OMRON

Sysmac NJ Series

Fiber Laser Marker MX-Z20xxH series

EtherNet/IP communication Function Block Library User's Manual

Contents

SYSMAC always in control

FST-TAF160001B

1. Overview

1.1. Function Overview

The EtherNet/IP communication function block library is used to send commands from the NJ/NX controller to the MX-Z20xxH series laser markers via EtherNet/IP.

The MX-Z2000H series laser marker has 34 commands using EtherNet/IP (Aug 2019). This FB library has 34 FBs which correspond to each command, allowing users to communicate to the laser marker easily without any consideration for the communication.

1.2. Library Detailed Information

1.2.1. Library Information

Item	Description
Library file name	EIP_MXZ2000HSeries_V1_0_*.slr
Library version	Ver1.0.*
Name space	OMA_ApplicationLib\MX_Laser

1.2.2. Library Part Information

FB name	Description
CancelError_00101000	Cancels errors and alarms.
SaveEditedData_00201000	Saves the edited marking data.
StartEdit_00301000	Starts editing the marking data.
EndEdit_00301010	Ends editing the marking data.
PalletParameterSetting_00302000	Sets the pallet parameter for the marking data.
PalletParameterAcquisition_00302010	Acquires the setting of the pallet parameter for the marking data.
CellParameterSetting_00303000	Sets the cell parameter for the marking data.
CellParameterAcquisition_00303010	Acquires the setting of the cell parameter for the marking data.
LayerParameterSetting_00304000	Sets the layer parameter for the marking data.
LayerparameterAcquisition_00304010	Acquires the setting of the layer parameter for the marking data.
BlockProcessingParameterSetting_00305000	Changes processing settings of the specified block.
BlockProcessingParameterAcquisition_00305010	Acquires the processing settings of the specified block.
CounterSetting_00401000	Sets the counter.
CounterSettingAcquisition_00401010	Acquires the counter setting.
CountUp_00401020	Counts up the counter.
CounterReset_00401030	Sets the counter to initial value.
CounterStatusAcquisition_00401040	Acquires the counter status.
VariableDataTableIndexSpecification_0	Specifies the variable data table No. and index No.

0401050	
VariableDataTableIndexAcquisition_00401060	Acquires the variable data table No. and index No.
MarkingDataNoSpecification_00402000	Specifies the marking data No.
MarkingDataNoAcquisition_00402010	Acquires the marking data No.
PositionCorrectionValueSetting_00403000	Sets the offset value for position correction.
PositionCorrectionValueAcquisition_00403010	Acquires the offset value for position correction.
OpenTheShutter_00404000	Opens the shutter.
CloseTheShutter_00404010	Closes the shutter.
DeviceStatusAcqusition_00404020	Acquires the device status.
StartMarking_00404030	Starts the marking.
MarkingStop_00404040	Stops the marking.
WarmUpStart_00404050	Starts the warm-up.
MarkingStatusAcquisition_00405000	Acquires the device status, including the marking status (MARK BUSY).
PowerMonitorMeasurement_00405010	Acquires the measurement results for the internal power monitor.
LaserPowerMonitorSettingChange_00406000	Changes the value of the laser monitor setting.
LaserPowerMonitorSettingAcqusition_00406010	Acquires the value of the laser monitor setting.
RunsTheLaserPowerCheck_00501000	Runs the laser power check.

2. FB Specifications

2.1. Common Variables

The specifications of variables used for all FBs (Execute, Done, Busy, Error, ErrorID) are described below. These variables are not described in the tables of variables for individual FBs.

2.1.1. Execute, Done, and Busy

Execute is an input variable that gives the execution condition.

FB execution starts when *Execute* changes to TRUE. After *Execute* changes to TRUE, execution of this FB is continued until processing is completed even if the value of *Execute* changes to FALSE.

Done is an output variable that shows the completion of execution.

Busy is an output variable that shows that FB execution is in progress.

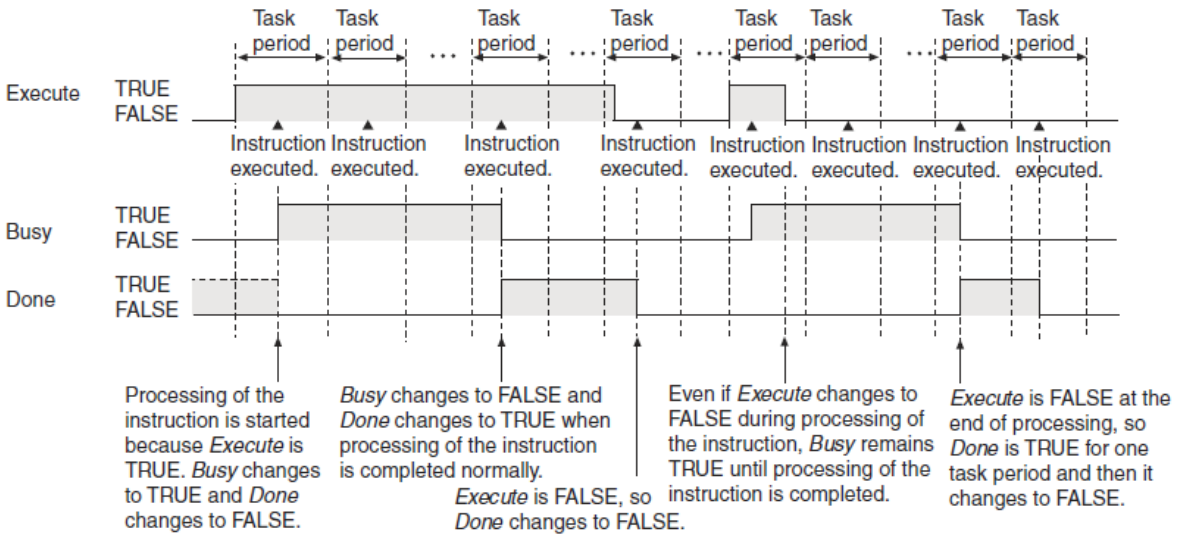
Name	Meaning	I/O	Description	Data type	Valid range	Initial value
Execute	Execute	Input	TRUE: Instruction is executed.*1 FALSE: Instruction is not executed.*2	BOOL	TRUE or FALSE	FALSE
Done	Done	Output	TRUE: Normal end.*3*4 FALSE: Error end, execution in progress, or execution condition not met.	BOOL	TRUE or FALSE	---
Busy	Busy		TRUE: Execution processing is in progress. FALSE: Execution processing is not in progress.			

*1 If the value of *Execute* is already TRUE when Controller operation starts, the instruction is not executed. To execute the instruction in that case, first change the value of *Execute* to FALSE.

*2 Processing is completed to the end even if *Execute* changes to FALSE during execution.

*3 The value of *Done* changes to FALSE when the execution condition is no longer met after a normal end.

*4 If the execution condition is no longer met when a normal end occurs, the value of *Done* is TRUE for one task period and it then changes to FALSE.



2.1.2. Error and ErrorID

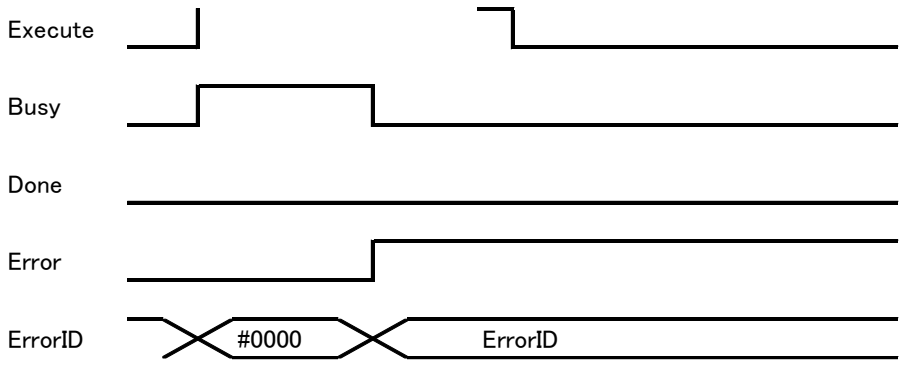
Error and *ErrorID* are output variables that show that an error occurred in the execution.

Name	Meaning	I/O	Description	Data type	Valid range	Initial value
Error	Error	Output	TRUE: Error end.*1*2 FALSE: Normal end, execution in progress, or execution condition not met.	BOOL	TRUE or FALSE	---
ErrorID	Error code		This is the error ID for an error end. The value is WORD#16#0 for a normal end.	WORD	Depends on the instruction.	
ErrorIDEx	Expansion error code		This is the error ID for an Expansion Unit Hardware Error. The value is DWORD#16#0 for a normal end.	DWORD		

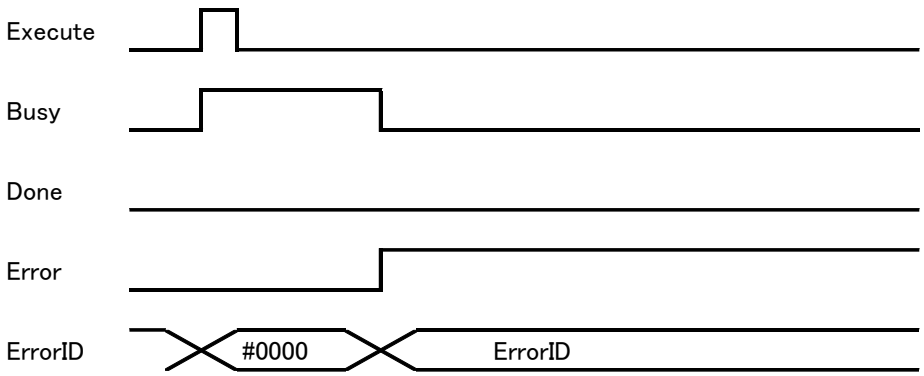
*1 The value of *Error* changes to FALSE when the execution condition is no longer met after an error end.

*2 If the execution condition is no longer met when an error end occurs, the value of *Error* is TRUE for one task period and it then changes to FALSE.

- The following timing chart is for when an error occurs while input variable *Execute* is TRUE. After completion, the output variable *Error* will remain TRUE even if *Execute* changes to FALSE.



- The following timing chart is for when the input variable *Execute* is TRUE for only one period and an error occurs for the instruction. The output variable *Error* will remain TRUE.



2.1.3. Error codes

ErrorID	Status	Cause	Correction
16#E001	Initialization Error	When *Execute* changes to TRUE and the laser marker is already in command execution or marking or error status.	Execute the FB when the laser marker is not in command execution, marking or error status.
16#E002	Marker Error	An error occurs during the FB execution.	Check the status of the laser marker.
16#E003	Response Code Error	Response code from the laser marker other than 0000, which means NG.	Check the Command Code and Response Code in the Response Area of the laser marker for EtherNet/IP.
16#E004	Time Out Error	The command execution of the FB was not completed within the time that was set in *TimeOut*.	Check the EtherNet/IP connection status.

2.1.4. MX_CommandArea and MX_ResponseArea

MX_CommandArea is an In-Out variable that corresponds with the Command Area of the laser marker for EtherNet/IP.
MX_ResponseArea is an In-Out variable that corresponds with the Response Area of the laser marker for EterNet/IP.
Although these two variables are In-Out variables, you do not need to set any parameters to them. These variables are the interface between FBs and EtherNet/IP memory area of the laser marker. They are controlled inside of FBs. Please consider these variables as output variables to see the communication status at any time, including when an error occurs.

Name	Data Type	Valid Range	Description
MX_CommandArea	S_EIP_ MX_CommandArea	-	See the description below for this data type
MX_ResponseArea	S_EIP_ MX_ResponseArea	-	See the description below for this data type

- S_EIP_MX_CommandArea

Member	Data Type	Description
ControlOutput	ARRAY[0..31] OF BOOL	Corresponds with Control Output area in Command Area of the laser marker.
CommandCode	DWORD	Corresponds with Command Code area in Command Area of

		the laser marker.
CommandParameters	ARRAY[0..20] OF DINT	Corresponds with Command Parameters area in Command Area of the laser marker.

- S_EIP_MX_ResponseArea

Member	Data Type	Description
ControlOutput	ARRAY[0..31] OF BOOL	Corresponds with Control Output area in Response Area of the laser marker.
CommandCode	DWORD	Corresponds with Command Code area in Response Area of the laser marker.
ResponseCode	DWORD	Corresponds with Response Code area in in Response Area of the laser marker.
ResponseData	ARRAY[0..20] OF DINT	Corresponds with Response Data area in Response Area of the laser marker.

Additional Information

For details on the command area and the response area of the laser marker, refer to the Fiber Laser Marker MX-Z2000H series User's manual (Cat. No. W504).

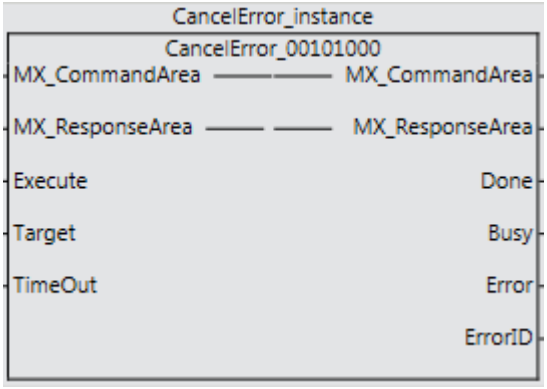
2.1.5. TimeOut

TimeOut is an input variable to stop the execution of the FB when the FB cannot be executed.

Name	Data Type	Valid Range	Default	Description
TimeOut	UINT	0 to 65535	10 (=1000ms)	The time is set in increments of 100 ms. *Error* changes to TRUE when the set time elapses after the execution of the FB starts.

2.2. **Error Processing FBs**

2.2.1. CancelError FB

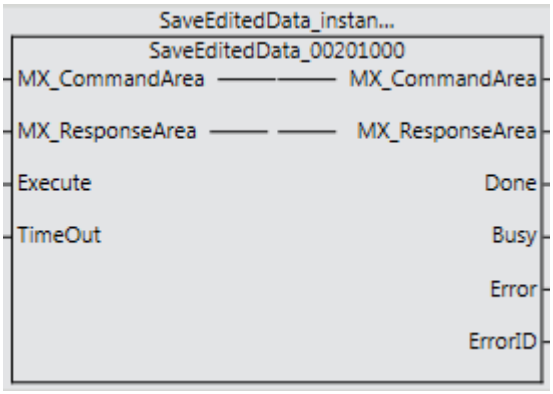
Instruction	Graphic expression	ST expression
CancelError _00101010		CancelError_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, Target:=, TimeOut:=, Done=>, Busy=>, Error=>, ErrorID=>);

- Input variables

Name	Data Type	Description
Target	DINT	0: Cancel all 1: Cancel error only 2: Cancel alarm only

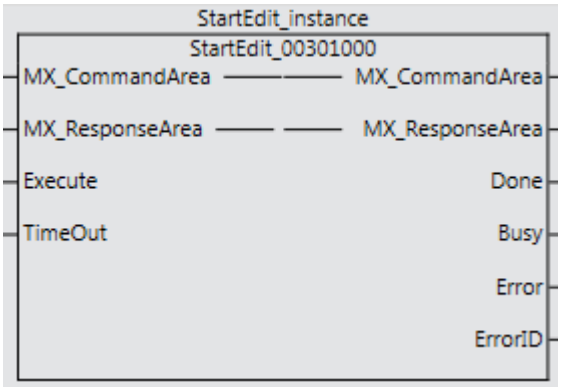
2.3. **Saving Marking Data FBs**

2.3.1. SaveEditedData FB

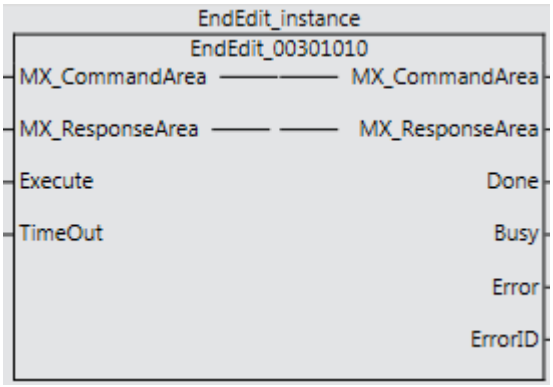
Instruction	Graphic expression	ST expression
SaveEditedData _00201000		SaveEditedData_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, Done=>, Busy=>, Error=>, ErrorID=>);

2.4. **Edditing Marking Data FBs**

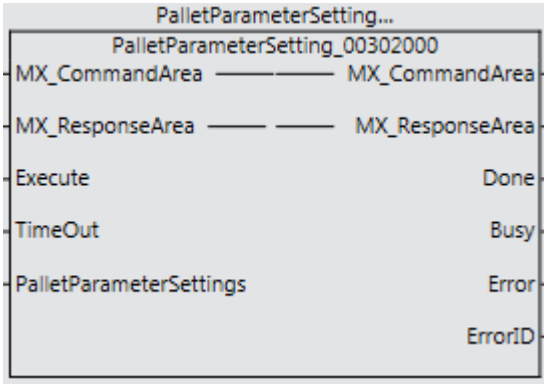
2.4.1. StartEdit FB

Instruction	Graphic expression	ST expression
StartEdit _00301000		StartEdit_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, Done=>, Busy=>, Error=>, ErrorID=>);

2.4.2. EndEdit FB

Instruction	Graphic expression	ST expression
EndEdit _00301010		EndEdit_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, Done=>, Busy=>, Error=>, ErrorID=>);

2.4.3. PalletParameterSetting FB

Instruction	Graphic expression	ST expression
PalletParameterSetting _00301010		PalletParameterSetting_instance(MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, PalletParameterSettings:=, Done=>, Busy=>, Error=>, ErrorID=>);

- Input variables

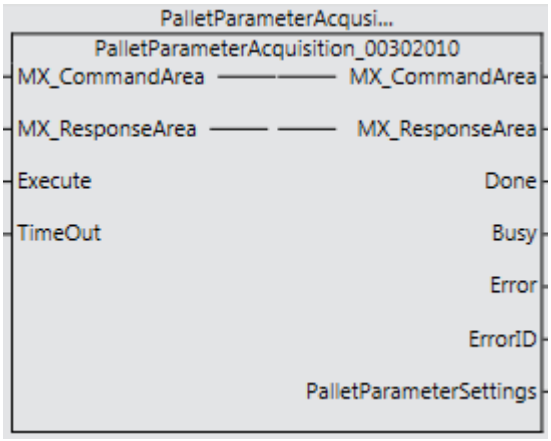
Name	Data Type	Description
PalletParameterSettings	S_MX_PalletParameterSettings	See the description below for this data type

- S_MX_PalletParameterSettings

Member	Data Type	Description
PalletSpecification	DINT	0: Disabled 1: Enabled
ClippingPositionStartPointX	DINT	Type MX-Z2000H: -45000 to 45000 Type MX-Z2050H/Z2055H: -80000 to 80000 Unit: 1/1000mm
ClippingPositionStartPointY	DINT	Type MX-Z2000H: -45000 to 45000 Type MX-Z2050H/Z2055H: -80000 to 80000 Unit: 1/1000mm

ClippingWidth	DINT	Type MX-Z2000H: 1 to 90000 Type MX-Z2050H/Z2055H: 1 to 160000 Unit: 1/1000mm
ClippingHeight	DINT	Type MX-Z2000H: 1 to 90000 Type MX-Z2050H/Z2055H: 1 to 160000 Unit: 1/1000mm
ClippingRotationAngle	DINT	-4500 to 4500 Unit: 1/100°
FirstPositionStartPointX	DINT	Type MX-Z2000H: -45000 to 45000 Type MX-Z2050H/Z2055H: -80000 to 80000 Unit: 1/1000mm
FirstPositionStartPointY	DINT	Type MX-Z2000H: -45000 to 45000 Type MX-Z2050H/Z2055H: -80000 to 80000 Unit: 1/1000mm
IntervalX	DINT	Type MX-Z2000H: 0 to 90000 Type MX-Z2050H/Z2055H: 0 to 160000 Unit: 1/1000mm
IntervalY	DINT	Type MX-Z2000H: 0 to 90000 Type MX-Z2050H/Z2055H: 0 to 160000 Unit: 1/1000mm
NumberOfCellsX	DINT	1 to 255
NumberOfCellsY	DINT	1 to 255
CellCountUpDirection	DINT	0: Lateral direction from upper left 1: Lateral direction from upper right 2: Lateral direction from down left 3: Lateral direction from down right 4: Vertical direction from upper left 5: Vertical direction from upper right 6: Vertical direction from down left 7: Vertical direction from down right
NonMarkingCells	DINT	0: Do not count up 1: Count up

2.4.4. PalletParameterAcquisition FB

Instruction	Graphic expression	ST expression
PalletParameterAcquisition_00302010		PalletParameterAcqusition_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, Done=>, Busy=>, Error=>, ErrorID=>, PalletParameterSettings= >);

- Output variables

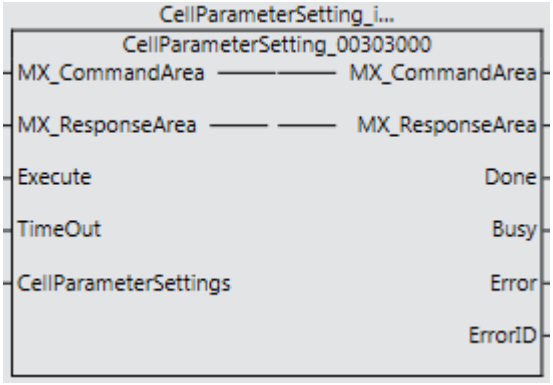
Name	Data Type	Description
PalletParameterSettings	S_MX_PalletParameterSettings	See the description below for this data type.

- S_MX_PalletParameterSettings

Member	Data Type	Description
PalletSpecification	DINT	0: Disabled 1: Enabled
ClippingPositionStartPointX	DINT	Unit: 1/1000mm
ClippingPositionStartPointY	DINT	Unit: 1/1000mm
ClippingWidth	DINT	Unit: 1/1000mm
ClippingHeight	DINT	Unit: 1/1000mm
ClippingRotationAngle	DINT	Unit: 1/100°
FirstPositionStartPointX	DINT	Unit: 1/1000mm
FirstPositionStartPointY	DINT	Unit: 1/1000mm
IntervalX	DINT	Unit: 1/1000mm
IntervalY	DINT	Unit: 1/1000mm
NumberOfCellsX	DINT	1 to 255
NumberOfCellsY	DINT	1 to 255
CellCountUpDirection	DINT	0: Lateral direction from upper left 1: Lateral direction from upper right 2: Lateral direction from down left 3: Lateral direction from down right 4: Vertical direction from upper left 5: Vertical direction from upper right 6: Vertical direction from down left 7: Vertical direction from down right

NonMarkingCells	DINT	0: Do not count up 1: Count up

2.4.5. CellParameterSetting FB

Instruction	Graphic expression	ST expression
CellParameterSetting_00303000		CellParameterSetting_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, CellParameterSettings:=, Done=>, Busy=>, Error=>, ErrorID=>);

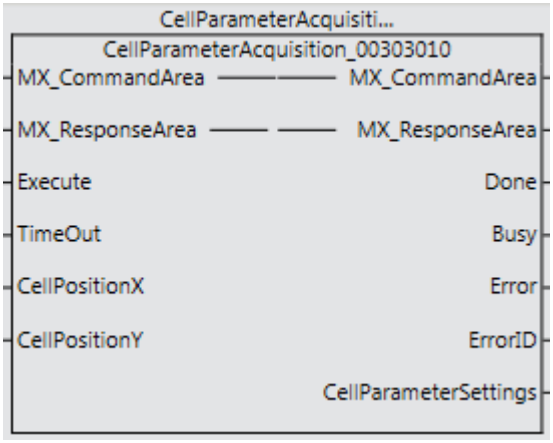
- Input variables

Name	Data Type	Description
CellParameterSettings	S_MX_CellParameterSettings	See the description below for this data type

- S_MX_CellParameterSettings

Member	Data Type	Description
CellPositionX	DINT	0 to 254
CellPositionY	DINT	0 to 254
MarkingTarget	DINT	0: No 1: Yes
EnableCountUp	DINT	0: Disabled 1: Enabled
XCorrection	DINT	Type MX-Z2000H: -45000 to 45000 Type MX-Z2050H/Z2055H: -80000 to 80000 Unit: 1/1000mm
YCorrection	DINT	Type MX-Z2000H: -45000 to 45000 Type MX-Z2050H/Z2055H: -80000 to 80000 Unit: 1/1000mm
ZCorrection	DINT	-10000 to 10000 Unit: 1/1000mm
θ ZCorrection	DINT	-18000 to 18000 Unit: 1/100˚

2.4.6. CellParameterAcquisition FB

Instruction	Graphic expression	ST expression
CellParameterAcquisition_00303010		CellParameterAcqusition_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, CellPositionX:=, CellPositionY:=, Done=>, Busy=>, Error=>, ErrorID=>, CellParameterSettings=>);

- Input variables

Name	Data Type	Description
CellPositionX	DINT	0 to 254
CellPositionY	DINT	0 to 254

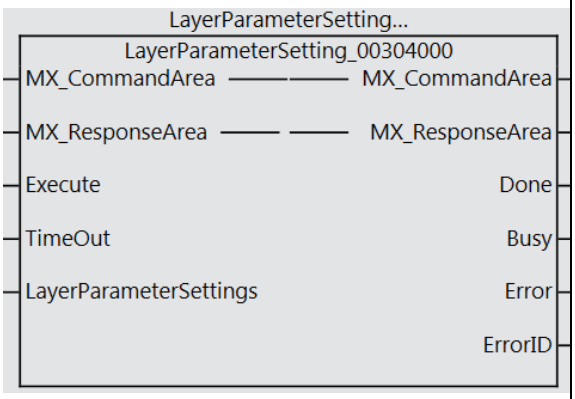
- Output variables

Name	Data Type	Description
CellParameterSettings	S_MX_CellParameterSettings	See the description below for this data type

- S_MX_CellParameterSettings

Member	Data Type	Description
CellPositionX	DINT	Same value with input variable *CellPositionX*
CellPositionY	DINT	Same value with input variable *CellPositionY*
MarkingTarget	DINT	0: No 1: Yes
EnableCountUp	DINT	0: Disabled 1: Enabled
XCorrection	DINT	Unit: 1/1000mm
YCorrection	DINT	Unit: 1/1000mm
ZCorrection	DINT	Unit: 1/1000mm
θ ZCorrection	DINT	Unit: 1/100˚

2.4.7. LayerParameterSetting FB

Instruction	Graphic expression	ST expression
LayerParameterSetting_00304000		LayerParameterSetting_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, LayerParameterSettings:=, Done=>, Busy=>, Error=>, ErrorID=>);

- Input variables

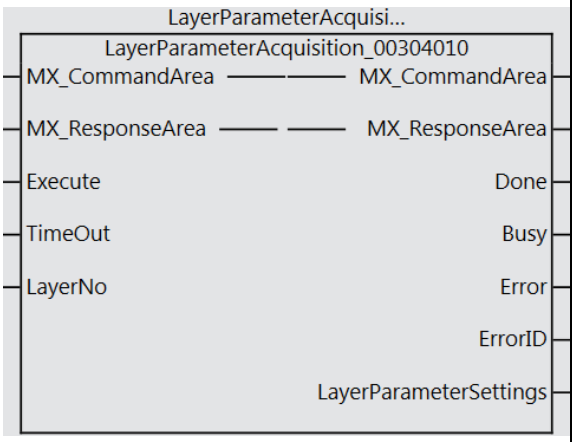
Name	Data Type	Description
LayerParameterSetting	S_MX_LayerParameterSettings	See the description below for this data type

- S_MX_LayerParameterSettings

Member	Data Type	Description
LayerNo	DINT	0 to 7
LayerSetting	DINT	0: Horizontal surface 1: Column external (X axis direction) 2: Column external (Y axis direction) 3: Column internal (X axis direction) 4: Column internal (Y axis direction) 5: Cone external (X axis right vertex) 6: Cone external (X axis left vertex) 7: Cone external (Y axis top vertex) 8: Cone external (Y axis bottom vertex) 9: Cone external (Z axis vertex) 10: Cone internal (X axis right vertex) 11: Cone internal (X axis left vertex) 12: Cone internal (Y axis top vertex) 13: Cone internal (Y axis bottom vertex) 14: Cone internal (Z axis vertex) 15: Sphere external 16: Sphere internal
XAxisCorrection	DINT	Type MX-Z2000H: -45000 to 45000 Type MX-Z2050H/Z2055H: -80000 to 80000 Unit: 1/1000 mm
YAxisCorrection	DINT	Type MX-Z2000H: -45000 to 45000

		Type MX-Z2050H/Z2055H: -80000 to 80000 Unit: 1/1000 mm
ZAxisCorrection	DINT	-10000 to 10000 Unit: 1/1000 mm
θXCorrection	DINT	-9000 to 9000 Unit: 1/100°
θYCorrection	DINT	-9000 to 9000 Unit: 1/100°
θZCorrection	DINT	-4500 to 4500 Unit: 1/100°
Radius	DINT	1 to 999999 Unit: 1/1000 mm
SurfaceDivisionCount	DINT	4 to 50
Height	DINT	1 to 999999 Unit: 1/1000 mm
LargeCircleRadius	DINT	1 to 999999 Unit: 1/1000 mm
SmallCircleRadius	DINT	1 to 999999 Unit: 1/1000 mm
ConePlacement	DINT	0: Placed directly 1: Marking surface horizontal 2: Semi-cone
LowerCircleRadius	DINT	1 to 999999 Unit: 1/1000 mm
UpperCircleRadius	DINT	1 to 999999 Unit: 1/1000 mm
HorizonalDivisionCount	DINT	4 to 20
VerticalDivisionCount	DINT	4 to 20
XRadius	DINT	1 to 999999 Unit: 1/1000 mm
YRadius	DINT	1 to 999999 Unit: 1/1000 mm
ZRadius	DINT	1 to 999999 Unit: 1/1000 mm

2.4.8. LayerParameterAcquisition FB

Instruction	Graphic expression	ST expression
LayerParameterAcquisition_00303010		LayerParameterAcqusition_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, LayerNo:=, Done=>, Busy=>, Error=>, ErrorID=>, LayerParameterSettings=>;

- Input variables

Name	Data Type	Description
LayerNo	DINT	0 to 7

- Output variables

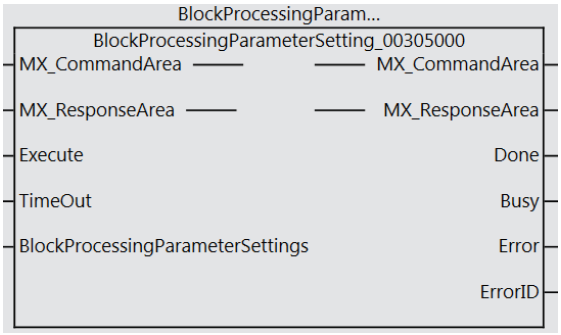
Name	Data Type	Description
LayerParameterSettings	S_MX_LayerParameterSettings	See the description below for this data type

- S_MX_CellParameterSettings

Member	Data Type	Description
LayerNo	DINT	0 to 7
LayerSetting	DINT	0: Horizontal surface 1: Column external (X axis direction) 2: Column external (Y axis direction) 3: Column internal (X axis direction) 4: Column internal (Y axis direction) 5: Cone external (X axis right vertex) 6: Cone external (X axis left vertex) 7: Cone external (Y axis top vertex) 8: Cone external (Y axis bottom vertex) 9: Cone external (Z axis vertex) 10: Cone internal (X axis right vertex) 11: Cone internal (X axis left vertex) 12: Cone internal (Y axis top vertex) 13: Cone internal (Y axis bottom vertex) 14: Cone internal (Z axis vertex) 15: Sphere external

		16: Sphere internal
XAxisCorrection	DINT	Type MX-Z2000H: -45000 to 45000 Type MX-Z2050H/Z2055H: -80000 to 80000 Unit: 1/1000 mm
YAxisCorrection	DINT	Type MX-Z2000H: -45000 to 45000 Type MX-Z2050H/Z2055H: -80000 to 80000 Unit: 1/1000 mm
ZAxisCorrection	DINT	-10000 to 10000 Unit: 1/1000 mm
θXCorrection	DINT	-9000 to 9000 Unit: 1/100°
θYCorrection	DINT	-9000 to 9000 Unit: 1/100°
θZCorrection	DINT	-4500 to 4500 Unit: 1/100°
Radius	DINT	1 to 999999 Unit: 1/1000 mm
SurfaceDivisionCount	DINT	4 to 50
Height	DINT	1 to 999999 Unit: 1/1000 mm
LargeCircleRadius	DINT	1 to 999999 Unit: 1/1000 mm
SmallCircleRadius	DINT	1 to 999999 Unit: 1/1000 mm
ConePlacement	DINT	0: Placed directly 1: Marking surface horizontal 2: Semi-cone
LowerCircleRadius	DINT	1 to 999999 Unit: 1/1000 mm
UpperCircleRadius	DINT	1 to 999999 Unit: 1/1000 mm
HorizonalDivisionCount	DINT	4 to 20
VerticalDivisionCount	DINT	4 to 20
XRadius	DINT	1 to 999999 Unit: 1/1000 mm
YRadius	DINT	1 to 999999 Unit: 1/1000 mm
ZRadius	DINT	1 to 999999 Unit: 1/1000 mm

2.4.9. BlockProcessingParameterSetting FB

Instruction	Graphic expression	ST expression
BlockProcessingParameterSetting_00305000		BlockProcessingParameterSetting_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, BlockProcessingParameterSettings:=, Done=>, Busy=>, Error=>, ErrorID=>);

- Input variables

Name	Data Type	Description
BlockProcessingParameterSettings	S_MX_BlockProcessingParameterSettings	See the description below for this data type

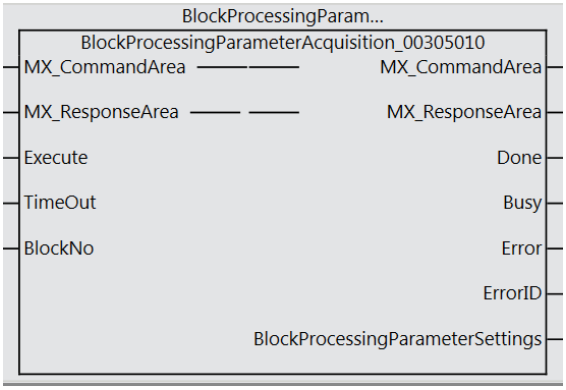
- S_MX_BlockProcessingParameterSettings

Member	Data Type	Description
BlockNo	DINT	Block No. to set
PowerCoefficient	DINT	1 to 100 Unit: %
Frequency	DINT	Standard mode: 10 to 1000 EE mode: 10 to 100 Unit: kHz
PulseShape	DINT	Standard mode: 1 to 15 EE mode: 1 to 3
ProcessingSpeed	DINT	1 to 12000 Unit: mm/s
PowerCoefficient_LightModule	DINT	1 to 100 Unit: %*2
Frequency_LightModule	DINT	Standard mode: 10 to 1000 *2 EE mode: 10 to 100 Unit: kHz
PulseShape_LightModule	DINT	Standard mode: 1 to 15 *2 EE mode: 1 to 3

*1 Cannot be omitted

*2 For QR codes and Data Matrix, the light module setting values are entered.
For other blocks, the setting values are invalid.

2.4.10. BlockProcessingParameterAcquisition FB

Instruction	Graphic expression	ST expression
BlockProcessingParameterAcquisition_00305010		BlockProcessingParameterAcqusition_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, BlockNo:=, Done=>, Busy=>, Error=>, ErrorID=>, BlockProcessingParameterSettings=>);

- Input variables

Name	Data Type	Description
BlockNo	DINT	Block No. to acquire

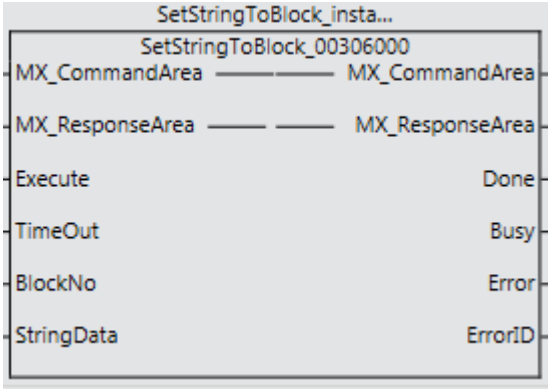
- Output variables

Name	Data Type	Description
BlockProcessingParameterSettings	S_MX_BlockProcessingParameterSettings	See the description below for this data type

- S_MX_BlockProcessingParameterSettings

Member	Data Type	Description
BlockNo	DINT	Same value with input variable *BlockNo*
PowerCoefficient	DINT	1 to 100 Unit: %
Frequency	DINT	Standard mode: 10 to 1000 *2 EE mode: 10 to 100 Unit: kHz
PulseShape	DINT	Standard mode: 1 to 15 *2 EE mode: 1 to 3
ProcessingSpeed	DINT	1 to 12000 Unit: mm/s
PowerCoefficient_LightModule	DINT	1 to 100 Unit: % *2
Frequency_LightModule	DINT	Standard mode: 10 to 1000 *2 EE mode: 10 to 100 Unit: kHz
PulseShape_LightModule	DINT	Standard mode: 1 to 15 *2 EE mode: 1 to 3

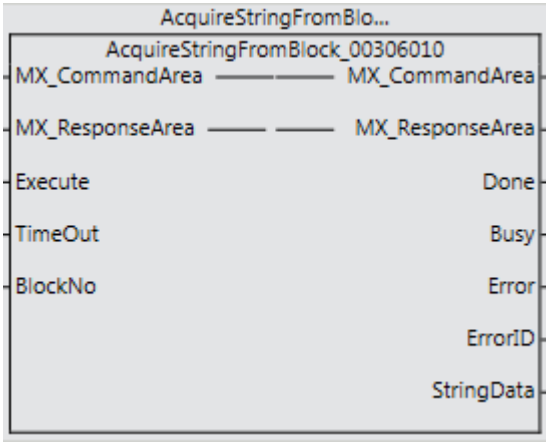
2.4.11. SetStringToBlock FB

Instruction	Graphic expression	ST expression
SetStringToBlock_00306000		SetStringToBlock_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, BlockNo:=, StringData:= Done=>, Busy=>, Error=>, ErrorID=>,);

- Input variables

Name	Data Type	Description
BlockNo	DINT	Block Number
StringData	String[41]	ASCII or Shift-JIS character codes. Up to 40 characters.

2.4.12. AcquireStringFromBlock FB

Instruction	Graphic expression	ST expression
AcquireStringFromBlock_00306010		AcquireStringFromBlock_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, BlockNo:=, Done=>, Busy=>, Error=>, ErrorID=>, StringData=>);

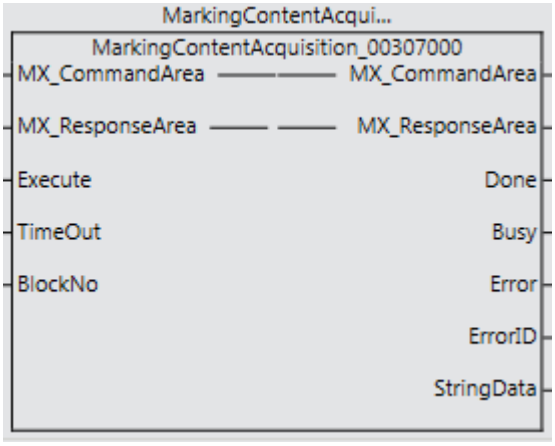
- Input variables

Name	Data Type	Description
BlockNo	DINT	Block No. to acquire

- Output variables

Name	Data Type	Description
StringData	String[41]	ASCII or Shift-JIS character codes. Up to 40 characters.

2.4.13. MarkingContentAcquisition FB

Instruction	Graphic expression	ST expression
AcquireStringFromBlock_00307000		MarkingContentAcquisition_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, BlockNo:=, Done=>, Busy=>, Error=>, ErrorID=>, StringData=>);

- Input variables

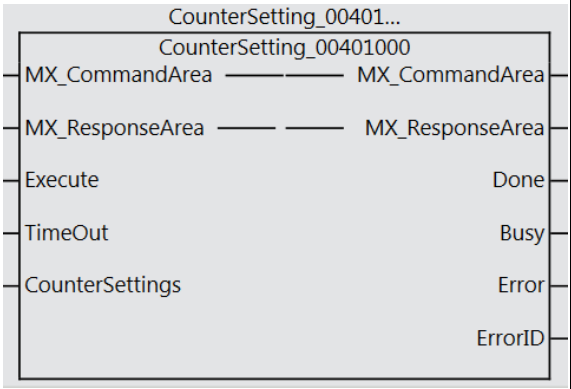
Name	Data Type	Description
BlockNo	DINT	Block No. to acquire

- Output variables

Name	Data Type	Description
StringData	String[41]	ASCII or Shift-JIS character codes. Up to 40 characters.

2.5. **Operation FBs**

2.5.1. CounterSettingFB

Instruction	Graphic expression	ST expression
CounterSetting _00401000		CounterSetting _instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, CounterSettings:=, Done=>, Busy=>, Error=>, ErrorID=>);

- Input variables

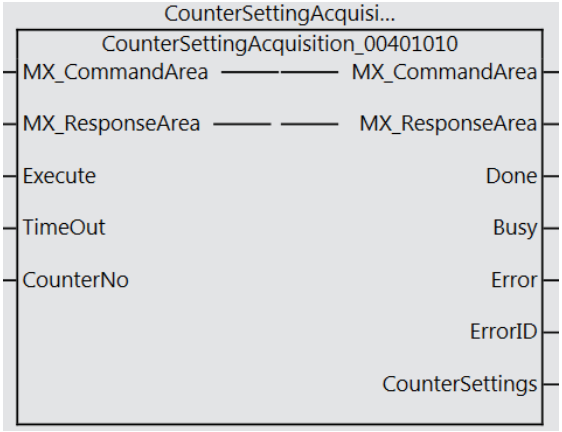
Name	Data Type	Description
CounterSettings	S_MX_ CounterSettings	See the description below for this data type

- S_MX_ CounterSettings

Member	Data Type	Description
CounterNo	DINT	0 to 15
CounterEnable	DINT	0: Disabled 1: Enabled
InitialValue	DINT	Counter initial value
EndValue	DINT	Counter end value
Steps	DINT	Number of counter steps
CurrentValue	DINT	Current counter value
InitializationTiming	DINT	0: Start marking 1: New sheet 3: Power supply ON 4: OFF 5: Change marking data
CountTiming	DINT	0: Every marking 1: Every sheet 2: Every cell 3: Command change only
CountCompleteAction	DINT	0: Error stop 1: Stop counter, resume at initial value.

		2: Stop counter, resume at end value. 3: Auto-loop
CountCompleteOutput	DINT	0: None 1: A 2: B 3: C 4: D
OutputType	DINT	0: Pulse 1: Leve

2.5.2. CounterSettingAcquisition FB

Instruction	Graphic expression	ST expression
CounterSettingAcquisition_00401010		CounterSettingAcquisition_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, CounterNo:=, Done=>, Busy=>, Error=>, ErrorID=>, CounterSettings=>);

- Input variables

Name	Data Type	Description
CounterNo	DINT	0-15

- Output variables

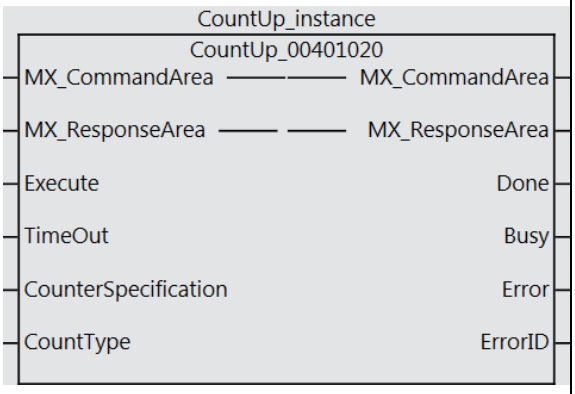
Name	Data Type	Description
CounterSettings	S_MX_ CounterSettings	See the description below for this data type

- S_MX_ CounterSettings

Member	Data Type	Description
CounterNo	DINT	Same value with input variable *CounterNo*
CounterEnable	DINT	0: Disabled 1: Enabled
InitialValue	DINT	Counter initial value
EndValue	DINT	Counter end value

Steps	DINT	Number of counter steps
CurrentValue	DINT	Current counter value
InitializationTiming	DINT	0: Start marking 1: New sheet 3: Power supply ON 4: OFF 5: Change marking data
CountTiming	DINT	0: Every marking 1: Every sheet 2: Every cell 3: Command change only
CountCompleteAction	DINT	0: Error stop 1: Stop counter, resume at initial value. 2: Stop counter, resume at end value. 3: Auto-loop
CountCompleteOutput	DINT	0: None 1: A 2: B 3: C 4: D
OutputType	DINT	0: Pulse 1: Leve

2.5.3. CountUpFB

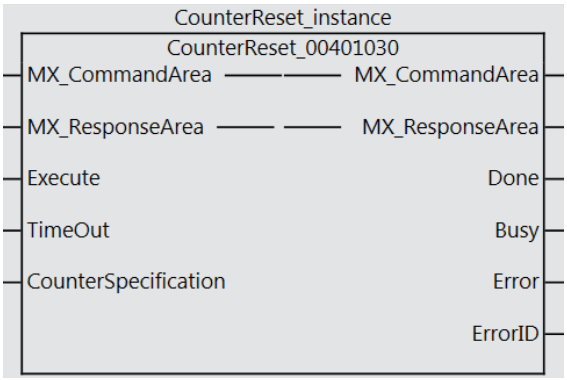
Instruction	Graphic expression	ST expression
CountUp _00401020		CountUp_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, CounterSpecification:=, CounterType:=, Done=>, Busy=>, Error=>, ErrorID=>);

- Input variables

Name	Data Type	Description
CounterSpecification	DINT	Specifies 0x0000 to 0xFFFF for counters 0 to 15. (Specifies the bit equivalent to the

		counter from the least significant.) 0: Not specify 1: Specify
CountType	DINT	0: Count up 1: Count down

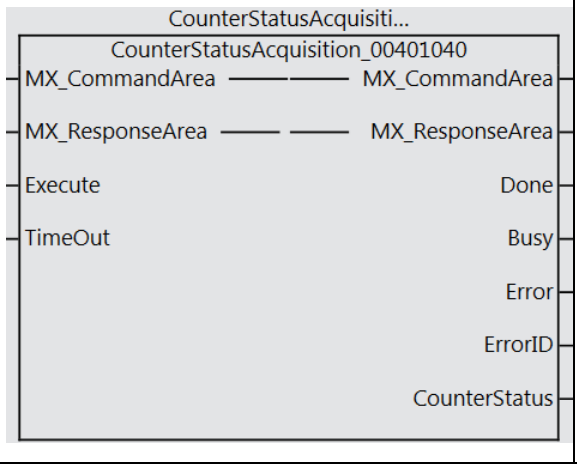
2.5.4. CountResetFB

Instruction	Graphic expression	ST expression
CounterReset_00401030		CounterReset_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, CounterSpecification:=, Done=>, Busy=>, Error=>, ErrorID=>);

- Input variables

Name	Data Type	Description
CounterSpecification	DINT	Specifies 0x0000 to 0xFFFF for counters 0 to 15. (Specifies the bit equivalent to the counter from the least significant.) 0: Not specify 1: Specify

2.5.5. CounterStatusAcquisitionFB

Insrtruction	Graphic expression	ST expression
CounterStatusAcquisition_00401040		CounterStatusAcquisition__ instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, Done=>, Busy=>, Error=>, ErrorID=>, CounterStatus=>);

- Output variables

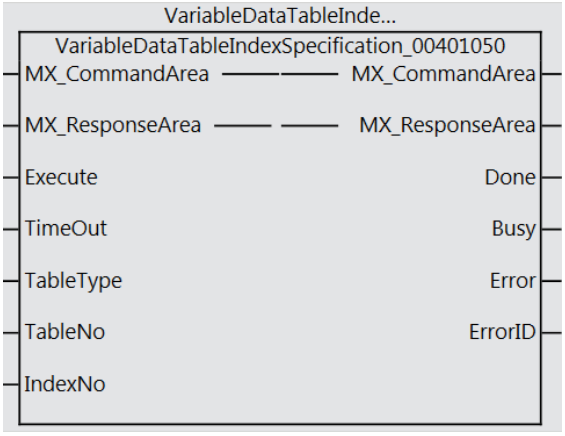
Name	Data Type	Description
CounterStatus	S_MX_CounterStatusAcquisition	See the description below for this data type

- S_MX_ CounterStatusAcquisition

Member	Data Type	Description
CounterNo0	DINT	0: Not used 1: In use 2: Count complete
CounterNo1	DINT	0: Not used 1: In use 2: Count complete
CounterNo2	DINT	0: Not used 1: In use 2: Count complete
CounterNo3	DINT	0: Not used 1: In use 2: Count complete
CounterNo4	DINT	0: Not used 1: In use 2: Count complete
CounterNo5	DINT	0: Not used 1: In use 2: Count complete
CounterNo6	DINT	0: Not used 1: In use 2: Count complete

CounterNo7	DINT	0: Not used 1: In use 2: Count complete
CounterNo8	DINT	0: Not used 1: In use 2: Count complete
CounterNo9	DINT	0: Not used 1: In use 2: Count complete
CounterNo10	DINT	0: Not used 1: In use 2: Count complete
CounterNo11	DINT	0: Not used 1: In use 2: Count complete
CounterNo12	DINT	0: Not used 1: In use 2: Count complete
CounterNo13	DINT	0: Not used 1: In use 2: Count complete
CounterNo14	DINT	0: Not used 1: In use 2: Count complete
CounterNo15	DINT	0: Not used 1: In use 2: Count complete

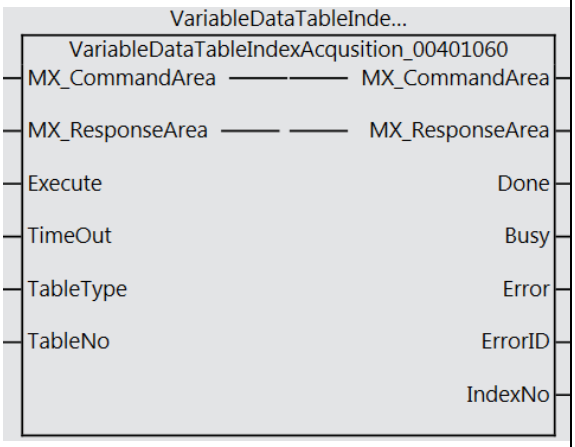
2.5.6. VariableDataTableIndexSpecification FB

Instruction	Graphic expression	ST expression
VariableDataTableIndexSpecification_00401050		VariableDataTableIndexSpecification_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, TableType:=, TableNo:=, IndexNo:=, Done=>, Busy=>, Error=>, ErrorID=>);

- Input variables

Name	Data Type	Description
TableType	DINT	0: String 1:Image 2:Shape
TableNo	DINT	0 to 63
IndexNo	DINT	0 to 255

2.5.7. VariableDataTableIndex Acquisition FB

Instruction	Graphic expression	ST expression
VariableDataTableIndexAcqusition_00401060		VariableDataTableIndexAcqusition_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, Done=>, Busy=>, Error=>, ErrorID=>, IndexNo=>);

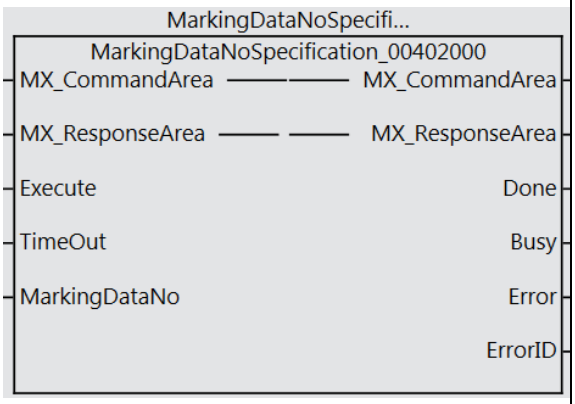
- Input variables

Name	Data Type	Description
TableType	DINT	0: String 1:Image 2:Shape
TableNo	DINT	0 to 63
IndexNo	DINT	0 to 255

- Output variables

Name	Data Type	Description
IndexNo	DINT	0 to 255

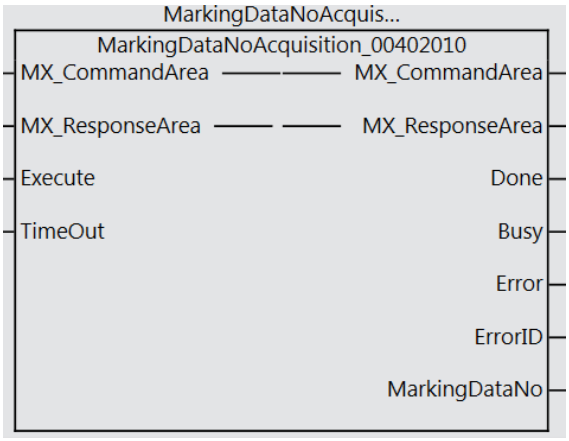
2.5.8. MarkingDataNoSpecification FB

Instruction	Graphic expression	ST expression
MarkingDataNoSpecification_00402000		MarkingDataNoSpecification_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, MarkingDataNo:=, Done=>, Busy=>, Error=>, ErrorID=>);

- Input variables

Name	Data Type	Description
MarkingDataNo	DINT	0 to 9999

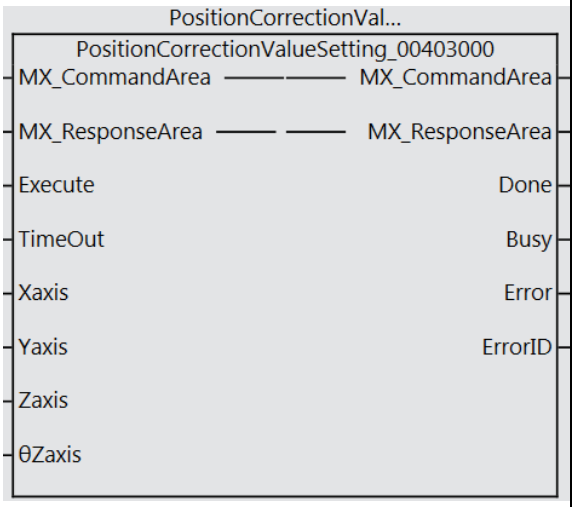
2.5.9. MarkingDataNoAcquisition FB

Instruction	Graphic expression	ST expression
MarkingDataNoAcquisition_00402010		MarkingDataNoAcqusition_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, Done=>, Busy=>, Error=>, ErrorID=>, MarkingDataNo=>);

- Output variables

Name	Data Type	Description
MarkingDataNo	DINT	0 to 9999

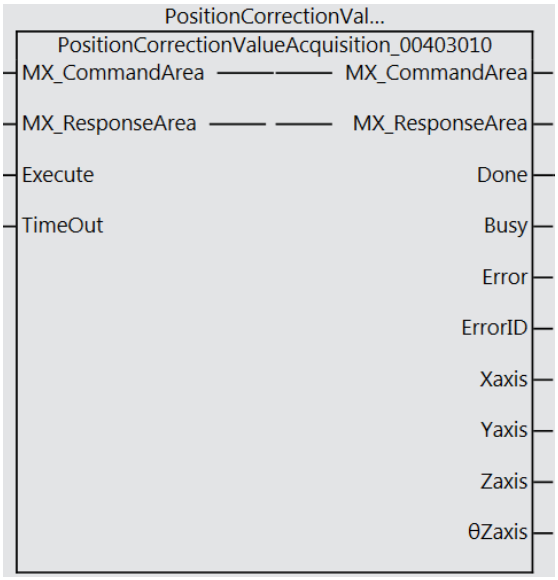
2.5.10. PositionCorrectionValueSetting FB

Instruction	Graphic expression	ST expression
PositionCorrectionValueSetting_00403000		PositionCorrectionValueSetting_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, Xaxis:=, Yaxis:=, Zaxis:=, θaxis:=, Done=>, Busy=>, Error=>, ErrorID=>);

- Input variables

Name	Data Type	Description
Xaxis	DINT	Type MX-Z2000H: -45000 to 45000 Type MX-Z2050H/Z2055H: -80000 to 80000 Unit: 1/1000 mm
Yaxis	DINT	Type MX-Z2000H: -45000 to 45000 Type MX-Z2050H/Z2055H: -80000 to 80000 Unit: 1/1000 mm
Zaxis	DINT	-10000 to 10000 Unit: 1/1000 mm
θZaxis	DINT	-4500 to 4500 Unit: 1/100°

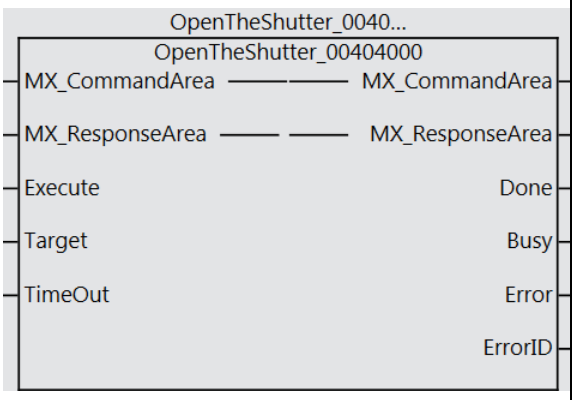
2.5.11. PositionCorrectionValueAcquisition FB

Instruction	Graphic expression	ST expression
PositionCorrectionValueAcquisition_00403010		PositionCorrectionValueAcquisition_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, Done=>, Busy=>, Error=>, ErrorID=>, Xaxis: =>, Yaxis: =>, Zaxis: =>, θaxis:=>);

- Output variables

Name	Data Type	Description
Xaxis	DINT	Type MX-Z2000H: -45000 to 45000 Type MX-Z2050H/Z2055H: -80000 to 80000 Unit: 1/1000 mm
Yaxis	DINT	Type MX-Z2000H: -45000 to 45000 Type MX-Z2050H/Z2055H: -80000 to 80000 Unit: 1/1000 mm
Zaxis	DINT	-10000 to 10000 Unit: 1/1000 mm
θZaxis	DINT	-4500 to 4500 Unit: 1/100°

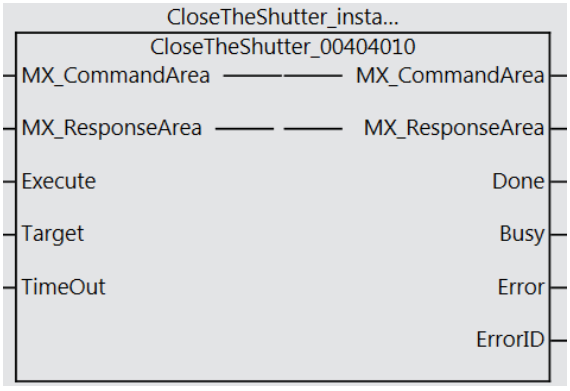
2.5.12. OpentheShutter FB

Instruction	Graphic expression	ST expression
OpenTheShutter_00404000		OpenTheShutter_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, Target:=, TimeOut:=, Done=>, Busy=>, Error=>, ErrorID=>);

- Input variables

Name	Data Type	Description
Target	DINT	0: Cancel all 1: Cancel error only 2: Cancel alarm only

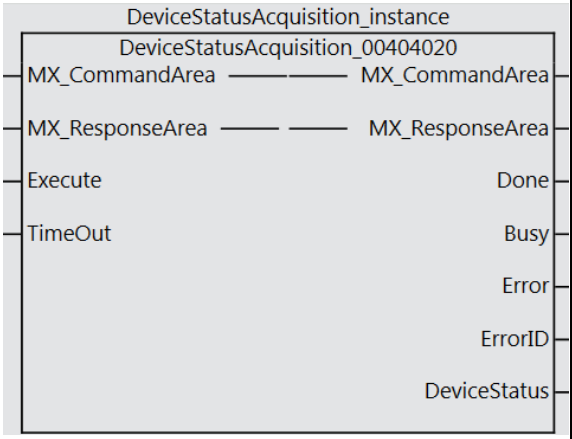
2.5.13. CloseTheShutter FB

Instruction	Graphic expression	ST expression
CloseTheShutter_00404010		CloseTheShutter_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, Target:=, TimeOut:=, Done=>, Busy=>, Error=>, ErrorID=>);

- Input variables

Name	Data Type	Description
Target	DINT	0: Cancel all 1: Cancel error only 2: Cancel alarm only

2.5.14. DeviceStatusAcquisition FB

Instruction	Graphic expression	ST expression
DeviceStatusAcquisition_00404020		DeviceStatusAcquisition_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, Done=>, Busy=>, Error=>, ErrorID=>, DeviceStatus=>);

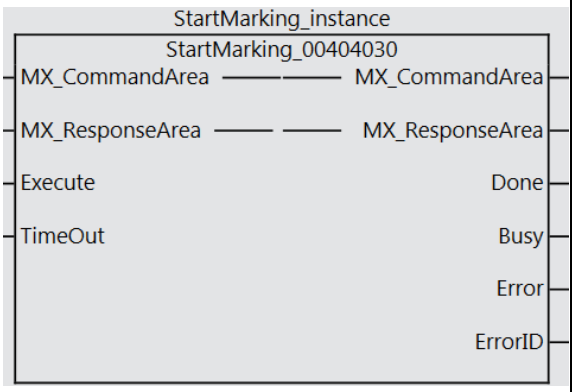
- Output variables

Name	Data Type	Description
DeviceStatus	S_MX_DeviceStatus	See the description below for this data type

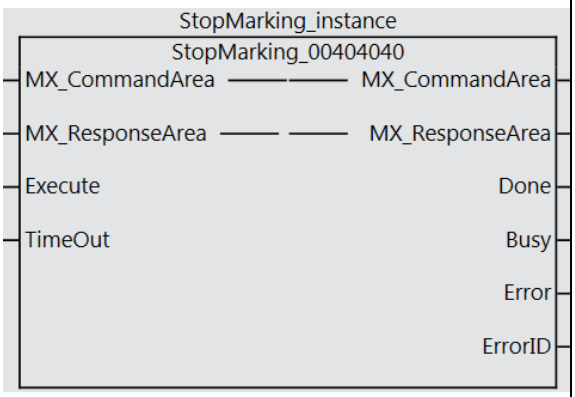
- S_MX_DeviceStatus

Member	Data Type	Description
LaserPower	DINT	0: OFF 1: ON
MarkingStop	DINT	0: OFF 1: ON
Error	DINT	0: OFF 1: ON
Shutter	DINT	0: OFF(Closed) 1: ON(Open)
MarkingReady	DINT	0: OFF 1: ON
EmergencyStop	DINT	0: OFF 1: ON

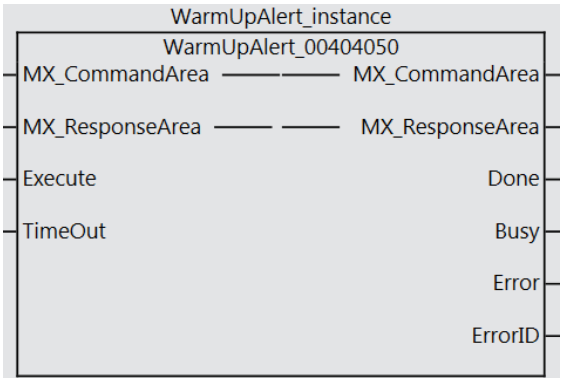
2.5.15. StartMarking FB

Instruction	Graphic expression	ST expression
StartMarking _00404030		StartMarking_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, Done=>, Busy=>, Error=>, ErrorID=>);

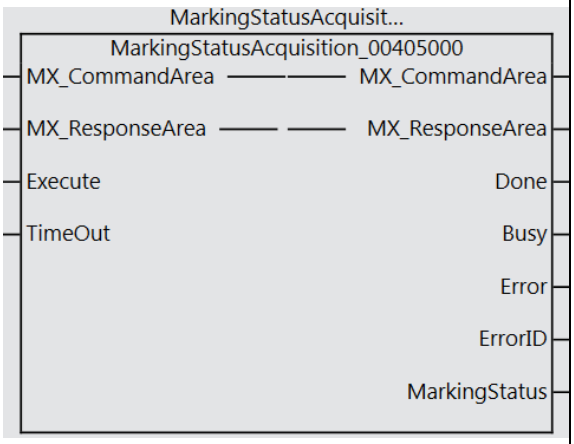
2.5.16. StopMarking FB

Instruction	Graphic expression	ST expression
StopMarking _00404040		StopMarking_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, Done=>, Busy=>, Error=>, ErrorID=>);

2.5.17. WarmUpAlert FB

Instruction	Graphic expression	ST expression
WarmUpAlert _00404050		WarmUpAlert_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, Done=>, Busy=>, Error=>, ErrorID=>);

2.5.18. MarkingStatusAcquisition FB

Instruction	Graphic expression	ST expression
MarkingStatusAcquisition_00405000		MarkingStatusAcquisition_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, Done=>, Busy=>, Error=>, ErrorID=>, MarkingStatus=>);

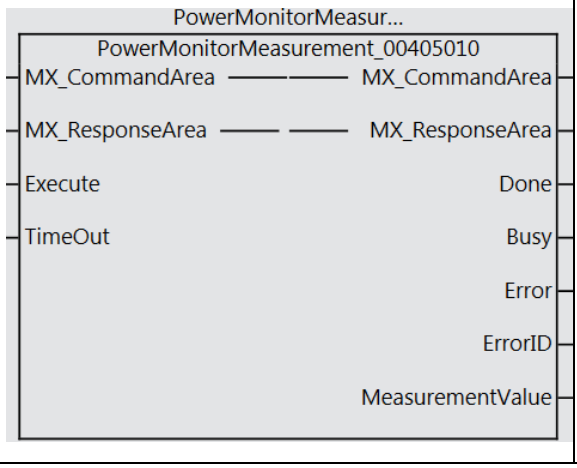
- Output variables

Name	Data Type	Description
MarkingStatus	S_MX_MarkingStatus	See the description below for this data type

- S_MX_MarkingStatus

Member	Data Type	Description
Marking	DINT	0: OFF(Marking Stopped) 1: ON(Marking)
Alarm	DINT	0: OFF 1: ON
LaserPower	DINT	0: OFF 1: ON
Error	DINT	0: OFF 1: ON
Shutter	DINT	0: OFF(Closed) 1: ON(Open)
MarkingReady	DINT	0: OFF 1: ON
EmergencyStop	DINT	0: OFF 1: ON

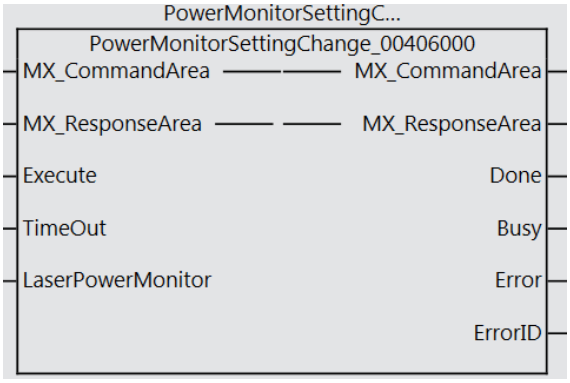
2.5.19. PowerMonitorMeasurement FB

Instruction	Graphic expression	ST expression
PowerMonitorMeasurement_00405010		PowerMonitorMeasurement_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, Done=>, Busy=>, Error=>, ErrorID=>, MeasurementValue=>);

- Input variables

Name	Data Type	Description
MeasurementValue	DINT	Unit: %

2.5.20. PowerMonitorSetting Change FB

Instruction	Graphic expression	ST expression
PowerMonitorSettingChange_00406000		PowerMonitorSettingChange_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, LaserPowerMonitor:=, Done=>, Busy=>, Error=>, ErrorID=>);

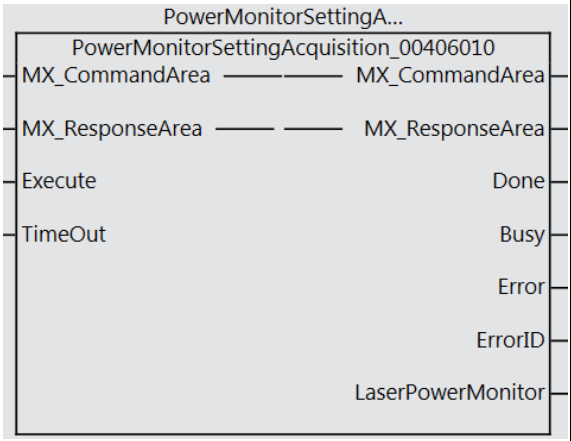
- Input variables

Name	Data Type	Description
LaserPowerMonitor	S_MX_LaserPowerMonitor	See the description below for this data type

- S_MX_Laser_Power_Setting

Member	Data Type	Description
MonitorSetting	DINT	0: Disabled 1: Enabled
LaserPowerLowLimit	DINT	10 to 200 Unit: %
LaserMonitorSetting	DINT	0: Only at start 1: Only at start marking 2: Only at end of marking 3: At start + at start marking 4: At start + at end of marking 5: At start + at start and end of marking 6: At start marking + at end of marking 7: None
MonitorTiming	DINT	0: At each marking 1: Every marking count specified
MarkingCount	DINT	1 to 9999 Unit: Count

2.5.21. PowerMonitorSettingAcquisition FB

Instruction	Graphic expression	ST expression
PowerMonitorSettingAcquisition_00406010		PowerMonitorSettingAcquisition_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, Done=>, Busy=>, Error=>, ErrorID=>, LaserPowerMonitor=>);

- Output variables

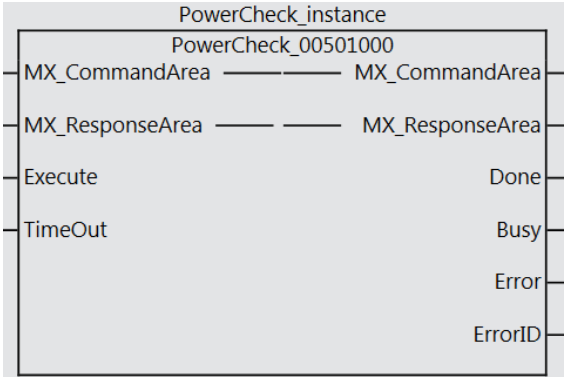
Name	Data Type	Description
LaserPowerMonitor	S_MX_ LaserPowerSetting	See the description below for this data type

- S_MX_LaserPowerSetting

Member	Data Type	Description
MonitorSetting	DINT	0: Disabled 1: Enabled
LaserPowerLowLimit	DINT	10 to 200 Unit: %
LaserMonitorSetting	DINT	0: Only at start 1: Only at start marking 2: Only at end of marking 3: At start + at start marking 4: At start + at end of marking 5: At start + at start and end of marking 6: At start marking + at end of marking 7: None
MonitorTiming	DINT	0: At each marking 1: Every marking count specified
MarkingCount	DINT	1 to 9999 Unit: Count

2.6. **Environmental Setting and Others**

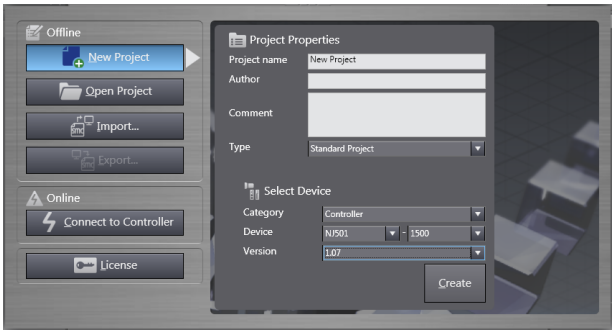
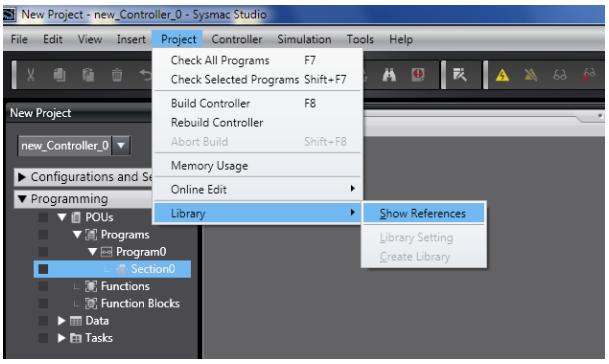
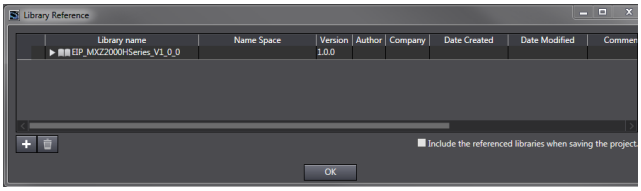
2.6.1. PowerCheck FB

Instruction	Graphic expression	ST expression
PowerCheck _00501000		PowerCheck_instance (MX_CommandArea:=, MX_ResponseArea:=, Execute:=, TimeOut:=, Done=>, Busy=>, Error=>, ErrorID=>);

3. Application Example

3.1. Using Library file

This section describes the procedure to use the library file in a project.

1	Start Sysmac Studio, and open an existing project or create a project.	
2	Select ***Library*** - ***Show References*** from the Project Menu.	
3	Add the library file to the list and click the **OK** Button. The library name is EIP_MXZ2000HSeries_V1_0_0.	

3.2. EtherNet/IP Settings

3.2.1. IP address Settings

Setting items	NJ	MX-Z20**H
IP address	192.168.250.1	192.168.250.2
Subnet mask	255.255.255.0	255.255.255.0

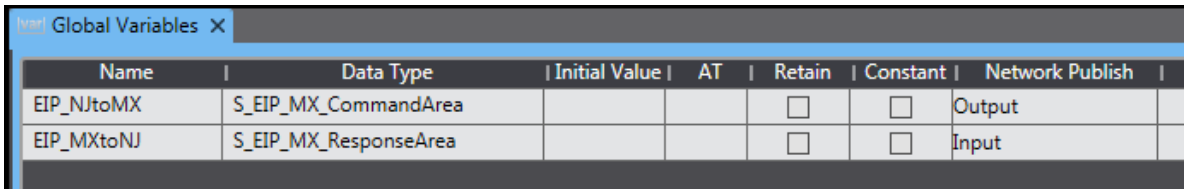
3.2.2. Data Types for Tag Data Links

2 data types that are required to set up the EtherNet/IP tag data links, which are S_EIP_MX_CommandArea and S_EIP_MX_ResponseArea, are provided from the library file. For these 2 data types, refer to “2.1.4. MX_CommandArea and MX_ResponseArea”.

3.2.3. Global Variables

Name	Data type	Network Publish	Data size (byte)
EIP_NJtoMX	S_EIP_MX_CommandArea	Output	92
EIP_MXtoNJ	S_EIP_MX_ResponseArea	Input	96

Sysmac Studio Setting



Additional Information

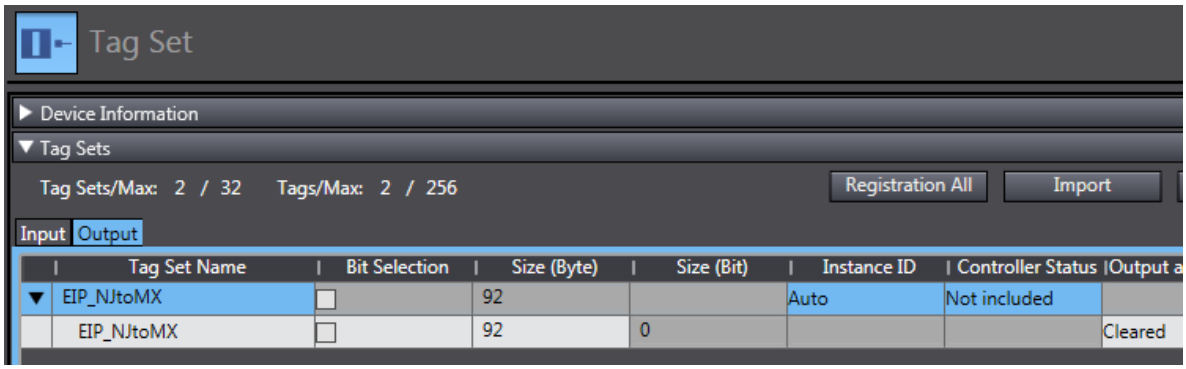
If the data type “S_EIP_MX_CommandArea” (or “S_EIP_MX_ResposeArea”) is not appeared in the Data Type dropdown lists, it means the library file is not installed correctly. Please install the library file with the procedure according to “3.1.Using Library file” before creating the global variables.

3.2.4. Tag Sets

- Output area (From NJ to MX-Z20**H)

Originator variable (tag set name)			Data size (byte)
EIP_NJtoMX			92
	OUT No.	Global variable name (tag name)	Data size (byte)
	1	EIP_NJtoMX	92

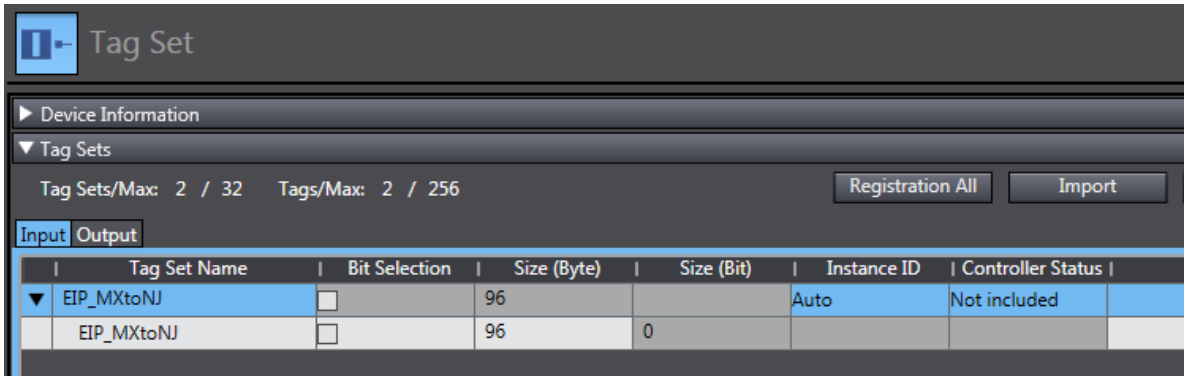
Sysmac Studio Setting



- Input area (From MX-Z20**H to NJ)

Originator variable (tag set name)			Data size (byte)
EIP_MXtoNJ			96
	IN No.	Global variable name (tag name)	Data size (byte)
	1	EIP_MXtoNJ	96

Sysmac Studio Setting

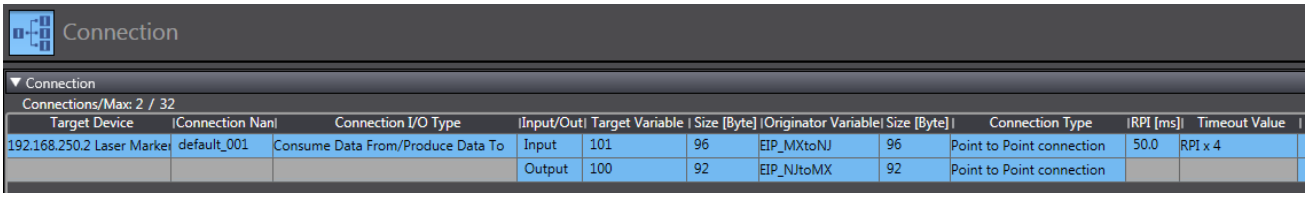


3.2.5. Tag Data Link Table

Connection Name	Connection I/O Type	RPI (ms)	Timeout Value
Default_001	Consume Data From/Produce Data To	50.0	RPI x 4

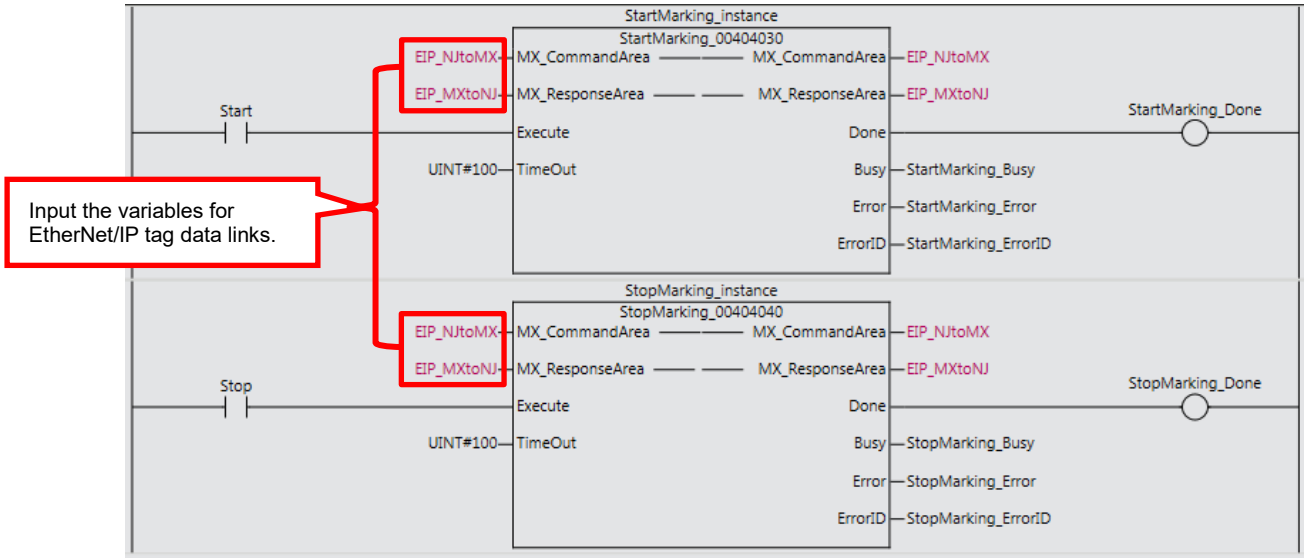
Connection I/O Type	Input/ Output	Target Variable (Set value of Destination Device instance number)	Size (byte)	Originator Variable (Tag set name)	Size (byte)	Connection Type
Consume Data From/ Produce Data To	Input	101	96	EIP_MXtoNJ	96	Point to Point connection
	Output	100	92	EIP_NJtoMX	92	Point to Point connection

Sysmac Studio Setting



3.3. **Sample Programming**

This section describes the sample program to use 2 FBs, StarMarking FB and StopMarking FB.



4. References

4.1. Related Manuals

Cat. No.	Model	Manual name
W500	NJ501-□□□□ NJ301-□□□□	Machine Automation Controller NJ-series CPU Unit Hardware User's Manual
W501	NJ501-□□□□ NJ301-□□□□	Machine Automation Controller NJ-series CPU Unit Software User's Manual
W504	SYSMAC-SE2□□□	Automation Software Sysmac Studio Version 1 Operation Manual
W502	NJ501-□□□□ NJ301-□□□□	Machine Automation Controller NJ-series Instructions Reference Manual
Z377	MX-Z20□□H	Fiber Laser Marker

4.2. Version History

Version	Date	Revised content
1.00	May 2017	Original production

5. Revision History

Revision code	Date	Revised content
A	May 2017	Original production
B	Apr 2019	Added FBs along with the laser marker update