7.0 Data Conversion Instructions

Use data conversion instructions to convert data from integer to binary coded decimal and vice versa.

Choose from these instructions:

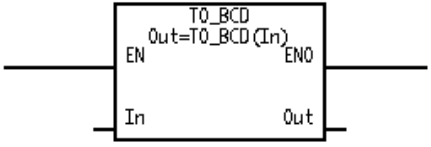
- TO_BCD
- BCD_TO

The supported parameters are:

- simple integer and double integer
- integer and double integer constants
- elements of integer and double integer arrays
- Timer variables (*name*.TPreset and *name*.Elapsed)
- Counter variables (*name*.CPreset and *name*.Current)

See each input and output parameter description for each instruction for specific information.

7.1 Convert Integer Data to BCD (TO_BCD)



Use this instruction to convert integer or double integer data to binary coded decimal (BCD) data.

While EN is true, the instruction converts the value of In to BCD. The result is stored in Out.

7.1.1 Input Parameters for the Convert Integer Data to BCD Instruction

This table lists the inputs for the TO_BCD instruction and the variable and type and data type/range that each input supports.

Parameter	Description	Variable Type	Data Type/Range
EN	While this input is true, the instruction executes. When this input is false, the instruction is not executed and ENO is false.	Connect a Boolean input or output.	
In	Enter the variable that you want converted to binary coded data.	• simple • constant • element of an array	• integer (0 to 9999) • double integer (0 to 99999999) • timer (*name*.TPreset and *name*.Elapsed) • counter (*name*.CPreset and *name*.Current)

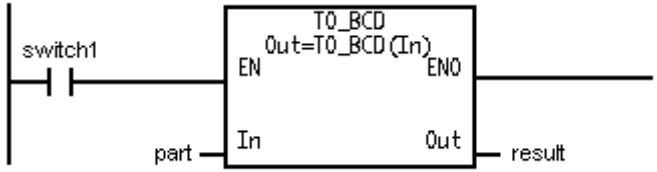
7.1.2 Output Parameters for the Convert Integer Data to BCD Instruction

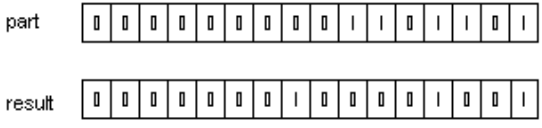
This table lists the outputs for the TO_BCD instruction and the variable type and data type/range that each output supports.

Parameter	Description	Variable Type	Data Type/Range
ENO	Use this output as the input to another instruction for easily chaining multiple instructions. This output follows the state of EN unless an error occurs.	Connect a contact, coil, or Boolean input of another instruction.	
Out	This output contains the binary coded decimal equivalent of the integer value of In.	• simple • element of an array	BCD value of 0-9999 (integer) or 0-99999999 (double integer)

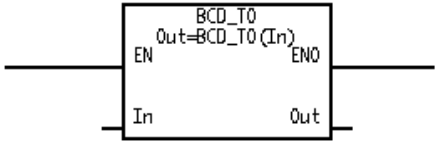
7.1.3 Example of a Convert Integer Data To BCD Instruction

When *switch1* is true, the instruction converts the integer value 109 in the variable *part* to binary coded decimal (BCD) and stores it in the variable *result*.





7.2 Convert From BCD to Integer Data (BCD_TO)



Use this instruction to convert binary coded decimal (BCD) data to integer or double integer data.

When EN is true, the instruction converts the BCD data of In to integer or double integer data. The result is stored in Out.

7.2.1 Input Parameters for the Convert From BCD to Integer Data Instruction

This table lists the inputs for the BCD_TO instruction and the data and type and data type/range that each input supports.

Parameter	Description	Variable Type	Data Type/Range
EN	While this input is true, the instruction executes. When this input is false, the instruction is not executed and ENO is false.	Connect a Boolean input or output.	
In	Enter the variable that you want converted to integer or double integer data.	• simple • constant • element of an array	BCD value of 0-9999 (integer) or 0-99999999 (double integer)

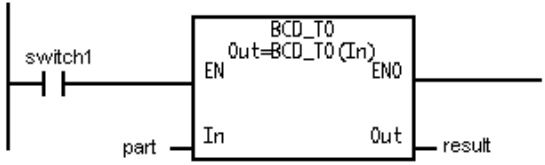
7.2.2 Output Parameters for the Convert From BCD to Integer Data Instruction

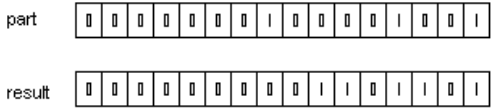
This table lists the outputs for the BCD_TO instruction and the variable type and data type/range that each output supports.

Parameter	Description	Variable Type	Data Type/Range
ENO	Use this output as the input to another instruction for easily chaining multiple instructions. This output follows the state of EN unless an error occurs.	Connect a contact, coil, or Boolean input of another instruction.	
Out	This output stores the integer or double integer equivalent of the BCD value of In.	• simple • element of an array	• converted integer or double integer value • timer (*name*.TPreset and *name*.Elapsed) • count (*name*.CPreset and *name*.Current)

7.2.3 Example of a Convert From Binary Data to Integer Data Instruction

When *switch1* becomes true, the instruction converts the BCD value 109 in the variable *part* to integer and stores the value in the variable *result*.





7.3 Errors Caused by the Data Conversion Instructions

This section describes the possible errors for all data conversion instructions and those additional errors specific to the TO_BCD and BCD_TO instructions.

7.3.1 Errors Caused by All Data Conversion Instructions

These errors can occur when you are using the data conversion instructions. They are logged in the error log.

If this error occurs:	Then:	Do the following:
The array index is negative.	ENO is set according to ERROR_ENO, and element zero of the array is used for the instruction's operation.	Specify a valid array element.
The array index is too large.	ENO is set according to ERROR_ENO, and the last element of the array is used for the instruction's operation.	Specify a valid array element.

7.3.2 Errors Caused by the Convert Integer Data To BCD Instruction

These errors can occur when you are using the TO_BCD instruction in a program. They are logged in the error log.

If this error occurs:	Then:	Do the following:
The result is larger than what Out's data type supports.	• Out contains the maximum value allowed for the data type (9999 for integers and 99999999 for double integers) • ENO is set according to ERROR_ENO	Make sure the value you want to convert to BCD is within the range Out supports.
Tried to convert a negative value to BCD.	• Out contains the value of 0 • ENO is set according to ERROR_ENO	Use a positive value for In.

7.3.3 Errors Caused by the Convert From Binary Data to Integer Data Instruction

These errors can occur when you are using the BCD_TO instruction in a program. They are logged in the error log.

If this error occurs:	Then:	Do the following:
The result is larger than what Out's data type supports.	ENO is set according to ERROR_ENO, and Out contains the largest value allowed for the data type being used.	Specify a larger data type for Out. For example, use a double integer data type instead of a integer.
An illegal BCD digit was found.	• Out contains the value of 0 • ENO is set according to ERROR_ENO.	Use a valid BCD value for In.