EZTouch® Protocol Conversion Feature

Application Note & Examples

The EZTouch Editor supports dual protocol PLC Communication. It also supports multi-function operations and expressions that can be used for protocol conversion and/or multi-PLC conditional coding. For example, you can read PLC tags from an Allen Bradley PLC and thru the EZTouch convert the data so a Siemens PLC can also understand the updated values.


If using Ethernet dual protocol then you can communicate with multiple PLCs of the same type that enables pass-through communication between these different PLCs using the EZTouch HMI®. For example, you can have a MicroLogix, CompactLogix and ControlLogix all transferring data between each other through the EZTouch®. This pass through communication and expressions allow for multi-PLC conditional coding as well.

This document will look at 4 different ways of setting up protocol conversion/pass through communication. Then it will provide an example for each at the end. First to setup dual protocol follow the directions below:

Dual Protocol Setup
1. On the Project Information Screen under **Protocol/PLC Model** you can enable **PLC2 / Drive** and then select a second PLC or drive to communicate to.
2. Communication setup is like for PLC 1 using the View/Edit PLC Com Setup.
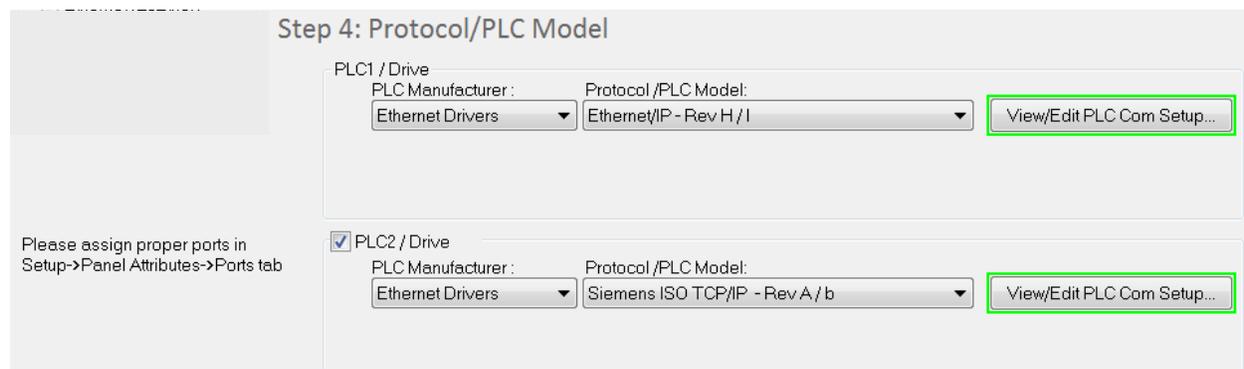
3. If you are using a second serial driver then you need to setup the Panel Com ports in the **Setup > Panel Attributes > Ports tab.**

4. Once you have setup both PLC Protocols then in the tag database you can use either PLC 1 or PLC 2 to create new tags. Note: Syntax will be checked for both PLCs that tag makes sense for the object being used and it has the correct format.
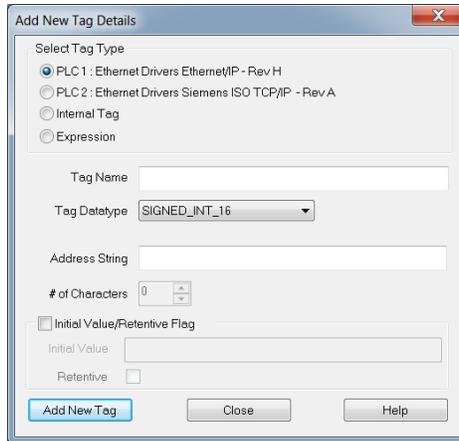
## MULTI-FUNCTIONS (Single Instance Conversion)

The multi-function button is a button which you add to the screen. When the button is pressed then multiple functions can be performed on multiple registers. These operations include a move function which can move information from a tag in PLC 1 to a tag in PLC 2 or vice versa. You can also do operations with both PLC 1 and PLC 2 tags together such as adding, dividing, multiplying, etc.

To create this object follow the directions below:

1. In the object menu select Multi-Function.
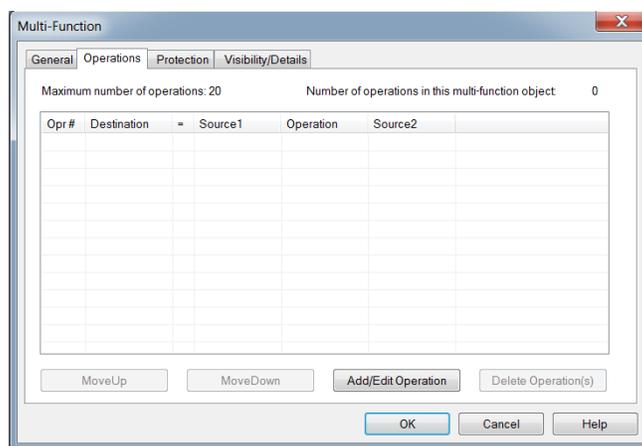
2. The General tab in the Multi-Function is useful to change the button display characteristics. The operations tab is where you define the operations to be performed like the move function.
3. Click the Add/Edit Operation to create the operation to be done. You can also decide on the source tag (can be from PLC 1 or PLC 2). Then finally decide the destination tag (this can also be from PLC 1 or PLC 2).
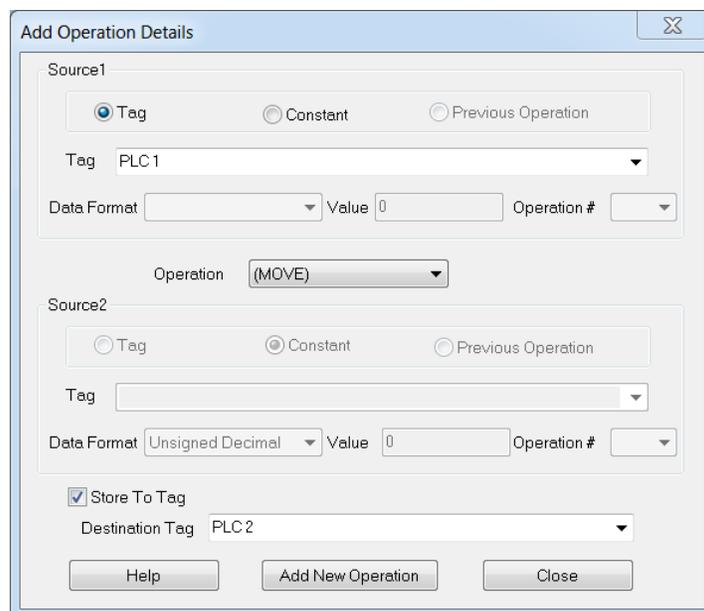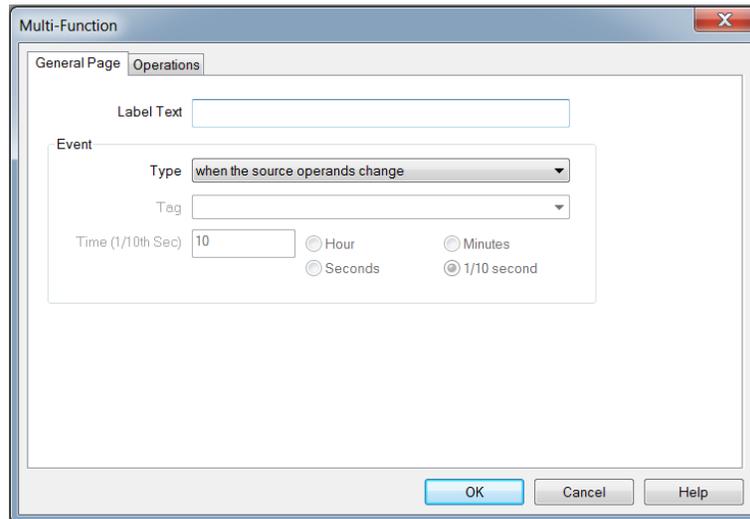
4. Once you finish, click on Add New Operation to add the operation. Then you can then define the next operation using the same method.
5. Once all operations are created and the object is added to the screen, pressing this button will evaluate all the operations at once. For Protocol conversion all the move functions will only be evaluated upon pressing of the button.

## GLOBAL MULTI-FUNCTIONS (Continuous Automatic Conversions)

The global multi-functions are operations which are done constantly when a condition happens. Such as when a value changes or even time based. After the condition changes multiple operations can be carried out at the same time. For protocol conversion this means that you could move data from PLC 1 to PLC 2 at set intervals, when the data changes or even based on a discrete tag conditions.

To create this object follow the directions below:

1. In Setup > Global Objects select Multi-Function.

2. In the dialogue box on the General Page define the condition when this will be evaluated. This can be when a register value changes, when a discrete turns on or off, or even on a time base scale.
3. In the Operations page you define the operations exactly as with the Multi-Function Button.
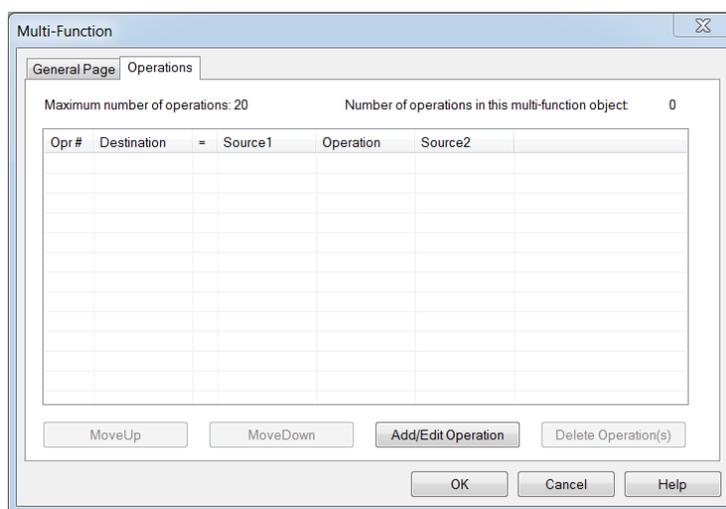
4. Click the Add/Edit Operation to create the operation to be done. You can also decide on the source tag (can be from PLC 1 or PLC 2). Then finally decide the destination tag (this can also be from PLC 1 or PLC 2).
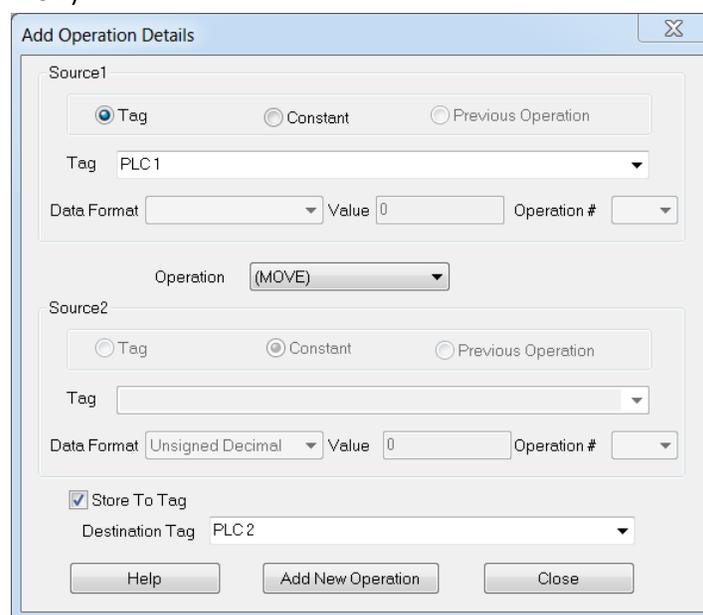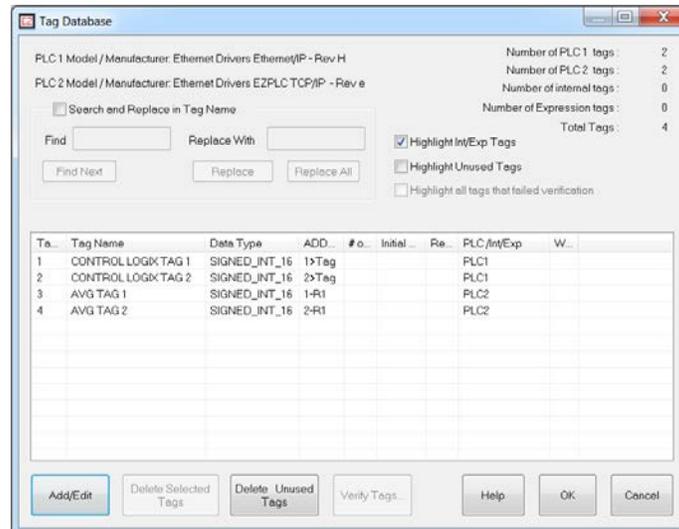

5. Once you finish, click on Add New Operation to add the operation. Then you can then define the next operation using the same method.
6. Once the operation created when the condition previously defined is true all the operations will be evaluated at once.
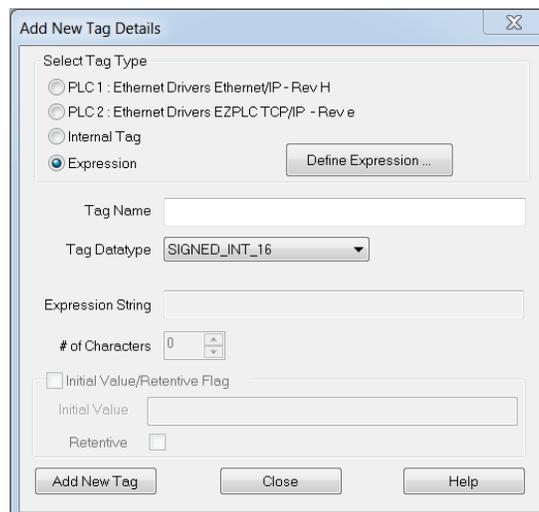
FUNCTION EXPRESSIONS (Multi-PLC Functions)

The function expressions are internal program logic designed to do simple math / logic functions. These functions can be done on multiple tags from 1 PLC or multiple tags from many different PLCs. The expressions are always evaluated and recorded and do not have to be viewed. Expressions can be assigned to be displayed by indicators and can also use internal HMI tags as well.

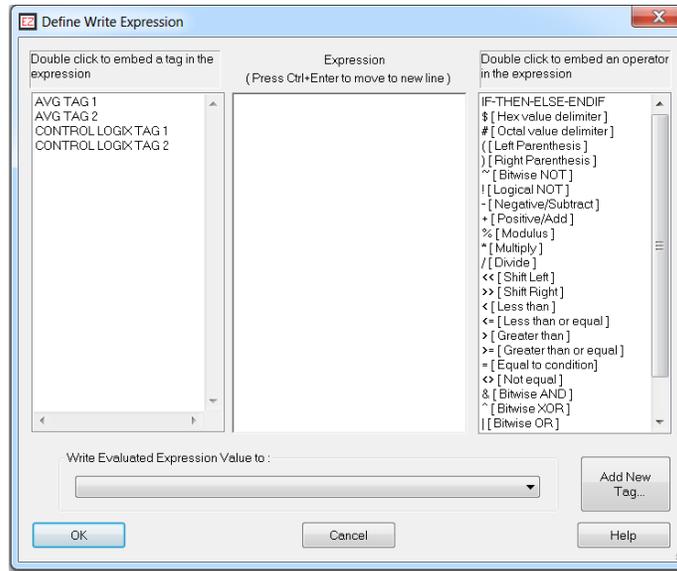To create an expression follow the directions below:

1. Go to Setup > Tag Database.

2. Click on Add/Edit. In the next dialogue box select Expression. And then put in the expression name in tag name box.

3. Now click on Define Expression.

4. In the Define Write Expression dialogue box you can define the expression:
    a. Click in the middle column to type in a Constant.
    b. Double click on a Tag in the list on the left hand column to insert it into an Expression. The tag will appear in the center column.
    c. Select (double click) an Operator in the right hand column to insert into the Expression.
5. Example of an function expression (further examples in example section):
    AVG TAG 1 Value = 1
    Operator = + [Positive/Add]
    CONTROL LOGIX TAG 1 Value = 3

    Result: 1 + 3 = 4
    Expression Value = 4

6. This is a very simple example of the complex computations that can be accomplished with Expression tags.
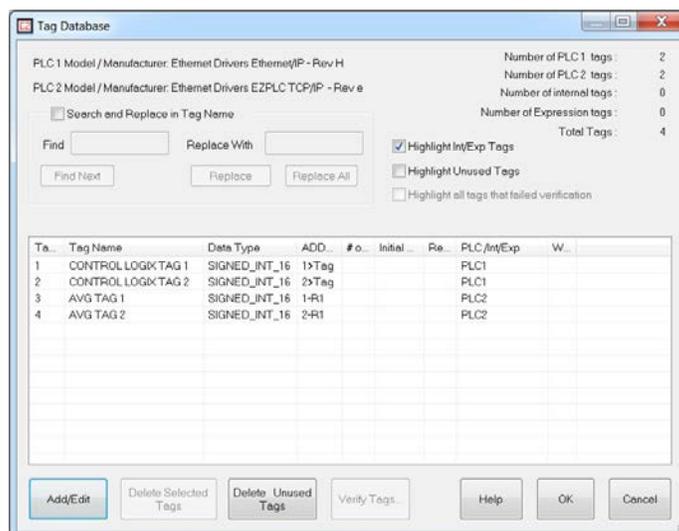
    Note: Please be aware that Expression Tags are limited to a maximum of 40 operands per tag. Complex operands may use more memory and may further limit the number of operands per expression.   In order to avoid errors when trying to use the tag, avoid using too many operands per expression.

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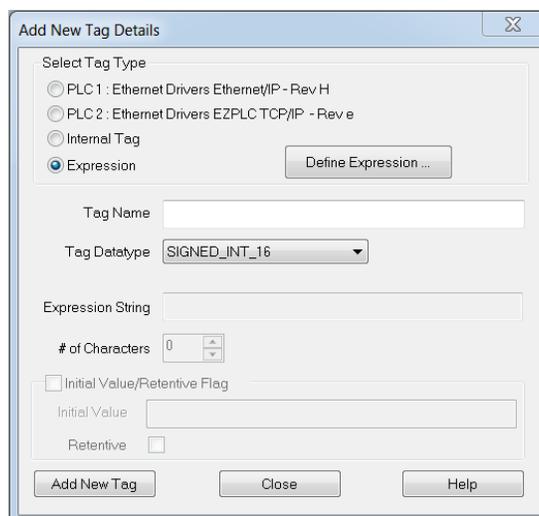## CONDITIONAL EXPRESSIONS (Multi-PLC Conditions)

The conditional expressions are internal program logic designed to do simple If / Then statements. These expressions are made the same way as Functional expressions, just behave differently. These functions can be done on multiple tags from 1 PLC or multiple tags from many different PLCs. The expressions are always evaluated and recorded and do not have to be viewed. Expressions can be assigned to be displayed by indicators and can also use internal HMI tags as well.

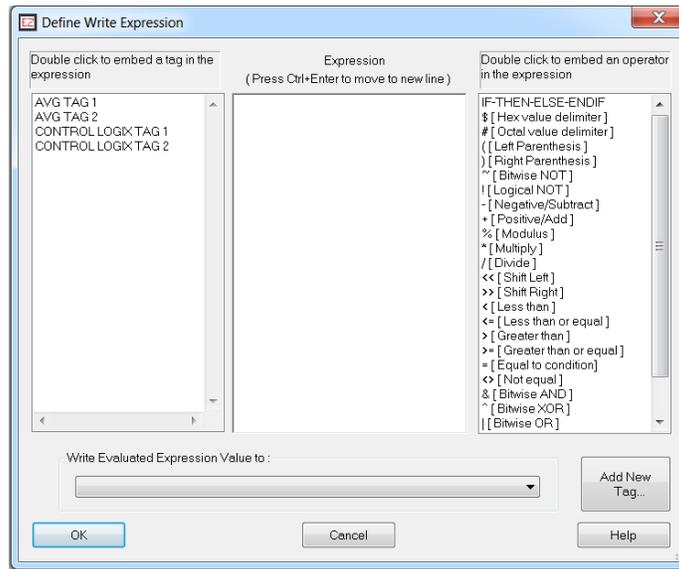To create an expression follow the directions below:

1. Go to Setup > Tag Database.

2. Click on Add/Edit. In the next dialogue box select Expression. And then put in the expression name in tag name box.

3. Now click on Define Expression.

4. In the Define Write Expression dialogue box you can define the expression:
   a. Click in the middle column to type in a Constant.
   b. Double click on a Tag in the list on the left hand column to insert it into an Expression. The tag will appear in the center column.
   c. Select (double click) an Operator in the right hand column to insert into the Expression.
5. Example of a conditional expression (further examples in example section):

   The format for the conditional is:
   IF **<expression>** THEN **<expression>** ELSE **<expression>** ENDIF
   The ELSE and ENDIF are required. All expressions require at least one operand.
   The conditional can be used as an operand.

   For example: IF(AVG TAG 2=5)THEN(CONTROL LOGIX TAG 1 + 10)ELSE(5)ENDIF

7. This is a very simple example of the complex computations that can be accomplished with Expression tags.

   Note: Please be aware that Expression Tags are limited to a maximum of 40 operands per tag. Complex operands may use more memory and may further limit the number of operands per expression.   In order to avoid errors when trying to use the tag, avoid using too many operands per expression.

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Example #1 – Single Instance Protocol Conversion

This example converts ControlLogix Tags to AVG tags when the multi-function button is pressed. It also adds the ControlLogix tags together and stores it in an Internal tag.
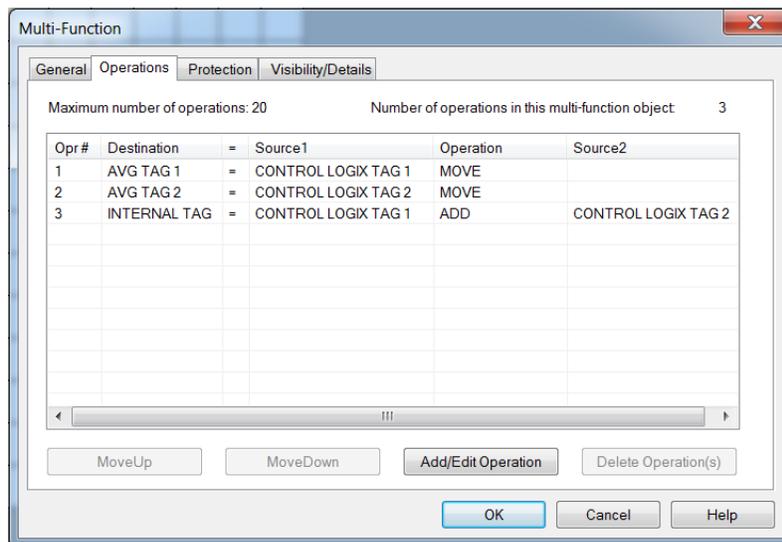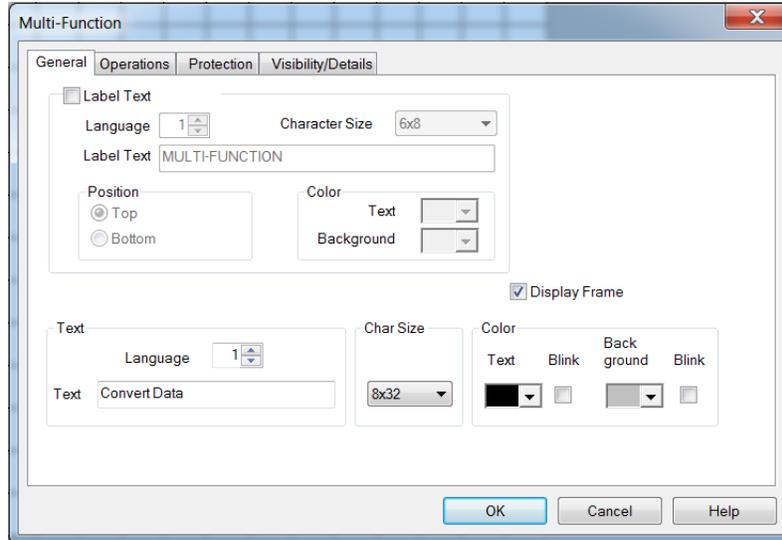

Pressing this button will now convert the data at this time and also add the ControlLogix tag together and move them into an Internal tag.

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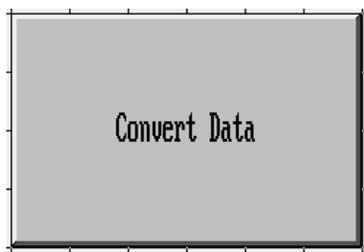
Example #2 – Continuous Automatic Protocol Conversion

This example converts ControlLogix Tags to Siemens tags when the value of the tags changes. It also adds the ControlLogix tags together and stores it in an Internal tag.

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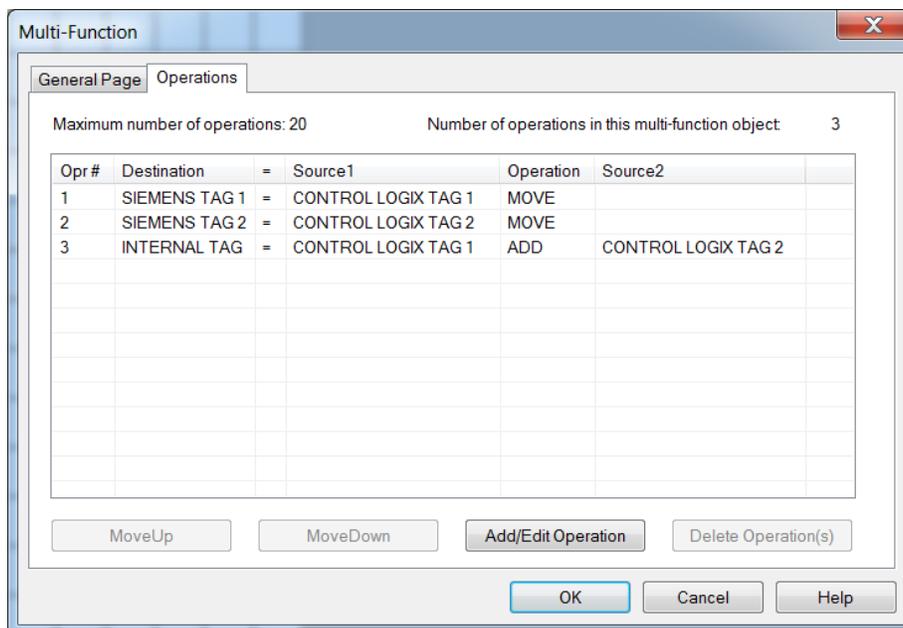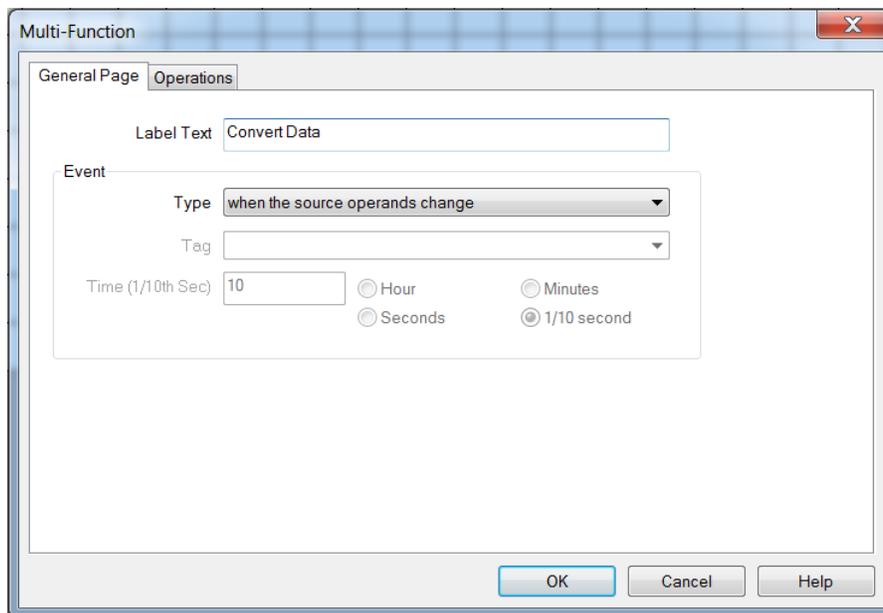
Example #3 – Multi-PLC Functions

This example adds the ControlLogix Tags to the Automation Direct tags. The result is always reported in the expression. Also shown is data display to show the result.

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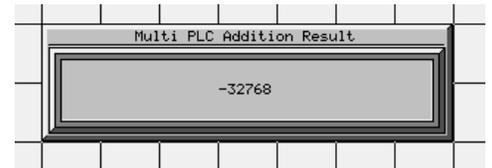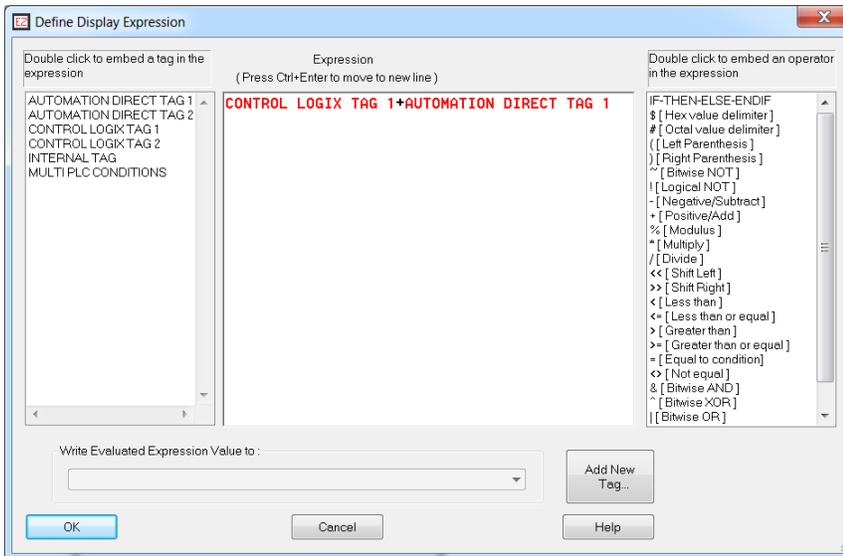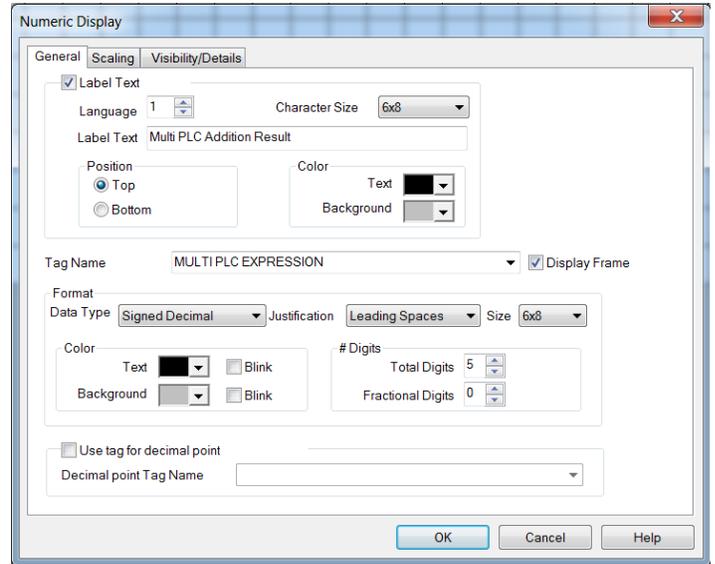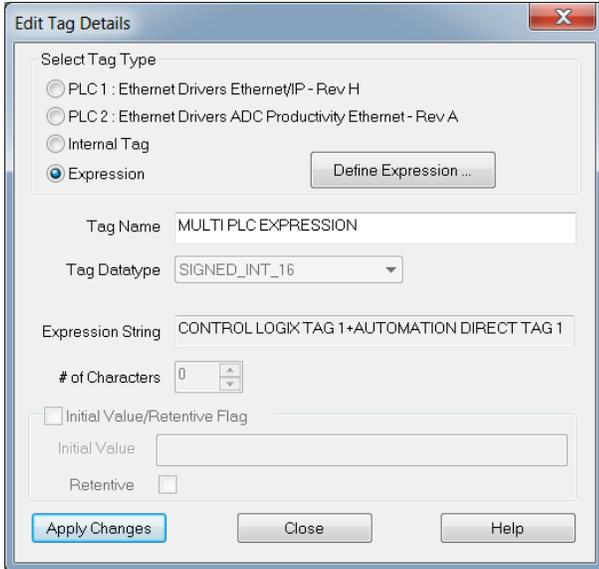
Example #4 – Multi-PLC Conditions

This example uses both ControlLogix and AVG Tags to control a multi-state indicator button to display multiple different messages based on both tags.
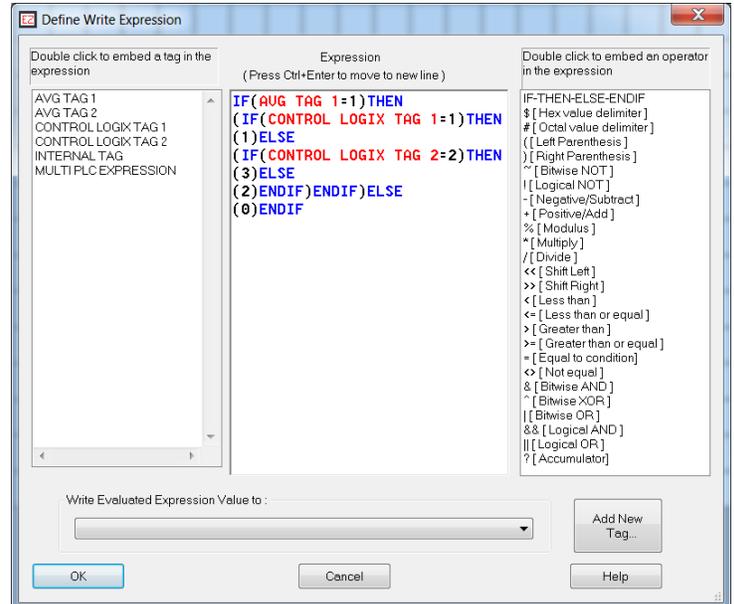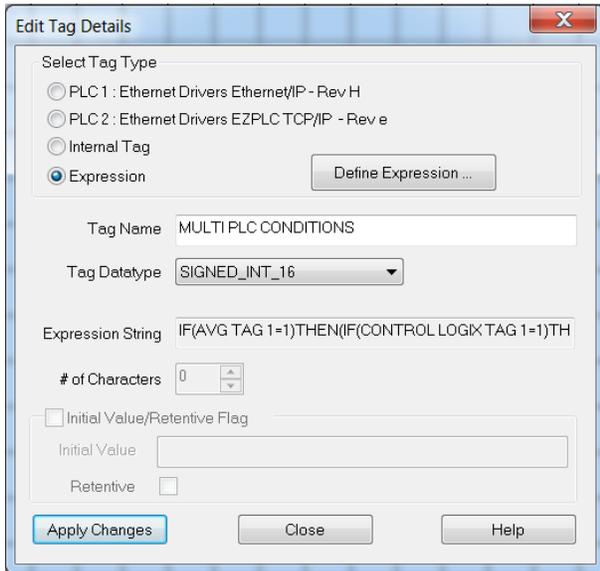
Example results:

- AVG TAG=1 and CONTROL LOGIX TAG=1
  - MULTI PLC CONDITIONS=1 → Message: All tags are 1!
- AVG TAG=1 and CONTROL LOGIX TAG=2
  - MULTI PLC CONDITIONS=3 → Message: AVG is 1 and CL is 2!
- AVG TAG=1 and CONTROL LOGIX TAG!= 1 or 2
  - MULTI PLC CONDITIONS=2 → Message: AVG is 1!
- AVG TAG!=1
  - MULTI PLC CONDITIONS=0 → Message: Default Message!