameter that you want to connect.

Program Parameters and Local Tags - Task_1_Pump						
Scope: Task_1_Pump		Show: All Tags				
Name	Usage	Value	Force Mask	Style	Data Type	
Cmd_PublicDrain	Public	0		Decimal	BOOL	
Cmd_PublicFill	Public	0		Decimal	BOOL	
Inp_AutoMode	Input	0		Decimal	BOOL	
Inp_DrainPumpLeak	Input	0		Decimal	BOOL	
Inp_DrainPumpPB	Input	0		Decimal	BOOL	
Inp_FillPumpLeak	Input	0		Decimal	BOOL	
Inp_FillPumpPB	Input	0		Decimal	BOOL	

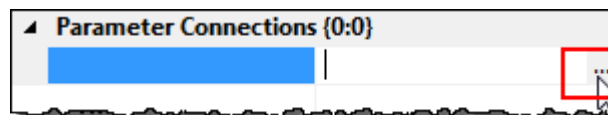
3. On the right, in the **Properties** pane, expand **Parameter Connections**.



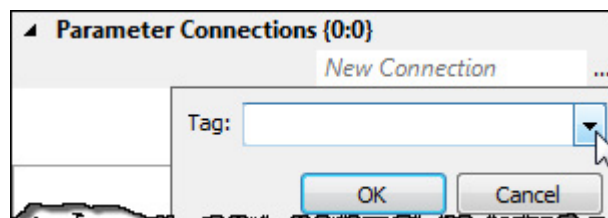
4. Select **New Connection**.



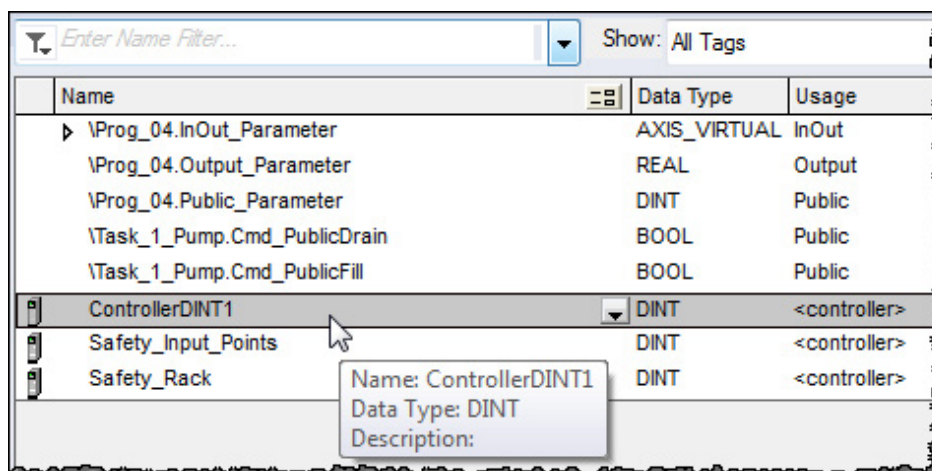
5. Select the **Browse (...)** button.



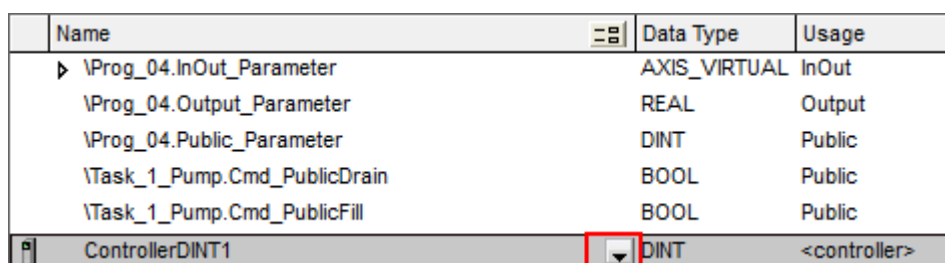
6. In the **Tag** box, choose the pull-down arrow.



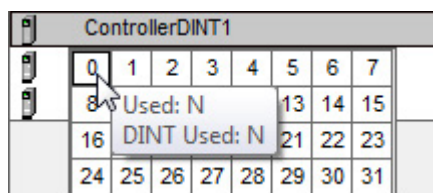
7. In the Tag Browser, locate and expand the desired controller scope tag.



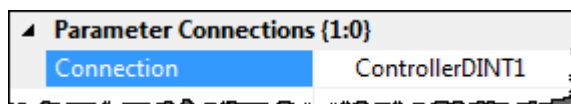
8. Select to the right of the desired tag, and select the pull-down arrow.



9. Select the bit that you want to associate with this Input parameter.



10. In the **Tag** box, verify that the resulting information is correct, and select **OK**. Notice that the first number in the brackets next to **Parameter Connections** has incremented by one, indicating that the number of connections to the parent tag have increased by one.



Output parameters

An Output parameter is a parameter that defines the data that is produced as a direct result of executing a program. Since Output parameters are always passed by value, their values only change at the end of the scan of a program when the copy of the parameters has executed.



Tip: If using direct access another program can be a source for an Output parameter.

Output parameter connection types and uses

Output parameters can be connected to one or more Input parameters, Public parameters, InOut parameters (constants), and controller scope tags, which make Output parameters a great option for connecting a code module or

object to an output card. It also is a good option for configuring a code module or object to invoke operations (such as commands and settings) in other code modules or objects. Additionally, multiple connections can be configured for an Output parameter (known as fanning), which allows one code module or object to send multiple commands to multiple modules or objects using one Output parameter.

General rules for using Output parameters

The following are general rules when using Output parameters.

- Output parameters, including members, can support multiple connections. For example, assume you have a BOOL Input parameter in Program_A named Input1a, and a BOOL Input parameter in Program_B named Input1b. You are allowed to connect a single Output parameter in Program_C to both Input1a and Input1b. This is known as fanout.
- Output parameter values are refreshed after each scan of a program. They maintain the value from the previous scan until the program execution is complete.
- Output parameters connected to Public parameters or controller scope tags are copied (pushed) at the end of the program execution.
- An Output parameter can only be connected to an InOut parameter if the InOut parameter is configured as a constant.



Tip: InOut parameters are passed by reference, which means they point to the base tag. That is, when an InOut parameter is used in logic, the current value of the parameter connected to the InOut parameter is used.

For more information on the Output parameter connections that can be made, see [Program parameter connection rules](#) on [page 29](#).

The following procedure explains how to connect an Output parameter to a controller scope tag.

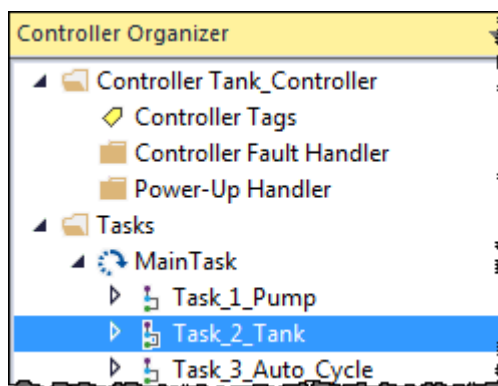


Tip: This procedure demonstrates the use of the **Parameters** tab on the **Program Properties** dialog box. You can alternatively connect parameters using any of the other methods shown in [Program parameter connection methods](#) on [page 12](#).

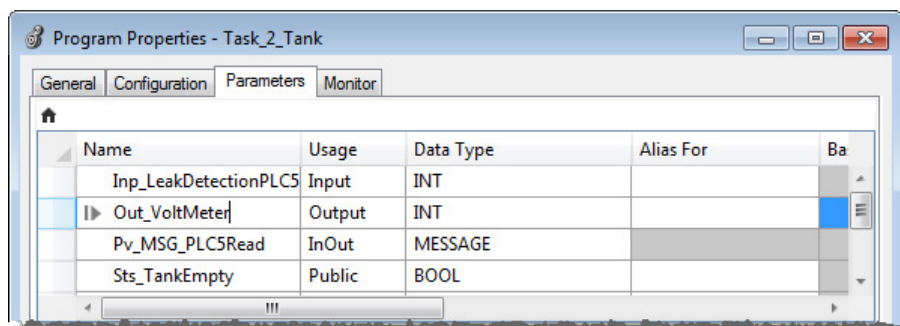
Connect an Output parameter to a controller scope tag

To connect an Output parameter to a controller scope tag

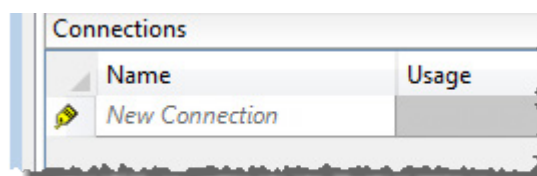
1. In the **Controller Organizer**, double-click the folder for the program for which you are creating an Output parameter connection.



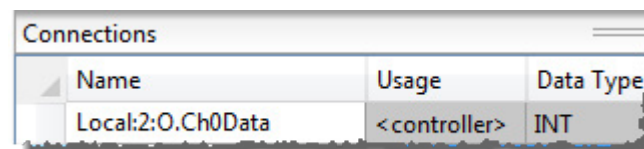
2. On the **Program Properties** dialog box, select the **Parameters** tab.
3. In the **Name** box, select the name of the Output parameter for which you want to add a connection.



4. In the **Connections** area, select **New Connection**.



5. In the **New Connection** box, type the tag to which you want to connect this Output parameter, and select **Apply**.



6. Select **OK** to close the **Program Properties** dialog box.

The following procedure explains how to connect an Output parameter to another program.

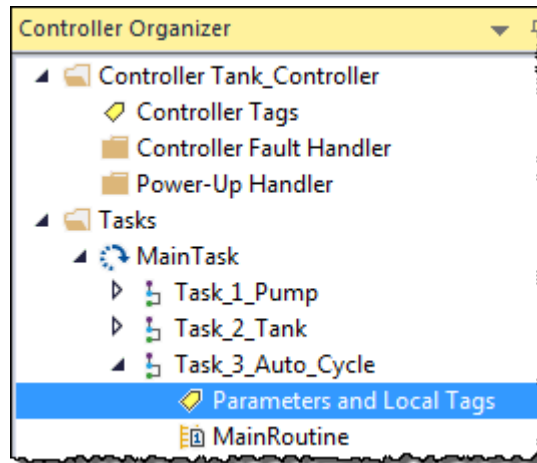


Tip: This procedure demonstrates the use of the **Properties** pane on the **Program Parameters and Local Tags** dialog box. You can alternatively connect parameters using any of the other methods shown in [Program parameter connection methods](#) on [page 12](#).

Connect an Output parameter to another program

To connect an Output parameter to another program

1. In the **Controller Organizer**, expand the folder for the program for which you are creating an Output parameter connection, and double-click **Parameters and Local Tags**.

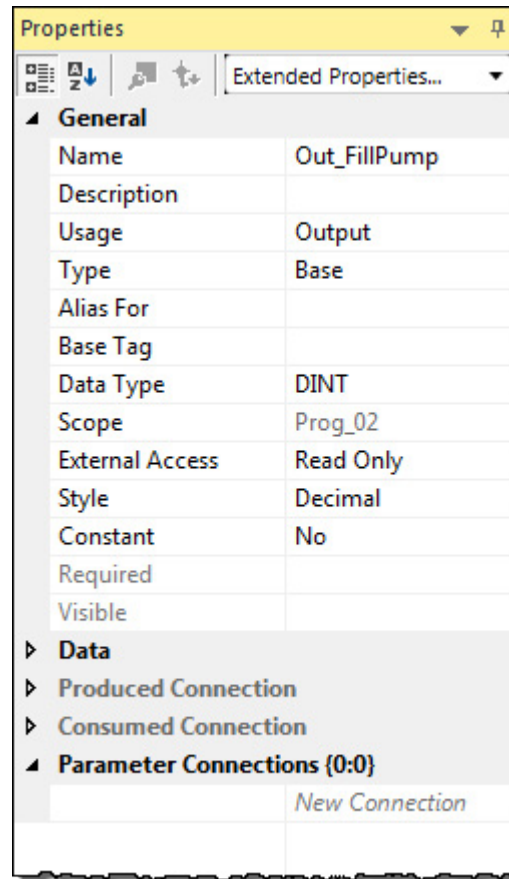


2. On the **Program Parameters and Local Tags** dialog box, choose the Output parameter that you want to connect.

The screenshot shows the 'Program Parameters and Local Tags - Task_3_Auto_Cycle' dialog box. The 'Scope' is set to 'Task_3_Auto_Cycle' and 'Show' is set to 'All Tags'. The table below lists the parameters:

Name	Data Type	Usage	Constant	Style
Inp_LeakStatusWord	INT	Input	☐	Decimal
Inp_ModeSwitch	BOOL	Input	☐	Decimal
Out_DrainPump	BOOL	Output	☐	Decimal
Out_FillPump	BOOL	Output	☐	Decimal
Sts_AutoMode	BOOL	Public	☐	Decimal

- On the right, in the **Properties** pane, expand **Parameter Connections**.



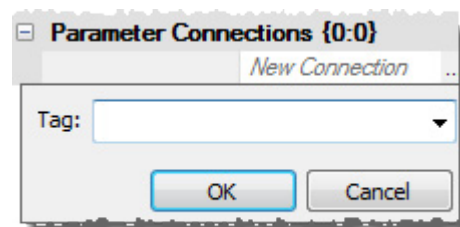
- Select **New Connection**.



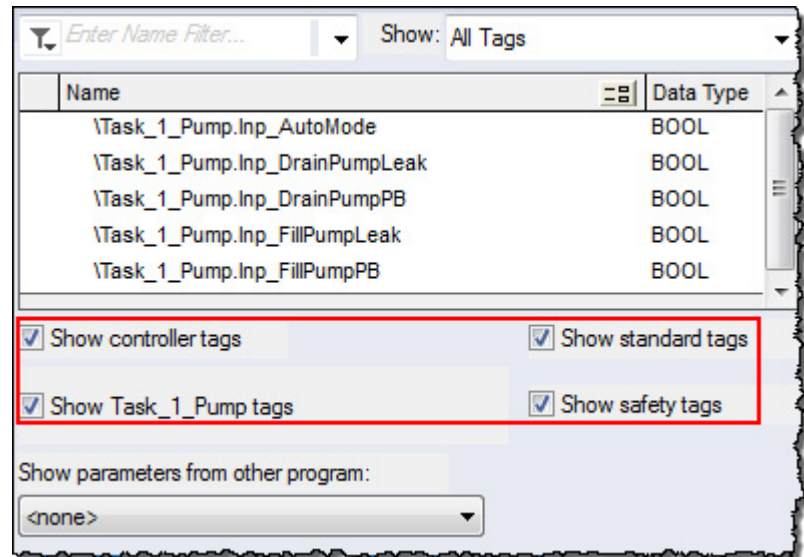
- Select the **Browse (...)** button.



- In the **Tag** box, choose the pull-down arrow.



7. (optional) On the Tag Browser, clear one or more of the check boxes to limit the number of available parameters that appear in the list.



8. In the **Show parameters from other program** list, choose the program to which you want to connect this Output parameter.
9. In the list of available parameters, double-click the desired parameter.
10. Select **OK**.

InOut parameters

An InOut parameter is a special usage program parameter that represents a reference to data that can be used both as input and output during the execution of a program. Because InOut parameters pass by reference rather than by value, they are merely a pointer to the original data and closely resemble the behavior of an alias tag. With that in mind, it is possible that the InOut parameter values could change during the execution of a program. Depending on your task structure, this behavior may be necessary.

InOut parameter connection types and uses

InOut parameters can be connected to Input parameters, Public parameters, Output parameters (if InOut is constant), and controller scope tags.

An example of how InOut parameters are advantageous is an application that contains multiple tasks with different priority assignments. In this scenario, a lower priority task is interrupted by a higher priority task. If the higher priority task is referencing data in the lower priority task, the InOut parameter allows the higher priority task to point directly to a tag's value in the lower priority task. This ensures that the higher priority task is using the most up-to-date value of a tag.

Another useful scenario for InOut parameters is for instructions whose tags can only be placed at the controller scope, such as the Message (MSG) instruction. InOut parameters can connect directly to the MSG instruction tags in the controller scope.

Finally, InOut parameters are useful for programs that have a large data structure, and you do not want to pass the whole structure by value.

General rules for using InOut parameters

The following are general rules when using InOut parameters.

- InOut parameters can only support one connection. You cannot configure connections to any member of an InOut parameter.
- An InOut parameter can only be connected to an Output parameter if the InOut parameter is configured as a constant.
- InOut parameters are passed by reference, which means they point to the base tag. In other words, when an InOut parameter is used in logic, the current value of the parameter connected to the InOut parameter is used.
- Connections to InOut parameters cannot be changed online, unless using the Partial Import Online (PIO) functionality.

For more information on the InOut parameter connections that can be made, see [Program parameter connection rules](#) on [page 29](#).

Connect an InOut parameter to a controller scope tag

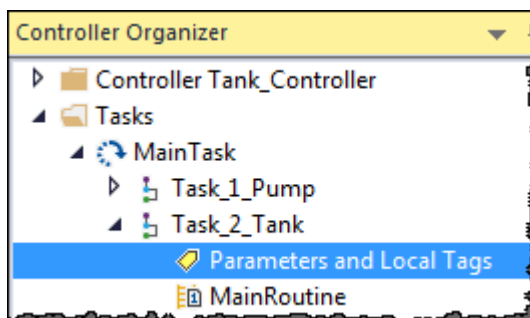
The following procedure explains how to connect an InOut parameter to a controller scope tag.



Tip: This procedure demonstrates the use of the **Properties** pane on the **Program Parameters and Local Tags** dialog box. You can alternatively connect parameters using any of the other methods shown in [Program parameter connection methods](#) on [page 12](#).

To connect an InOut parameter to a controller scope tag

1. In the **Controller Organizer**, expand the folder for the program for which you are creating an InOut parameter connection, and double-click **Parameters and Local Tags**.



2. On the **Program Parameters and Local Tags** dialog box, choose the InOut parameter that you want to connect.

Name	Usage	Value	Force Mask	Style	Data Type
Inp_LeakDetection...	Input	0		Decimal	INT
Out_VoltMeter	Output	0		Decimal	INT
Pv_MSG_PLCSRead	InOut	{...}		{...}	MESSAGE

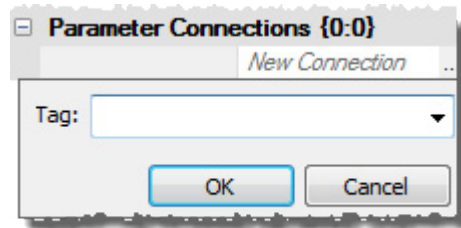
3. On the right, in the **Properties** pane, expand **Parameter Connections**, and select **New Connection**.



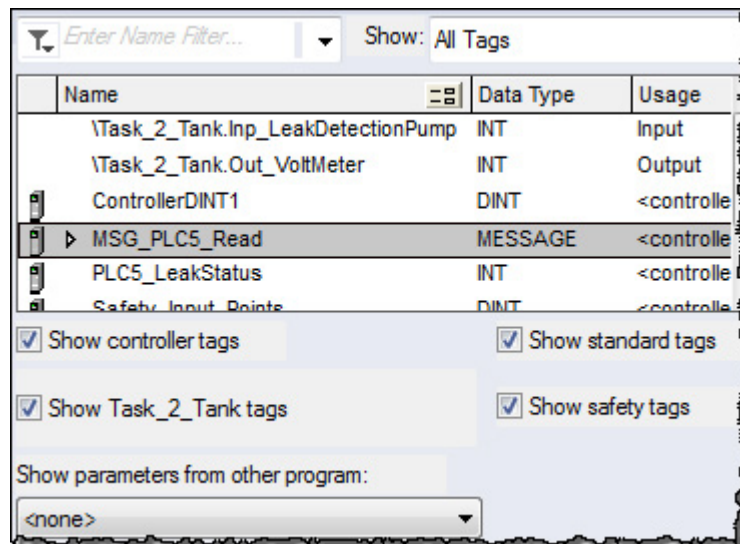
4. Select the **Browse (...)** button.



5. In the **Tag** box, choose the pull-down arrow.



6. (optional) On the Tag Browser, clear all but the **Show controller tags** check box to limit the number of available parameters that appear in the list.
7. In the list of available parameters, double-click the desired parameter.



8. Select **OK**.

Public parameters

A Public parameter is an encapsulated version of a controller scope tag, and typically it is used for large data structures that need to be shared among programs.

Public parameter connection types and uses

Public parameters can be connected to Input parameters, Output parameters, and InOut parameters. Public parameters function like controller scope tags, but are at the program level. The key benefit to using Public parameters over controller scope tags is better encapsulation. It is an excellent option for code modules or objects that contain data that must be globally available to other code modules.

Public parameters are updated as the source updates, so higher priority tasks that interrupt a program during execution have access to any updated values in the lower priority task. Additionally, fan-in is supported with Public parameters, which is useful in situations where a code module or object could

receive a command from many modules or objects. Input parameters can be used, but an individual Input parameter is required for each connection. In other words, if a code module or object had a command that could be invoked by 10 different code modules or objects, then 10 input parameters are required. However, if the command is configured as a Public parameter, then all 10 code modules or objects could have an Output parameter connected to a single Public parameter.

General rules for using Public parameters

The following are general rules when using Public parameters.

- Public parameters can support multiple connections. You can configure connections to the base Public parameter or any member of a Public parameter, including User-defined structures.
- Public parameters are updated when the source is updated. In other words, when a Public parameter value updates, it is immediately available to any higher priority tasks that are connected to that parameter.
- While Public parameters cannot be connected to controller scope tags, they can be aliased to controller scope tags. If this functionality is desired, it is important to remember that the alias updates asynchronous to program execution. The Public parameter contains the real-time value of the controller scope tag.

For more information on the Public parameter connections that can be made, see [Program parameter connection rules](#) on [page 29](#).

Connect a Public parameter to another program

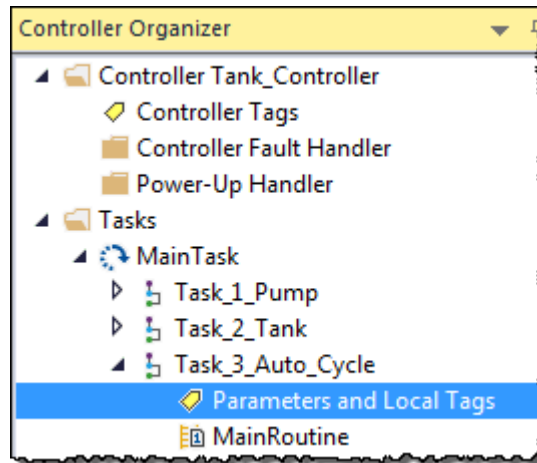
The following procedure explains how to change an existing tag to a Public parameter, and then connect a Public parameter to another program.



Tip: This procedure demonstrates the use of the **Properties** pane on the **Program Parameters and Local Tags** dialog box. You can alternatively connect parameters using any of the other methods shown in [Program parameter connection methods](#) on [page 12](#).

To connect a Public parameter to another program

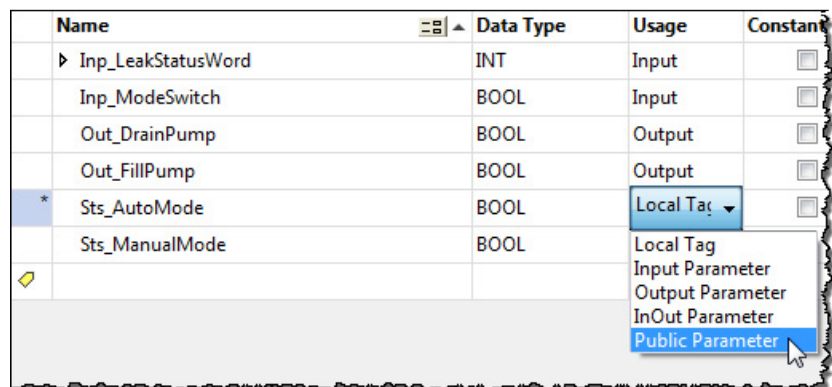
1. In the **Controller Organizer**, expand the folder for the program for which you are creating a Public parameter connection, and double-click **Parameters and Local Tags**.



2. On the **Program Parameters and Local Tags** dialog box, select the **Edit Tags** tab.



3. Locate the tag you want to change to a Public parameter, and in the **Usage** box, choose **Public Parameter**.



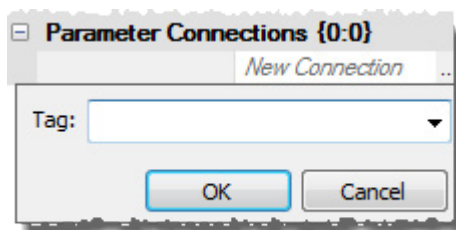
4. On the right, in the **Properties** pane, expand **Parameter Connections**, and select **New Connection**.



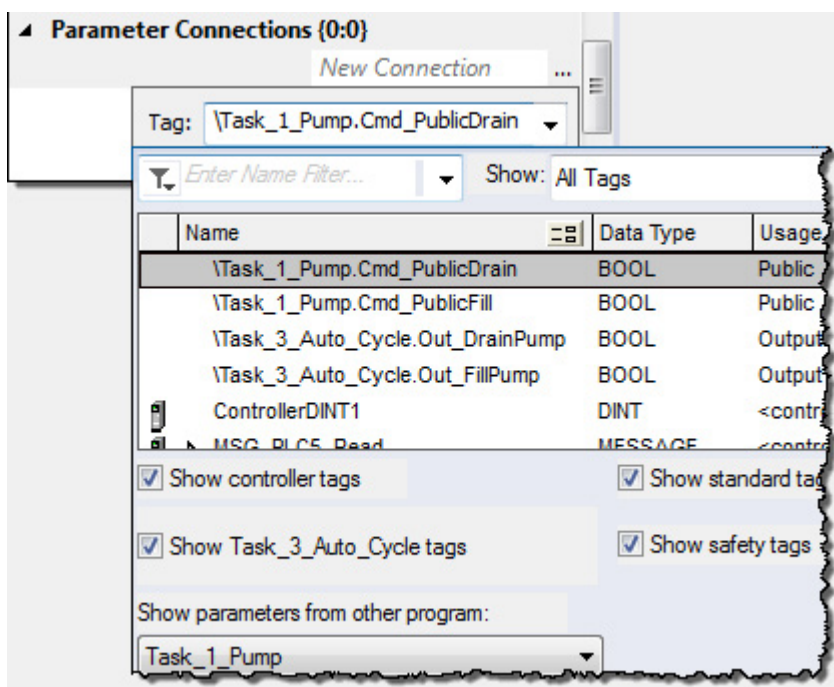
5. Select the **Browse (...)** button.



6. In the **Tag** box, choose the pull-down arrow.



7. On the Tag Browser, in the **Show parameters from other program** list, choose the program to which you want to connect this Public parameter.
8. In the list of available parameters, double-click the desired parameter.



9. Select **OK**.

Safety program parameters

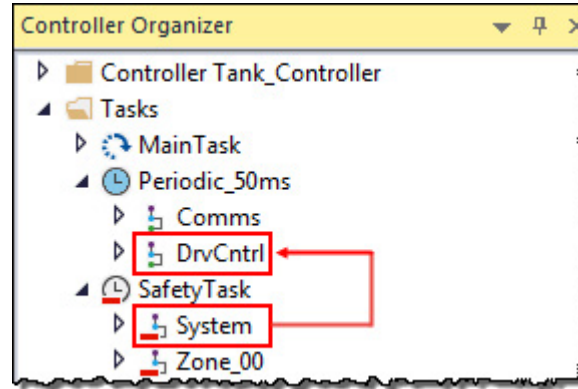
Special considerations apply when using program parameters within safety programs.

General rules for connecting parameters for safety programs

The following are general rules when connecting parameters for safety programs.

- A safety parameter cannot connect to a standard parameter or controller scoped tag of standard class; the controller scope must be of class safety.

- A safety parameter can source a standard parameter, as shown in the following image.



- Safety Output parameters cannot connect to a standard class InOut parameter.
- Safety local tags can alias safety class controller scope tags.
- Safety Public parameters can alias safety class controller scope tags.

Program parameter connection rules

Standard program to standard program connection rules

This tables summarize the program parameter connection rules.

The following table summarizes the rules for using program parameters to connect two standard programs.



Tip: The connection rules for programs also apply to Equipment Phases.

	Program_B (Standard)	Program_A (Standard)				Controller Scope Tag (Standard Class)
		Input	Output	InOut	Public	
Input		—	Yes	—	Yes	Yes
Output		Yes	—	Yes*	Yes	Yes
InOut		—	Yes*	—	Yes	Yes
Public		Yes	Yes	Yes	—	Alias
Controller Scope Tag (Standard Class)		Yes	Yes	Yes	Alias	Alias

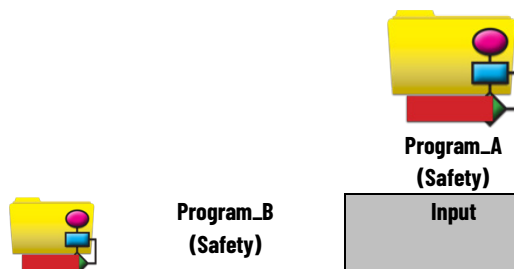
- * An InOut parameter can only be connected to an Output parameter if the InOut parameter is configured as a constant.
- An Input parameter from Program_A can connect to an Output parameter of Program_A (wrap around).
- Parameters of the same type cannot be connected together.
- Public tags can only bind to controller scope tags using an alias.

Safety program to safety program connection rules

The following table summarizes the rules for using program parameters to connect two safety programs.



Tip: The connection rules for programs also apply to Equipment Phases.



	Program_B (Safety)	Input	Output	InOut	Public	Controller Scope Tag (Safety Class)
Input		—	Yes	—	Yes	Yes
Output		Yes	—	Yes*	Yes	Yes
InOut		—	Yes*	—	Yes	Yes
Public		Yes	Yes	Yes	—	Alias
Controller Scope Tag (Safety Class)		Yes	Yes	Yes	Alias	Alias

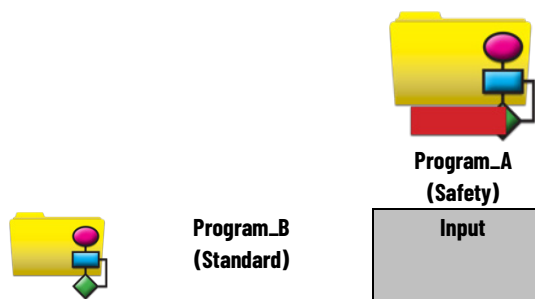
- * An InOut parameter can only be connected to an Output parameter if the InOut parameter is configured as a constant.
- An Input parameter from Program_A can connect to an Output parameter of Program_A (wrap around).
- Safety mapping must be used to connect standard class tags to safety class tags/parameters.
- Standard class tags cannot alias safety class tags.

Safety program to standard program connection rules

The following table summarizes the rules for using program parameters to connect a safety program to a standard program.



Tip: The connection rules for programs also apply to Equipment Phases.



	Program_B (Standard)	Input	Output	InOut	Public	Controller Scope Tag (Safety Class)
Input		—	Yes	—	Yes	Yes
Output		—	—	—	—	—
InOut		—	—	—	—	—
Public		—	—	—	—	—
Controller Scope Tag (Safety Class)		Yes	Yes	Yes	Alias	Alias

- An Input parameter from Program_A can connect to an Output parameter of Program_A (wrap around).
- Safety mapping must be used to connect standard class tags to safety class tags/parameters.
- Standard class tags cannot alias safety class tags.

Directly accessing program parameters

Introduction

This chapter provides an overview of direct access and an example procedure for directly accessing program parameters when working within code editors.

Direct access

Direct access lets you reference the program parameters from another program in logic without configuring parameters in the local program. The syntax used for direct access is `\ProgramName.ParameterName`. For example, assume Program_A has an output parameter called Tank_Level. Without creating a corresponding input parameter to connect to Program_A, Program_B can reference the Tank_Level parameter in logic using the syntax `\A.Tank_Level`.

Program local tags cannot be accessed using direct access.

Behavior of direct access in logic

Input, Output, and Public parameters can all be directly accessed in logic.

- When direct access is implemented in Output parameters, values are updated when the program that contains the Output parameter completes execution.
- When direct access is implemented in Input and Public parameters, the values of the referenced parameters are updated in real time. This means that higher priority tasks are using parameter values that are up to date, thus minimizing the risk of performing actions on stale data.
- Direct access to an Input parameter counts toward fan-in. You cannot have both a connection and a direct access sourcing an Input parameter. You can however still use direct access to read the value.
- Using direct access of Input parameters is a good way to circumvent the one connection limit of Input parameters. If you create an Input parameter but do not configure any connections for that Input parameter, you can directly reference it from multiple programs.

Access program parameters when editing ladder logic

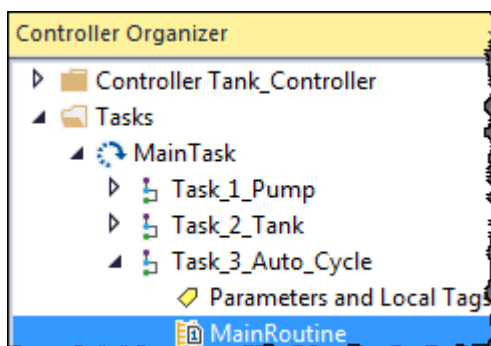
The following procedure explains how to access program parameters when editing ladder logic.



Tip: While this example is specific to ladder logic, the notation is the same for all programming languages.

To access program parameters when editing ladder logic

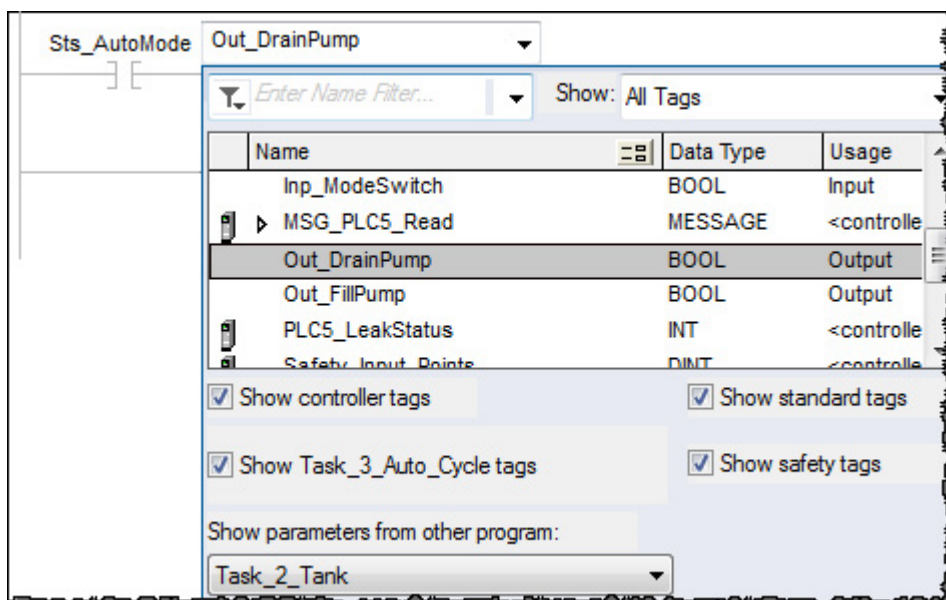
1. In the **Controller Organizer**, expand the folder for the program that contains the ladder logic routine that contains instructions for which you are configuring direct access, and double-click the routine.



2. In the **Ladder Editor Routine**, locate the instruction for which you want to add a reference to a program parameter that is in another program.
3. Double-click the existing tag name (it appears as ? if currently unassigned), and choose the pull-down arrow.



4. (optional) On the Tag Browser, clear or select the check boxes to focus the list of available parameters that appear to what you need.



5. In the **Show parameters from other program** list, choose the program to which you want to connect this instruction.
6. In the list of available parameters, double-click the desired parameter.

Index

A

argument 9

C

connect

InOut parameter 24
Input parameter 15
Output parameter 19, 20
Public parameter 26

connection methods 12

D

direct access

behavior 33
overview 33
use 33

I

InOut parameter

connect to a controller scope tag 24
connection types and uses 23
general connection rules 24
overview 23

Input parameter

connect to a controller scope tag 15
connection types and uses 15
general connection rules 15
overview 15

O

Output parameter

connect to a controller scope tag 19
connect to another program 20
connection types and uses 18
general connection rules 19
overview 18

P

passed by reference 9

passed by value 9

program parameter

connect 11
connection methods 12
connection of UDT sub-elements 15
connection syntax 14

Public parameter

connect to another program 26
connection types and uses 25
general connection rules 26
overview 25

S

safety program parameters

general connection rules 28
overview 28

U

UDT sub-elements 15

Rockwell Automation support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, and product notification updates.	rok.auto/support
Knowledgebase	Access Knowledgebase articles.	rok.auto/knowledgebase
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	rok.auto/pcdc

Documentation feedback

Your comments help us serve your documentation needs better. If you have any suggestions on how to improve our content, complete the form at rok.auto/docfeedback.

Waste Electrical and Electronic Equipment (WEEE)



At the end of life, this equipment should be collected separately from any unsorted municipal waste.

Rockwell Automation maintains current product environmental information on its website at rok.auto/pec.

Allen-Bradley, expanding human possibility, Logix, Rockwell Automation, and Rockwell Software are trademarks of Rockwell Automation, Inc.

EtherNet/IP is a trademark of ODVA, Inc.

Trademarks not belonging to Rockwell Automation are property of their respective companies.

Rockwell Otomasyon Ticaret A.Ş. Kar Plaza İş Merkezi E Blok Kat:6 34752, İçerenköy, İstanbul, Tel: +90 (216) 5698400 EEE Yönetmeliğine Uygundur

Connect with us.    

rockwellautomation.com — expanding **human possibility**™

AMERICAS: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444

EUROPE/MIDDLE EAST/AFRICA: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640

ASIA PACIFIC: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846