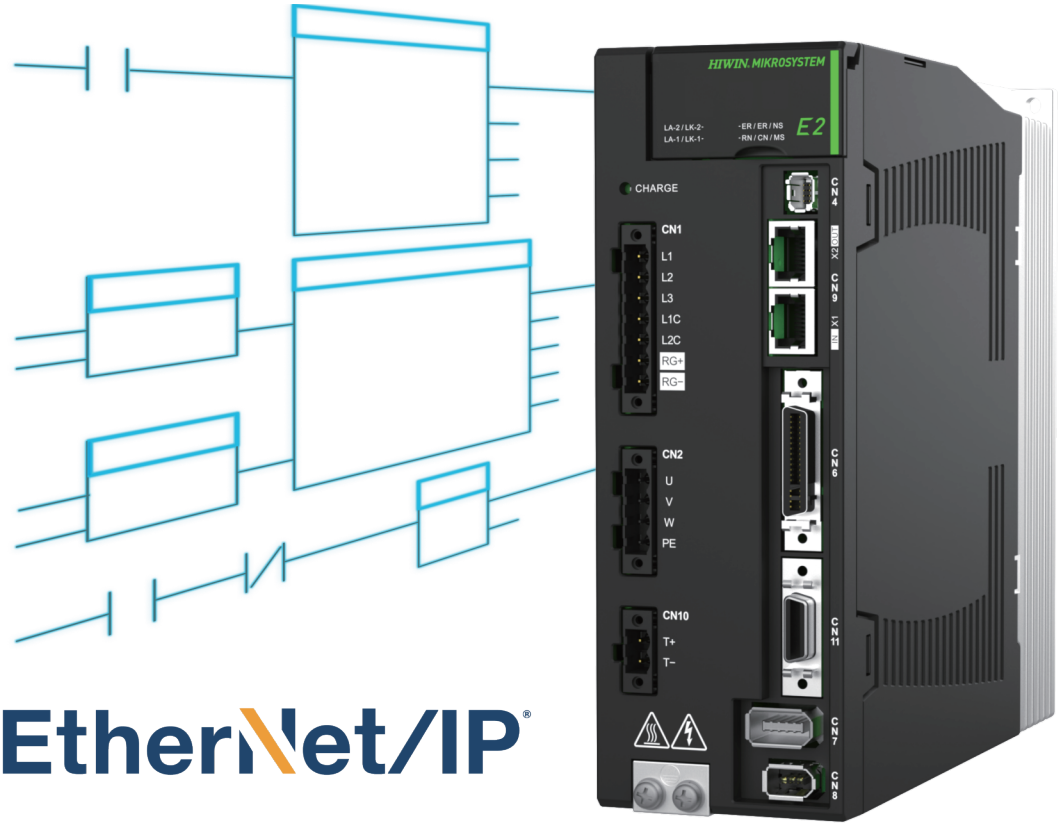
HIWIN. MIKROSYSTEM



EtherNet/IP®

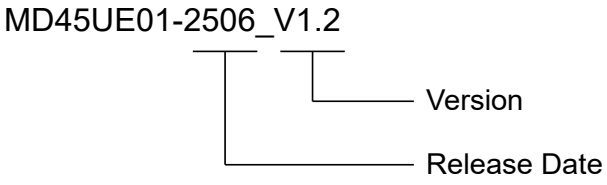
Function Blocks (AOIs) Application Manual

E2 EtherNet/IP Drive with Rockwell Studio 5000

www.hiwinmikro.tw
MD45UE01-2506_V1.2

Revision History

The version of the manual is also indicated on the bottom of the front cover.



Release Date	Manual Version	Library Version	Applicable Product	Revision Contents
Jun. 13th, 2025	1.2	1.2	E2 EtherNet/IP Drive	1. Add the description of control unit. 2. Section 2.7 **H_MAH**: Add the description of HomeOffset. 3. Section 2.10 **H_MAT**: Add the description of torque command and TorqueSlope. Correct the unit of TorqueSlope. 4. Add the reference description of MSG_ErrCode and MSG_ExtErrCode. 5. Section 2.16 **H_ParmRead_Single**: Add parameters setup description for step 3 in the setting example. 6. Section 2.17 **H_ParmWrite_Single**: Add the description of Data_Length.
Dec. 20th, 2024	1.1	1.2	E2 EtherNet/IP Drive	1. Add a note for step 5 in section 1.1 **Create an axis**. 2. Add details to the H_ACOMM tag creation for step 2 in the setting example of section 2.1 **H_ACOMM**. 3. Add a note for step 3 in the setting example of section 2.1 **H_ACOMM**. 4. Change the name of the H_ACOMM output parameter from ErrCode to DrvErrCode. 5. Change the name of the H_ACOMM output parameter from WarnCode to DrvWarnCode. 6. Correct the parameter usage instructions from Data_Length to Input in section 2.17 **H_ParmWrite_Single**. 7. Add new function block (AOI): **H_AStatus**. 8. Add revision information to each function block (AOI).
Jun. 25th, 2024	1.0	1.1	E2 EtherNet/IP Drive	First edition.

Related Documents

Through related documents, users can quickly understand the positioning of this manual and the correlation between manuals and products. Go to HIWIN MIKROSYSTEM's official website → Download → Manual Overview for details (https://www.hiwinmikro.tw/Downloads/ManualOverview_EN.htm).

Preface

This manual provides the description of the function blocks (Add-On Instructions, AOIs) supported by E2 EtherNet/IP drive with Allen-Bradley (Rockwell) PLC, which aims to simplify the operation process of related functions of the drive and help users shorten the time for development and programming.

Note:

EtherNet/IP is the trademark owned by ODVA, Inc.

Studio 5000, Studio 5000 Logix Designer and CompactLogix are the trademarks owned by Rockwell Automation.

Specifications of Software/Hardware

Name	Version of Software/Firmware
E2 EtherNet/IP Drive	Software (Thunder): 1.11.6.0 or above Firmware: 3.11.6 or above EDS file: HIWINMIKROSYSTEM_ED2F_20240418 or above
Allen-Bradley PLC (CompactLogix 5380)	Software (Studio 5000): V34.01.00 or above Firmware: V34.011 or above

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1. Project configuration

1. Project configuration 1-1
1.1 Create an axis 1-2
1.2 Import Add-On Instructions (AOIs) 1-5

1.1 Create an axis

Step1. Install the EDS files by **EDS Hardware Installation Tool**.

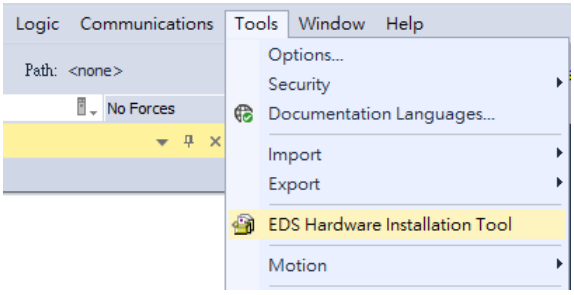

Figure 1.1.1

Step2. Right-click the connected Ethernet port and select **New Module…**.

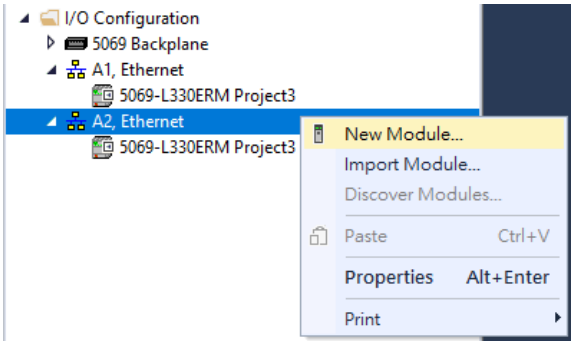

Figure 1.1.2

Step3. Find and select the drive in the list, and then click **Create**.
In this example, a HIWIN MIKROSYSTEM E2 drive is selected.

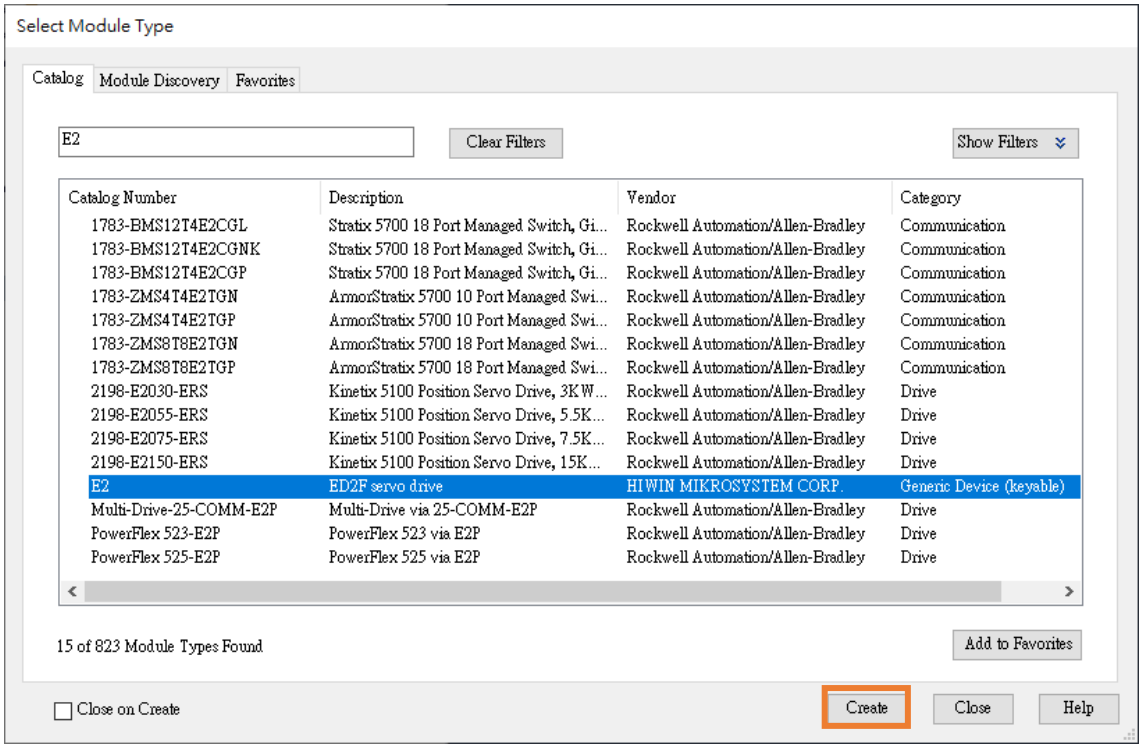

Figure 1.1.3

Step4. Configure the IP address and the axis name.

Then, click **Change** to open “Module Definition” window.

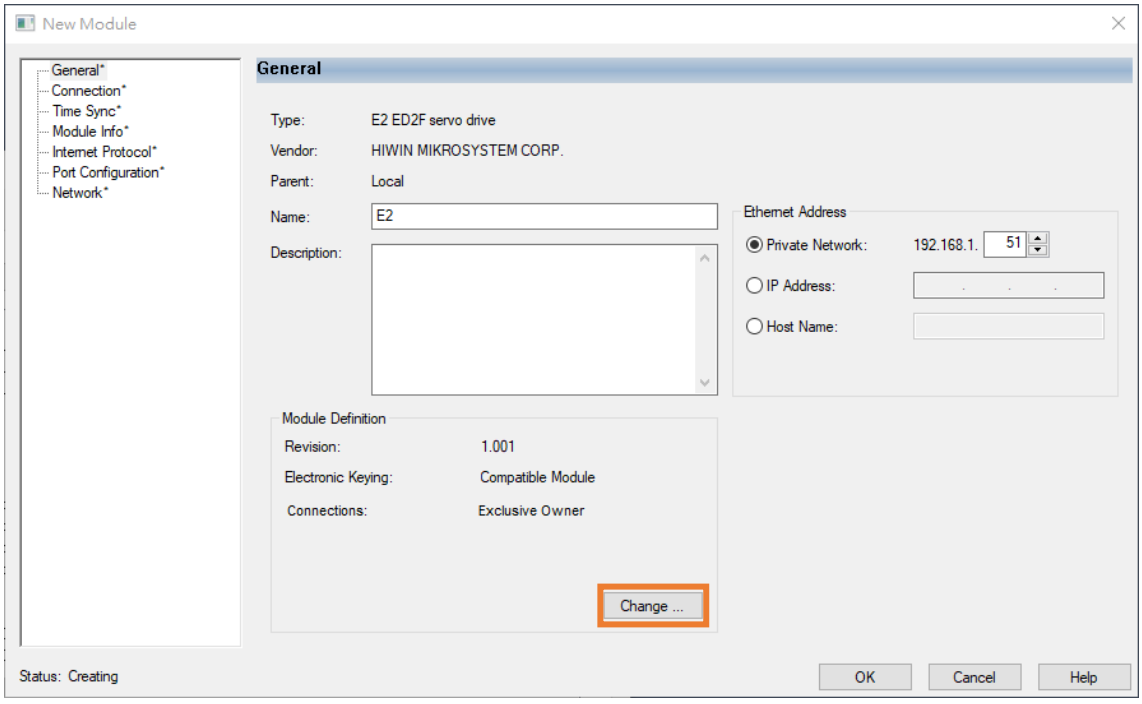

Figure 1.1.4

Step5. In “Module Definition” window, change the “Size” setting from **SINT** to **INT** and click **OK**.

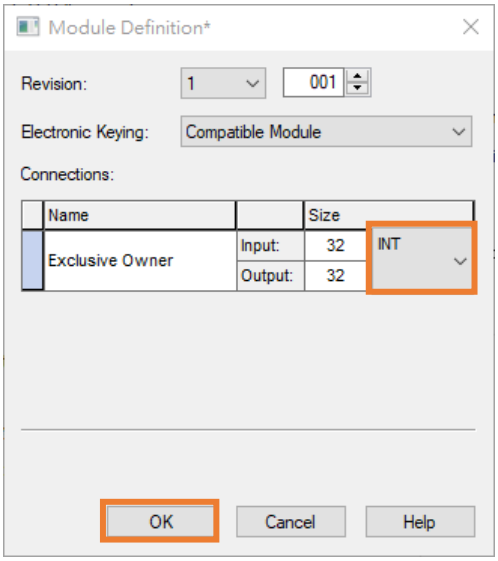

Figure 1.1.5

Note:

Before creating a new module in Step6, the “Size” must be set correctly in Step5. Otherwise, the incorrect data type of **I:Data** and **O:Data** will make them unusable by the H_ACOMM instruction. After Step6, any changes in the size setting will not simultaneously change the data type of “I:Data” and “O:Data” in “Controller Tags.”

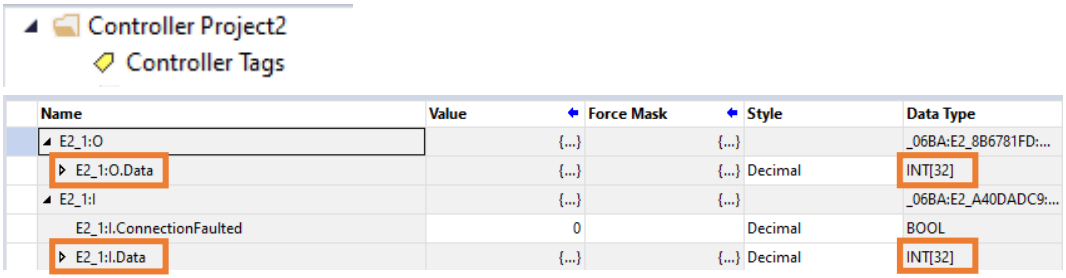

Figure 1.1.6

Step6. Click **OK** in the window of Step4 to complete the axis creation.

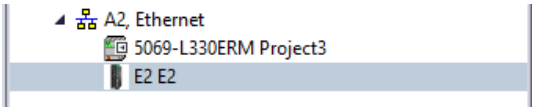

Figure 1.1.7

1.2 Import Add-On Instructions (AOIs)

Step1. Right-click “Add-On Instructions” folder (which is under “Assets” folder) and select **Import Add-On Instruction…**.

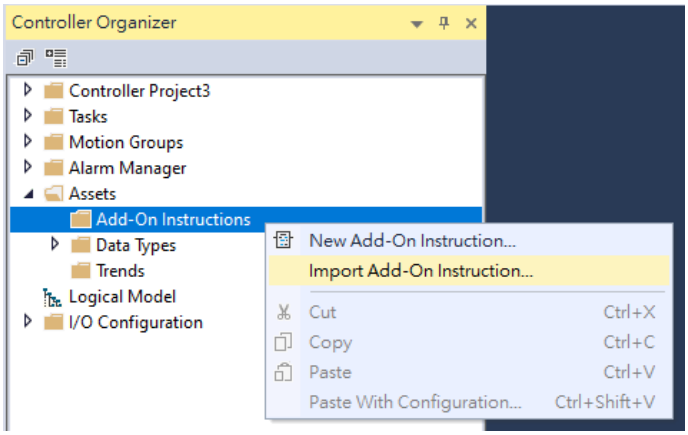

Figure 1.2.1

Step2. Select the file with the name of “HIWIN_MIKROSYSTEM_AOI_vx.x.L5X” and click **Open**.

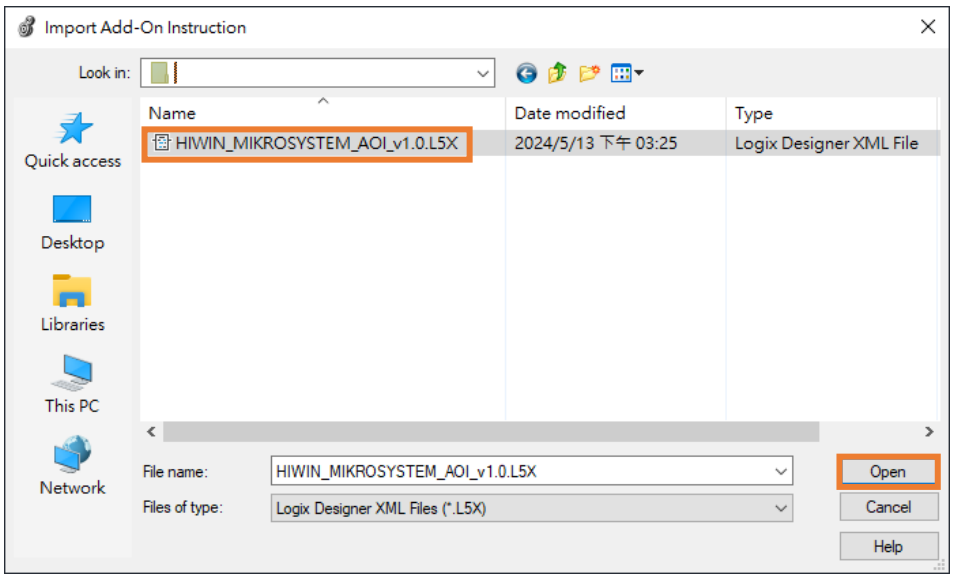

Figure 1.2.2

Step3. Deal with the conflicts of the items of **Add-On Instructions** and **Data Types** in “Import Configuration” window. If there is no conflict to be handled, click **OK** to import the instructions.

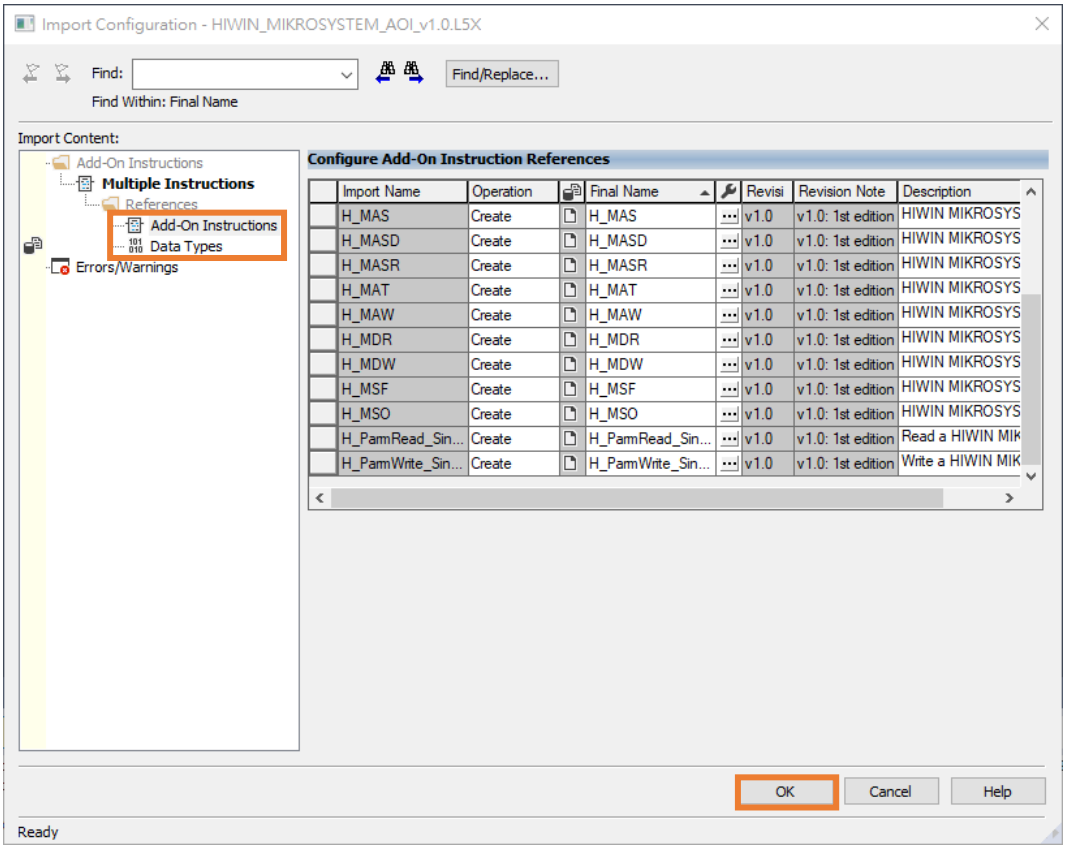

Figure 1.2.3

Step4. As the import is completed, all instructions are listed in “Add-On Instructions” folder.

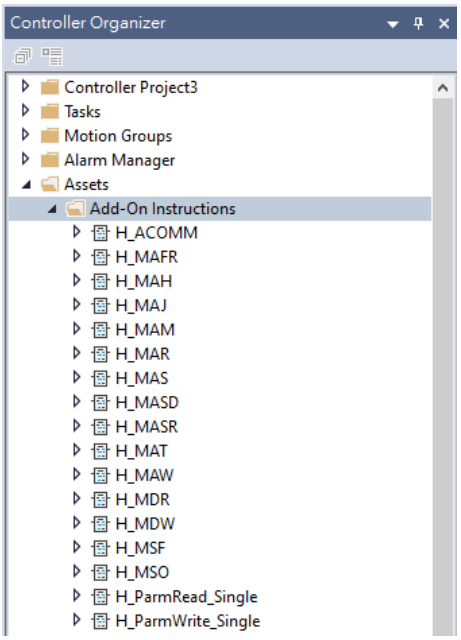

Figure 1.2.4

2. Function blocks (AOIs) description

2. Function blocks (AOIs) description 2-1

2.1 H_ACOMM - HIWIN MIKROSYSTEM Axis Communication 2-2

2.2 H_MAFR - HIWIN MIKROSYSTEM Axis Alarm Reset 2-7

2.3 H_MASD - HIWIN MIKROSYSTEM Axis Shutdown 2-9

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2.9 H_MAM - HIWIN MIKROSYSTEM Axis Positioning 2-25

2.10 H_MAT - HIWIN MIKROSYSTEM Axis Torque Control 2-28

2.11 H_MAS - HIWIN MIKROSYSTEM Axis Stop 2-31

2.12 H_MAR - HIWIN MIKROSYSTEM Axis Arm Registration 2-33

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2.18 H_AStatus – HIWIN MIKROSYSTEM Axis Status 2-52

2.1 H_ACOMM - HIWIN MIKROSYSTEM Axis Communication

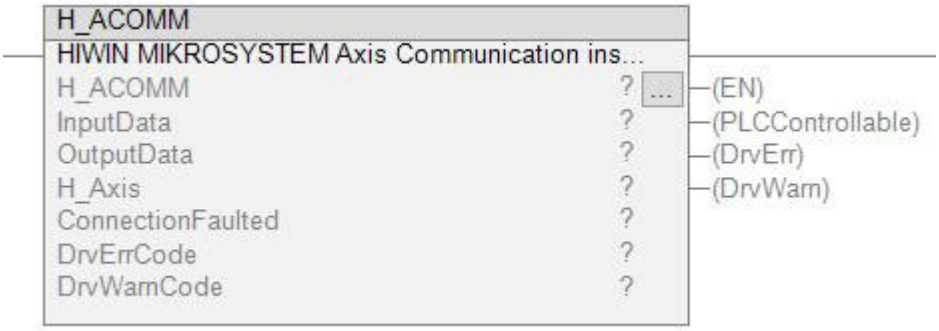
HIWIN MIKROSYSTEM Axis Communication instruction.

■ Description

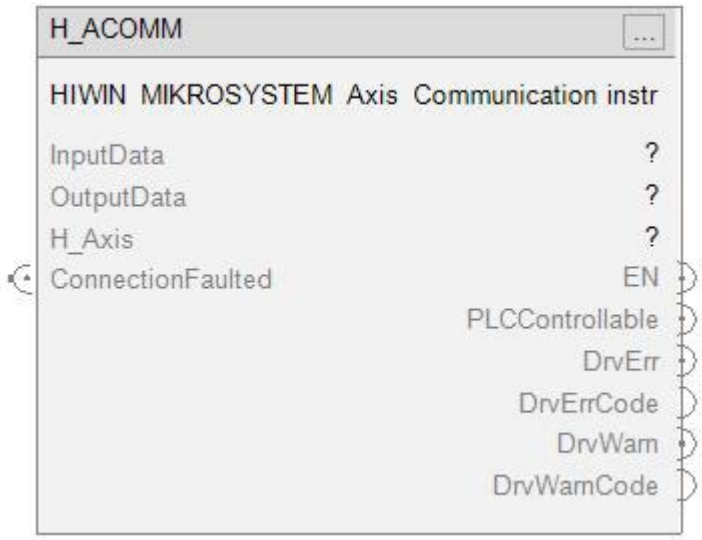
H_ACOMM is for drive motion and parameter IO data transmission.
Each HIWIN MIKROSYSTEM axis needs a H_ACOMM instruction to create the transmission channel.
This instruction must always be in enabled state.

■ Available Languages

Relay Ladder



Function Block



Structured Text

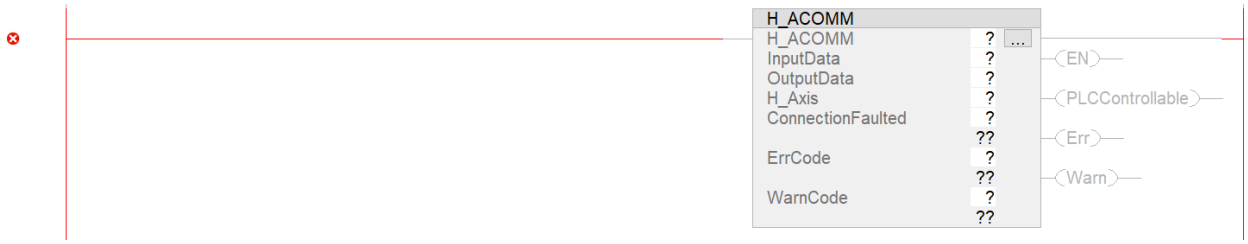
```
H_ACOMM(H_ACOMM,InputData,OutputData,H_Axis,ConnectionFaulted,ErrCode,WarnCode);
```

■ Parameters

Required	Name	Data Type	Usage	Description
x	H_ACOMM	H_ACOMM	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	InputData	INT[32]	InOut	module:I.Data, e.g., E2:I.Data
x	OutputData	INT[32]	InOut	module:O.Data, e.g., E2:O.Data
x	H_Axis	HIWIN_MIKRO_AXIS	InOut	HIWIN MIKROSYSTEM Servo Axis Object
x	ConnectionFaulted	BOOL	Input	1: In connection fault state
	EN	BOOL	Output	1: Instruction is enabled
	PLCControllable	BOOL	Output	1: Axis is controllable by PLC
	DrvErr	BOOL	Output	1: Drive is in alarm state
x	DrvErrCode	INT	Output	Drive alarm code
	DrvWarn	BOOL	Output	1: Drive is in warning state
x	DrvWarnCode	INT	Output	Drive warning code
	InternalLimit	BOOL	Output	1: A drive internal limit is active

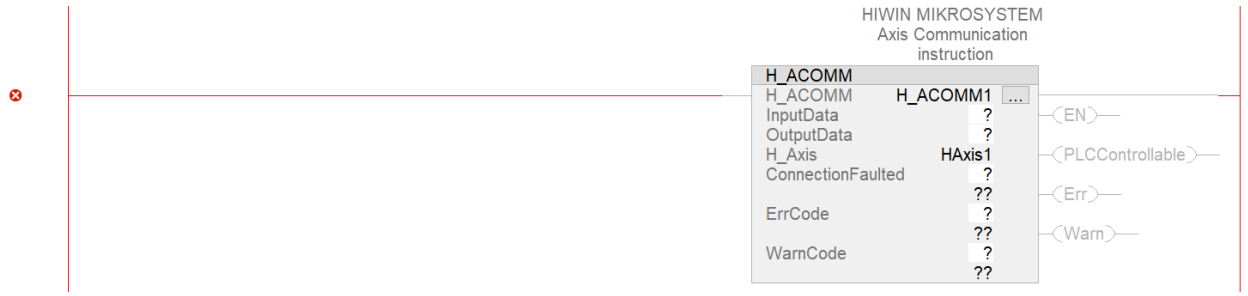
■ Ladder Setting Example

Step1. Add a H_ACOMM instruction to a rung.

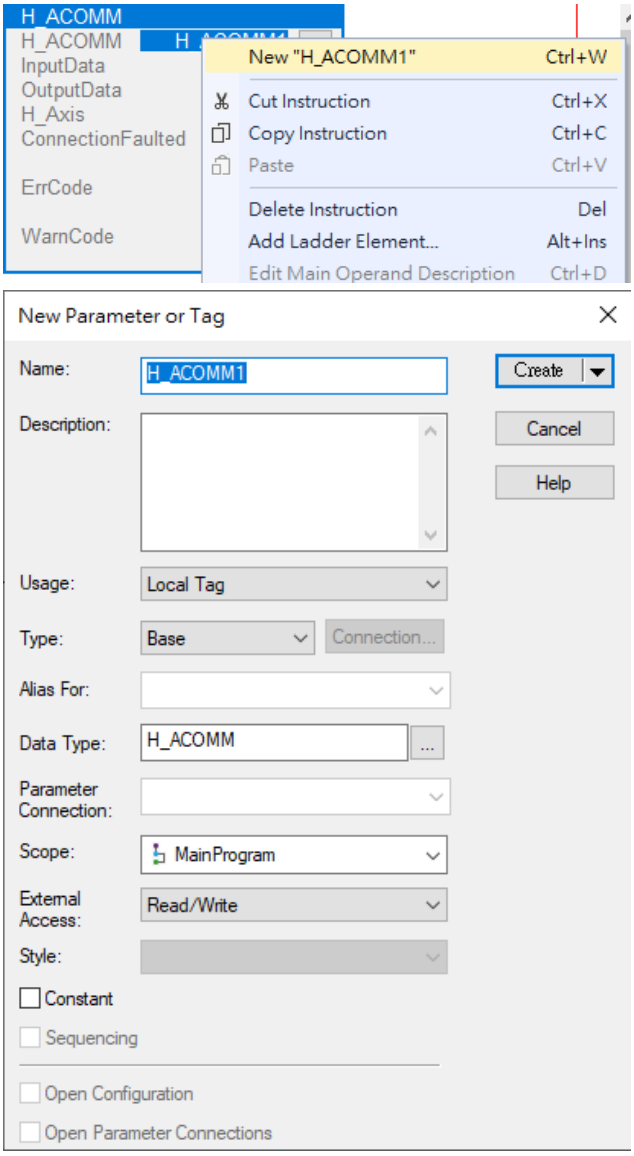


Step2. Create a H_ACOMM tag and a H_Axis tag.

Step 2-1 Enter a tag name in the H_ACOMM name box. E.g., H_ACOMM1.

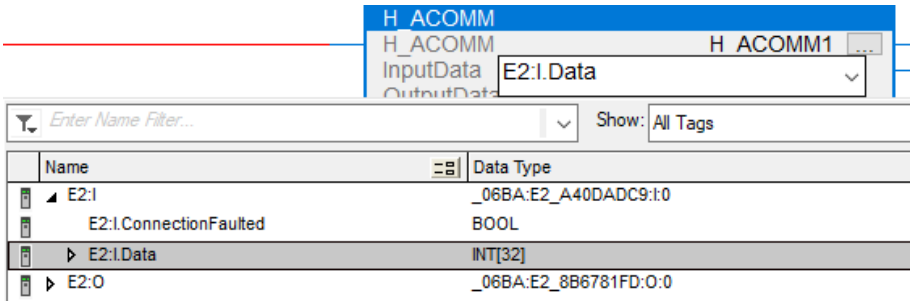


Step 2-2 Right-click the mouse on the name that was entered. Click **New <TagName>** and then click **Create** to finish creating a H_ACOMM tag.



Step 2-3 Enter a name in the H_Axis box, e.g., H_Axis1. Then, create the H_Axis tag as the same way as creating the H_ACOMM tag in Step 2-2.

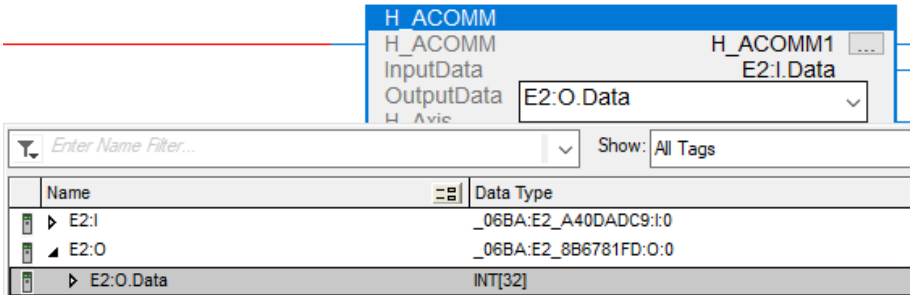
Step3. Link *InputData* to an E2 drive module's I.Data parameter.



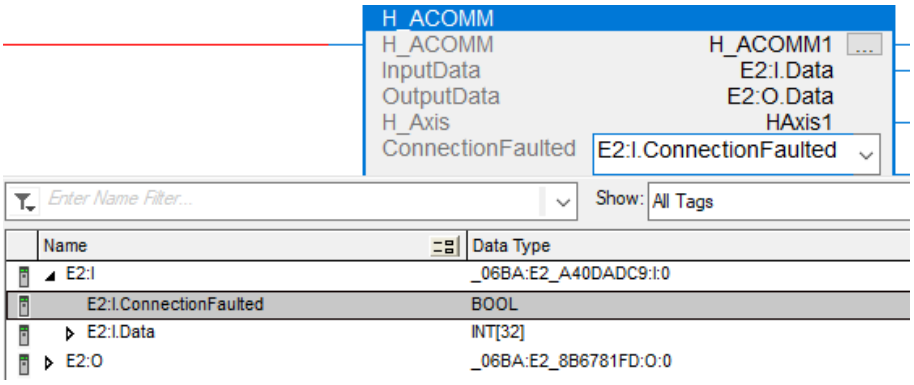
Note

- If the parameter of "I.Data" cannot be found under a module, please remove the module and re-create it according to the steps in section 1.1. Please note that the "Size" setting in section 1.1 step 5 must be completed in this step.

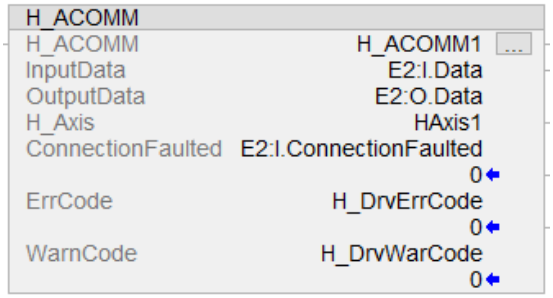
Step4. Link *OutputData* to an E2 drive module's O.Data parameter.



Step5. Link *ConnectionFaulted* to an E2 drive module's I.ConnectionFaulted parameter.



Step6. Create the tags for *ErrCode* and *WarnCode*. Then, the configuration is completed.



■ Revision

Version	Revision Contents
1.2	1. Fix the functional errors of digital input and digital output. 2. Change the name of *ErrCode* to *DrvErrCode*. 3. Change the name of *WarnCode* to *DrvWarnCode*. 4. Change the attributes of *DrvErrCode* and *DrvWarnCode* to “not required.” 5. Change the output state from *Err* to *DrvErr*. 6. Change the output state from *Warn* to *DrvWarn*.
1.1	First edition.

2.2 H_MAFR - HIWIN MIKROSYSTEM Axis Alarm Reset

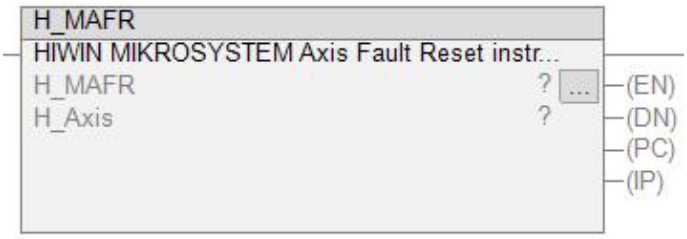
HIWIN MIKROSYSTEM Axis Alarm Reset instruction.

■ Description

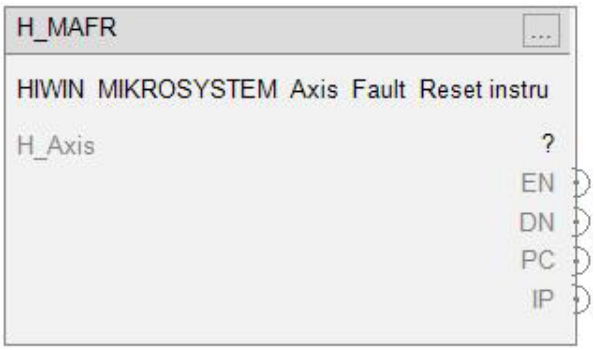
H_MAFR is used to clear the drive alarms of a HIWIN MIKROSYSTEM axis.
The command needs 20 ms for execution. After 20 ms, the fault reset command of Controlword will be reset and the output of *PC* will show if the drive alarms are reset successfully.
This instruction is executed at the rising edge of enabling.

■ Available Languages

Relay Ladder



Function Block



Structured Text

```
H_MAFR(H_MAFR,H_Axis);
```

■ Parameters

Required	Name	Data Type	Usage	Description
x	H_MAFR	H_MAFR	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	H_Axis	HIWIN_MIKRO_AXIS	InOut	HIWIN MIKROSYSTEM Servo Axis Object
	EN	BOOL	Output	1: Instruction is enabled
	DN	BOOL	Output	1: Command execution is done
	PC	BOOL	Output	1: Alarms reset successfully
	IP	BOOL	Output	1: Command is in process

■ Revision

Version	Revision Contents
1.1	First edition.

2.3 H_MASD - HIWIN MIKROSYSTEM Axis Shutdown

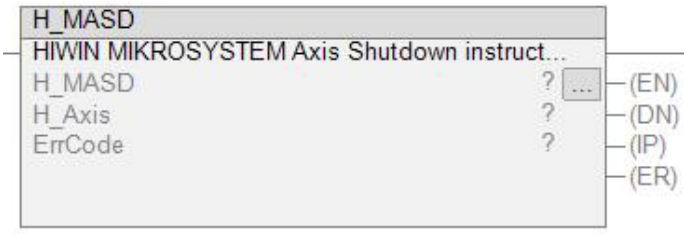
HIWIN MIKROSYSTEM Axis Shutdown instruction.

■ Description

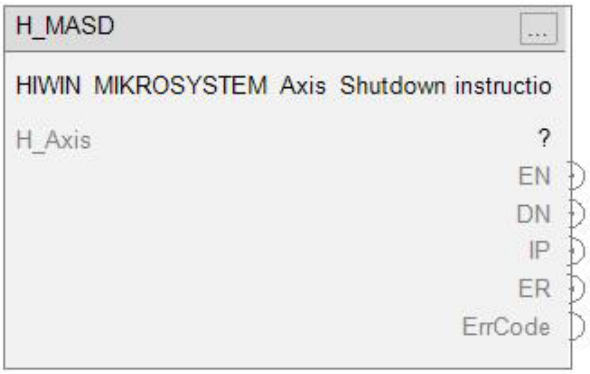
H_MASD is used to make a HIWIN MIKROSYSTEM axis go to the shutdown state.
The axis will remain in the shutdown state until H_MASR instruction is executed.

■ Available Languages

Relay Ladder



Function Block



Structured Text

```
H_MASD(H_MASD,H_Axis);
```

■ Parameters

Required	Name	Data Type	Usage	Description
x	H_MASD	H_MASD	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	H_Axis	HIWIN_MIKRO_AXIS	InOut	HIWIN MIKROSYSTEM Servo Axis Object
	EN	BOOL	Output	1: Instruction is enabled
	DN	BOOL	Output	1: Axis is shutdown successfully
	IP	BOOL	Output	1: Command is in process
	ER	BOOL	Output	1: Instruction detects an error
	ErrCode	INT	Output	Instruction error code

■ Instruction Error Codes

Error Code	Description
-1	PLC not controllable

■ Revision

Version	Revision Contents
1.1	First edition.

2.4 H_MASR - HIWIN MIKROSYSTEM Axis Shutdown Reset

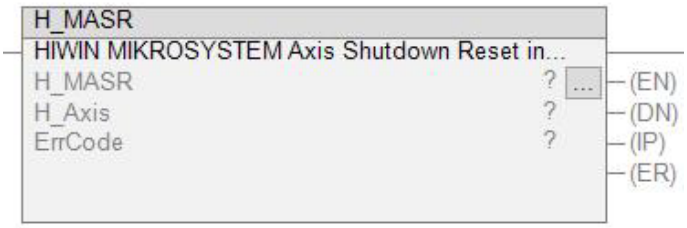
HIWIN MIKROSYSTEM Axis Shutdown Reset instruction.

■ Description

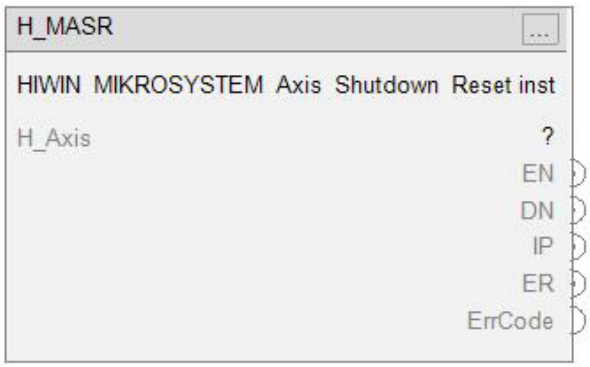
H_MASR is used to reset a HIWIN MIKROSYSTEM axis from the shutdown state.

■ Available Languages

Relay Ladder



Function Block



Structured Text

```
H_MASR(H_MASR,H_Axis);
```

■ Parameters

Required	Name	Data Type	Usage	Description
x	H_MASR	H_MASR	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	H_Axis	HIWIN_MIKRO_AXIS	InOut	HIWIN MIKROSYSTEM Servo Axis Object
	EN	BOOL	Output	1: Instruction is enabled
	DN	BOOL	Output	1: Axis is reset from the shutdown state
	IP	BOOL	Output	1: Command is in process
	ER	BOOL	Output	1: Instruction detects an error
	ErrCode	INT	Output	Instruction error code

■ Instruction Error Codes

Error Code	Description
-1	PLC not controllable

■ Revision

Version	Revision Contents
1.1	First edition.

2.5 H_MSO - HIWIN MIKROSYSTEM Axis Servo ON

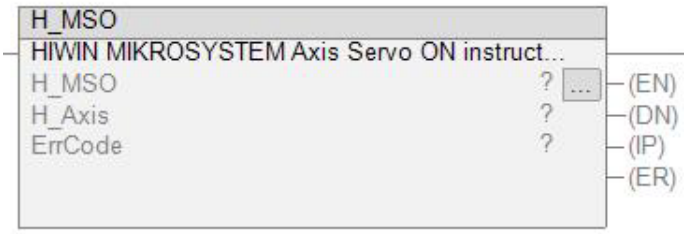
HIWIN MIKROSYSTEM Axis Servo ON instruction.

■ Description

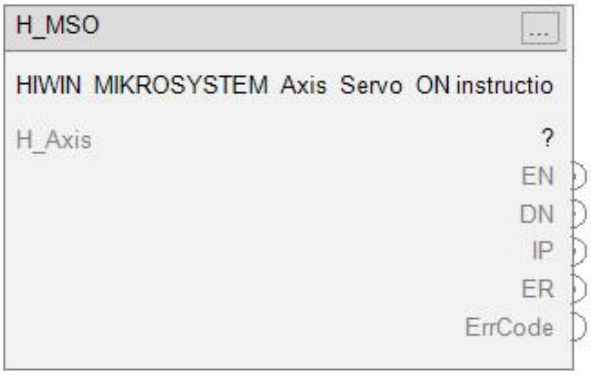
H_MSO is used to enable a HIWIN MIKROSYSTEM axis.
This instruction is executed at the rising edge of enabling.
To disable the axis, call H_MSF instruction.

■ Available Languages

Relay Ladder



Function Block



Structured Text

```
H_MSO(H_MSO,H_Axis);
```

■ Parameters

Required	Name	Data Type	Usage	Description
x	H_MSO	H_MSO	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	H_Axis	HIWIN_MIKRO_AXIS	InOut	HIWIN MIKROSYSTEM Servo Axis Object
	EN	BOOL	Output	1: Instruction is enabled
	DN	BOOL	Output	1: Axis is successfully servo ON
	IP	BOOL	Output	1: A servo ON command is in process
	ER	BOOL	Output	1: Instruction detects an error
	ErrCode	INT	Output	Instruction error code

■ Instruction Error Codes

Error Code	Description
-1	PLC not controllable
-2	Drive is in alarm state
-3	Drive not ready

■ Revision

Version	Revision Contents
1.1	First edition.

2.6 H_MSF - HIWIN MIKROSYSTEM Axis Servo OFF

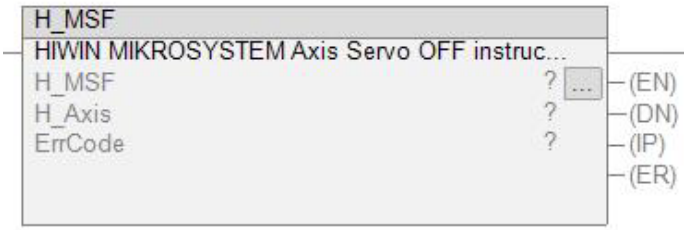
HIWIN MIKROSYSTEM Axis Servo OFF instruction.

■ Description

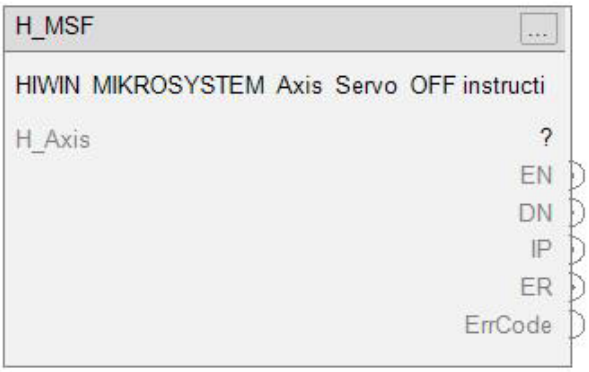
H_MSF is used to disable a HIWIN MIKROSYSTEM axis.

■ Available Languages

Relay Ladder



Function Block



Structured Text

```
H_MSF(H_MSF,H_Axis);
```

■ Parameters

Required	Name	Data Type	Usage	Description
x	H_MSF	H_MSF	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	H_Axis	HIWIN_MIKRO_AXIS	InOut	HIWIN MIKROSYSTEM Servo Axis Object
	EN	BOOL	Output	1: Instruction is enabled
	DN	BOOL	Output	1: Axis is successfully servo OFF
	IP	BOOL	Output	1: A servo OFF command is in process
	ER	BOOL	Output	1: Instruction detects an error
	ErrCode	INT	Output	Instruction error code

■ Instruction Error Codes

Error Code	Description
-1	PLC not controllable

■ Revision

Version	Revision Contents
1.1	First edition.

2.7 H_MAH - HIWIN MIKROSYSTEM Axis Homing

HIWIN MIKROSYSTEM Axis Homing instruction.

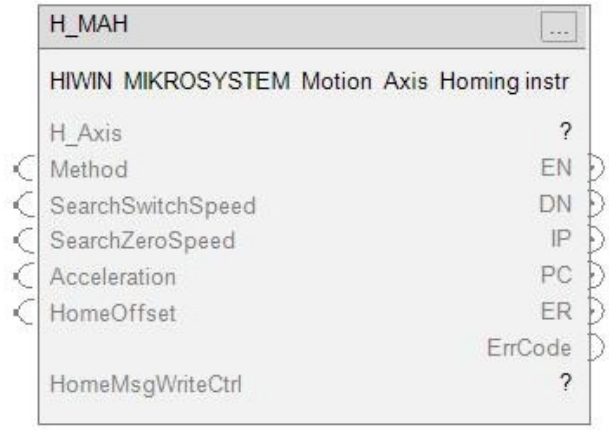
■ Description

H_MAH is used to start a CiA402 homing procedure on a HIWIN MIKROSYSTEM axis.
The information on the supported homing methods is described in servo drive's EtherNet/IP communication command manual (e.g., "E2 Series Servo Drive EtherNet/IP Communication Command Manual").
This instruction is executed at the rising edge of enabling.
To stop the homing procedure, call H_MAS instruction.

■ Available Languages

Relay Ladder

Function Block



Structured Text

```
H_MAH(H_MAH,H_Axis,Method,SearchSwitchSpeed,SearchZeroSpeed,Acceleration,HomeOffset,
HomeMsgWriteCtrl);
```

■ Parameters

Required	Name	Data Type	Usage	Description
x	H_MAH	H_MAH	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	H_Axis	HIWIN_MIKRO_AXIS	InOut	HIWIN MIKROSYSTEM Servo Axis Object
x	Method	DINT	Input	CiA402 homing method
x	SearchSwitchSpeed	DINT	Input	Calibration point (e.g., a limit switch or a near home sensor) searching speed
x	SearchZeroSpeed	DINT	Input	Home point searching speed
x	Acceleration	DINT	Input	Homing acceleration
x	HomeOffset	DINT	Input	Home offset value
	EN	BOOL	Output	1: Instruction is enabled
	DN	BOOL	Output	1: Homing procedure is completed or aborted
	IP	BOOL	Output	1: Homing procedure is busy
	PC	BOOL	Output	1: Homing is successfully completed
	ER	BOOL	Output	1: Instruction detects an error
	ErrCode	INT	Output	Instruction error code
x	HomeMsgWriteCtrl	MESSAGE	InOut	Message read/write object struct (see the setting example in this section)
	MsgWriteData	DINT	Input	DO NOT CHANGE (used to set the *HomeMsgWriteCtrl* 'source element')

Note:

The behavior of HomeOffset will be different based on the setting of Pt70A. Please refer to section 8.11.1 **Setting internal homing** in “E2 Series Servo Drive User Manual” for details.

■ Input Parameters Unit

Parameter	Unit
SearchSwitchSpeed	control unit/s
SearchZeroSpeed	control unit/s
HomeOffset	control unit

Note:

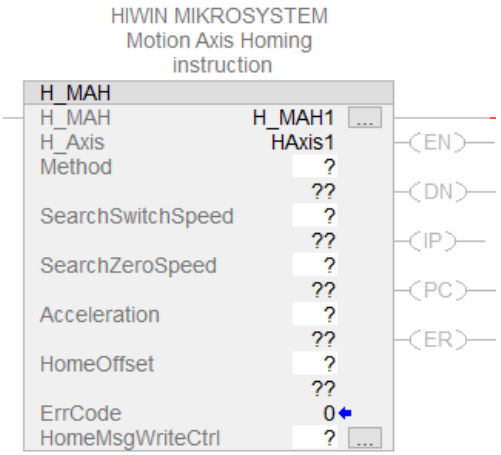
“control unit” is the basic unit defined by servo drive, and it can be set via Thunder. Please refer to section 6.11 **Electronic gear ratio** in “E2 Series Servo Drive User Manual” for details.

■ Instruction Error Codes

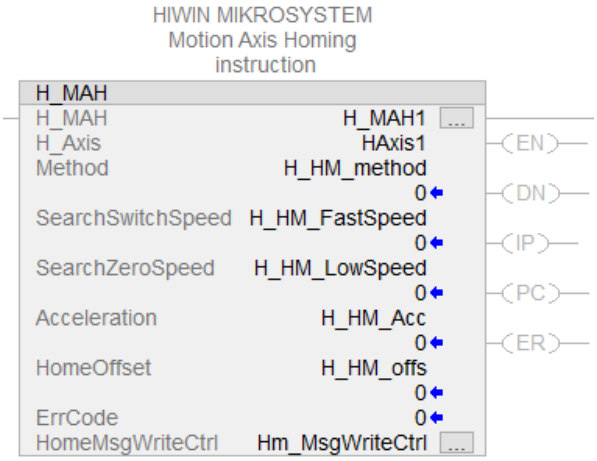
Error Code	Description
-1	PLC not controllable
-2	Drive is in alarm state
-3	Drive not ready
-4	Servo not ready
-5	Homing fail
Others	The MSG instruction error codes (refer to Logix 5000 instruction Help file)

■ Ladder Setting Example

Step1. Create a H_MAH tag and assign a target axis to *H_Axis*.



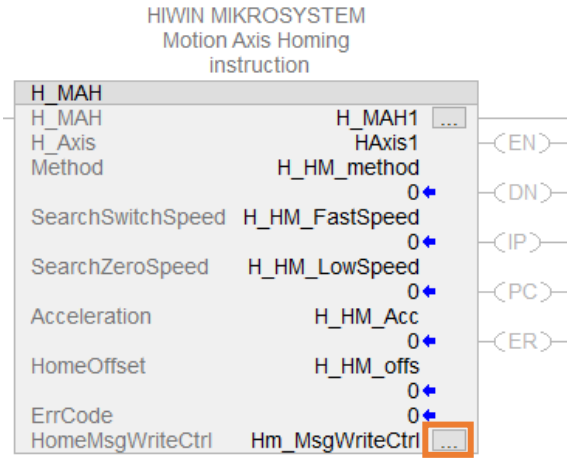
Step2. Assign parameters to the required input items.

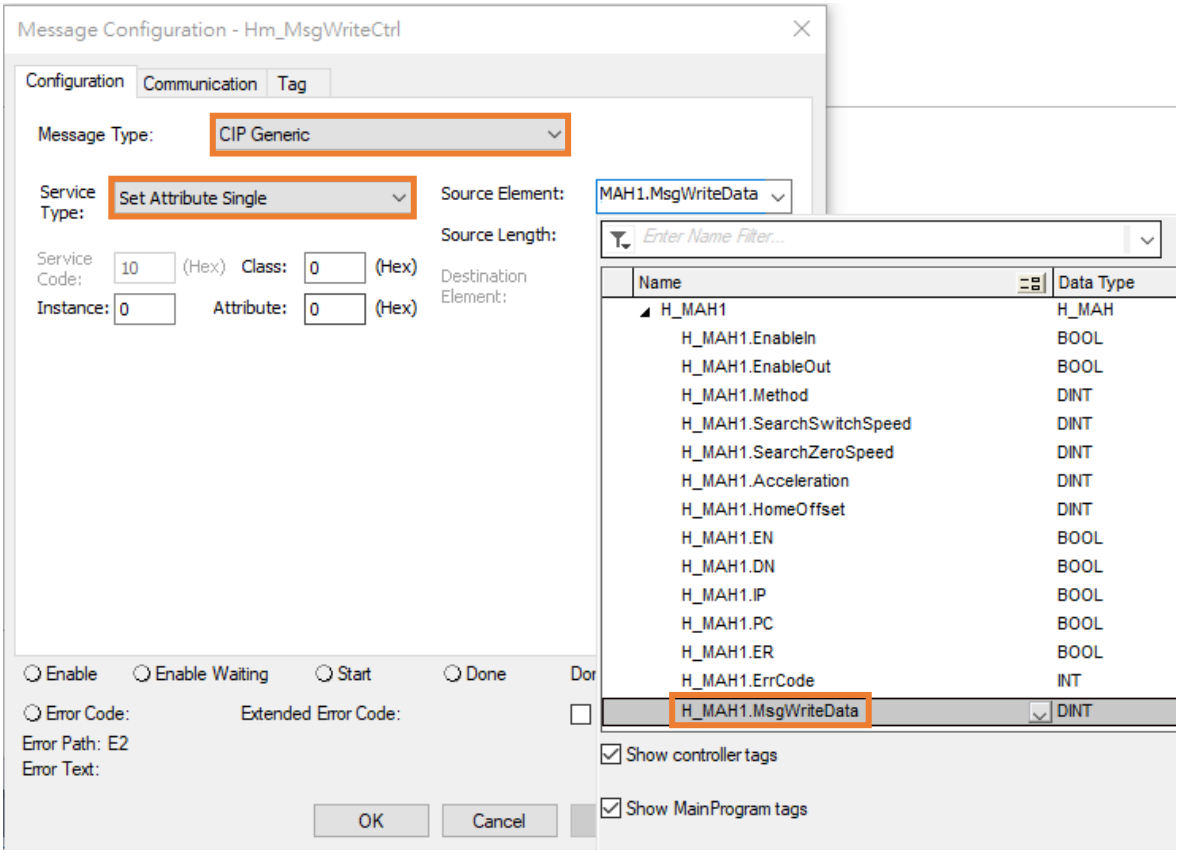


Step3. Open the configuration dialog of *HomeMsgWriteCtrl*. Set Message Type to **CIP Generic** and Service Type to **Set Attribute Single**. Set Class, Instance and Attribute to 0.

Select the parameter of *MsgWriteData* from the created H_MAH tag for Source Element. In this example, select **H_MAH1.MsgWriteData**.

Then, click **OK** to complete the configuration.





■ Revision

Version	Revision Contents
1.1	First edition.

2.8 H_MAJ - HIWIN MIKROSYSTEM Axis Jog

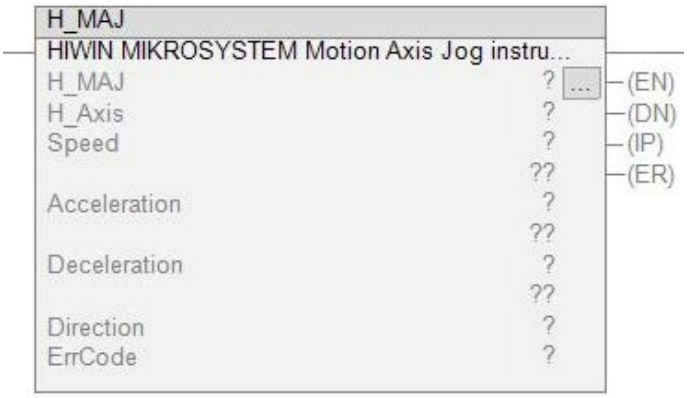
HIWIN MIKROSYSTEM Axis Jog instruction.

■ Description

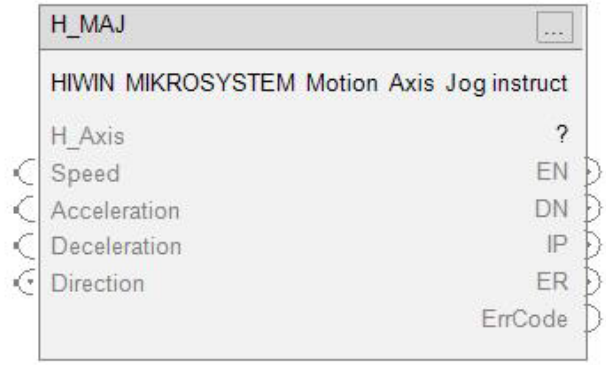
H_MAJ is used to do an endless jogging of a HIWIN MIKROSYSTEM axis.
This instruction is executed at the rising edge of enabling.
To stop the jogging, call H_MAS instruction.

■ Available Languages

Relay Ladder



Function Block



Structured Text

```
H_MAJ(H_MAJ,H_Axis,Speed,Acceleration,Deceleration,Direction);
```

■ Parameters

Required	Name	Data Type	Usage	Description
x	H_MAJ	H_MAJ	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	H_Axis	HIWIN_MIKRO_AXIS	InOut	HIWIN MIKROSYSTEM Servo Axis Object
x	Speed	DINT	Input	Jogging speed
x	Acceleration	DINT	Input	Jogging acceleration
x	Deceleration	DINT	Input	Jogging deceleration
x	Direction	BOOL	Input	0: Forward; 1: Reverse
	EN	BOOL	Output	1: Instruction is enabled
	DN	BOOL	Output	1: Command is executed
	IP	BOOL	Output	0: Jogging command is stopped; 1: Jogging command is in execution
	ER	BOOL	Output	1: Instruction detects an error
	ErrCode	INT	Output	Instruction error code

■ Input Parameters Unit

Parameter	Unit
Speed	control unit/s
Acceleration	control unit/s^2
Deceleration	control unit/s^2

Note:

“control unit” is the basic unit defined by servo drive, and it can be set via Thunder. Please refer to section 6.11 **Electronic gear ratio** in “E2 Series Servo Drive User Manual” for details.

■ Instruction Error Codes

Error Code	Description
-1	PLC not controllable
-2	Drive is in alarm state
-3	Drive not ready
-4	Servo not ready

■ Revision

Version	Revision Contents
1.1	First edition.

2.9 H_MAM - HIWIN MIKROSYSTEM Axis Positioning

HIWIN MIKROSYSTEM Axis Positioning instruction.

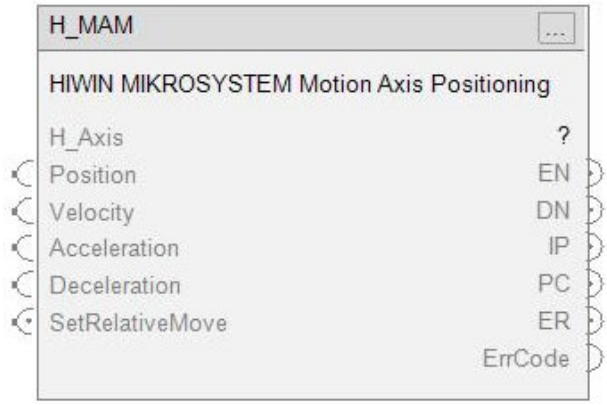
■ Description

H_MAM is used to do positioning of a HIWIN MIKROSYSTEM axis.
Every time the instruction is executed, the setting will be active immediately.
This instruction is executed at the rising edge of enabling.

■ Available Languages

Relay Ladder

Function Block



Structured Text

```
H_MAM(H_MAM,H_Axis,Position,Velocity,Acceleration,Deceleration,SetRelativeMove);
```

■ Parameters

Required	Name	Data Type	Usage	Description
x	H_MAM	H_MAM	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	H_Axis	HIWIN_MIKRO_AXIS	InOut	HIWIN MIKROSYSTEM Servo Axis Object
x	Position	DINT	Input	The set position
x	Velocity	DINT	Input	Moving velocity
x	Acceleration	DINT	Input	Moving acceleration
x	Deceleration	DINT	Input	Moving deceleration
x	SetRelativeMove	BOOL	Input	0: Move absolute; 1: Move relative
	EN	BOOL	Output	1: Instruction is enabled
	DN	BOOL	Output	1: Command is executed
	IP	BOOL	Output	1: Command is in process
	PC	BOOL	Output	1: Motor is in-position
	ER	BOOL	Output	1: Instruction detects an error
	ErrCode	INT	Output	Instruction error code

■ Input Parameters Unit

Parameter	Unit
Position	control unit
Velocity	control unit/s
Acceleration	control unit/s^2
Deceleration	control unit/s^2

Note:

“control unit” is the basic unit defined by servo drive, and it can be set via Thunder. Please refer to section 6.11 **Electronic gear ratio** in “E2 Series Servo Drive User Manual” for details.

■ Instruction Error Codes

Error Code	Description
-1	PLC not controllable
-2	Drive is in alarm state
-3	Drive not ready
-4	Servo not ready

■ Revision

Version	Revision Contents
1.1	First edition.

2.10 H_MAT - HIWIN MIKROSYSTEM Axis Torque Control

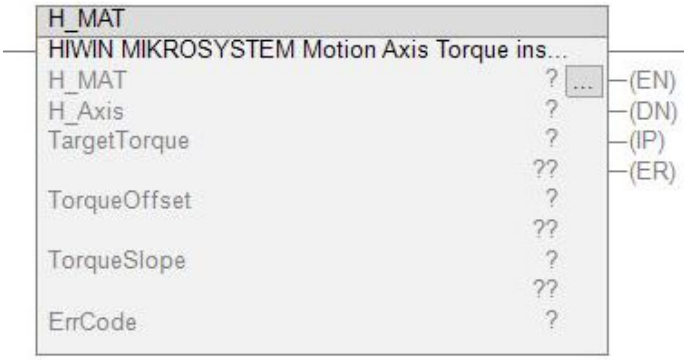
HIWIN MIKROSYSTEM Axis Torque Control instruction.

■ Description

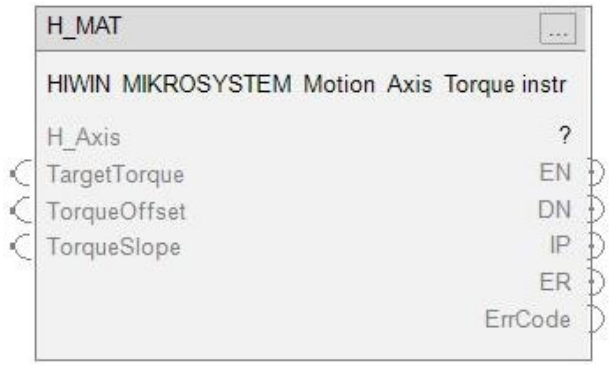
H_MAT is used to make a torque control to a HIWIN MIKROSYSTEM axis.
To stop the movement by the torque control, call H_MAS instruction.

■ Available Languages

Relay Ladder



Function Block



Structured Text

```
H_MAT(H_MAT,H_Axis,TargetTorque,TorqueOffset,TorqueSlope);
```

■ Parameters

Required	Name	Data Type	Usage	Description
x	H_MAT	H_MAT	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	H_Axis	HIWIN_MIKRO_AXIS	InOut	HIWIN MIKROSYSTEM Servo Axis Object
x	TargetTorque	INT	Input	Target torque
x	TorqueOffset	INT	Input	Torque offset
x	TorqueSlope	INT	Input	The rate of change of torque
	EN	BOOL	Output	1: Instruction is enabled
	DN	BOOL	Output	1: Command is executed
	IP	BOOL	Output	0: Torque motion is stopped; 1: Torque motion is in execution
	ER	BOOL	Output	1: Instruction detects an error
	ErrCode	INT	Output	Instruction error code
	PC	BOOL	Output	1: The drive torque is clamped at the set torque and not reached the velocity limit

Note:

(1) The actual torque command is related to TargetTorque and TorqueOffset.

(2) Do not set TorqueSlope to 0. The rate of change of torque will be invalid.

■ Input Parameters Unit

Parameter	Unit
TargetTorque	0.1% rate torque
TorqueOffset	0.1% rate torque
TorqueSlope	0.1% rate torque/s

■ Instruction Error Codes

Error Code	Description
-1	PLC not controllable
-2	Drive is in alarm state
-3	Drive not ready
-4	Servo not ready

■ Revision

Version	Revision Contents
1.1	First edition.

2.11 H_MAS - HIWIN MIKROSYSTEM Axis Stop

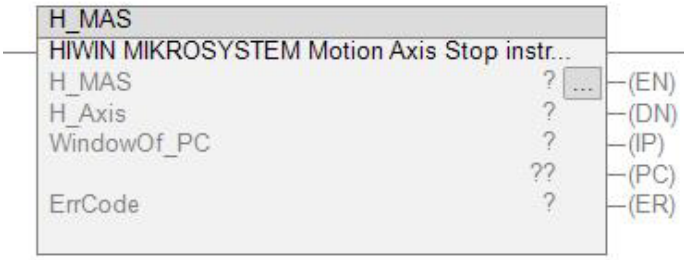
HIWIN MIKROSYSTEM Axis Stop instruction.

■ Description

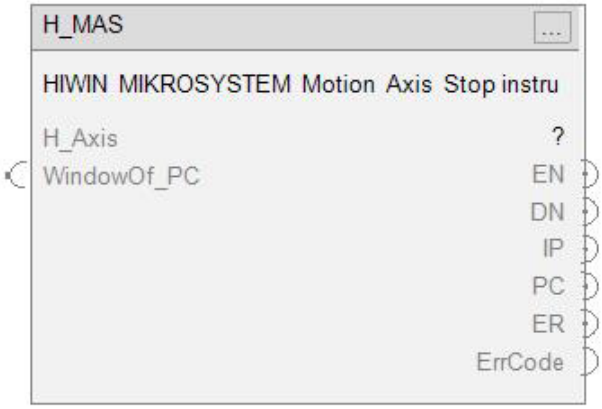
H_MAS is used to stop the movement on a HIWIN MIKROSYSTEM axis.
The output of *PC* shows if the motor is stopped based on the setting window of PC (*WindowOf_PC*). The default value of *WindowOf_PC* is 10. If *WindowOf_PC* is not given a suitable value, the *PC* state may be incorrect.

■ Available Languages

Relay Ladder



Function Block



Structured Text

```
H_MAS(H_MAS,H_Axis,WindowOf_PC);
```

■ Parameters

Required	Name	Data Type	Usage	Description
x	H_MAS	H_MAS	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	H_Axis	HIWIN_MIKRO_AXIS	InOut	HIWIN MIKROSYSTEM Servo Axis Object
	EN	BOOL	Output	1: Instruction is enabled
	DN	BOOL	Output	1: Stop command is executed
	IP	BOOL	Output	1: Axis is stopping
	PC	BOOL	Output	1: Axis is stopped
	ER	BOOL	Output	1: Instruction detects an error
x	WindowOf_PC	DINT	Input	The window to judge if the motor is in stop state (PC is true)
	ErrCode	INT	Output	Instruction error code

■ Input Parameters Unit

Parameter	Unit
WindowOf_PC	In torque mode is 0.1% rate torque. Other modes are control unit.

Note:

“control unit” is the basic unit defined by servo drive, and it can be set via Thunder. Please refer to section 6.11 **Electronic gear ratio** in “E2 Series Servo Drive User Manual” for details.

■ Instruction Error Codes

Error Code	Description
-1	PLC not controllable

■ Revision

Version	Revision Contents
1.1	First edition.

2.12 H_MAR - HIWIN MIKROSYSTEM Axis Arm Registration

HIWIN MIKROSYSTEM Axis Arm Registration instruction.

■ Description

H_MAR is used to arm registration event checking one time for a HIWIN MIKROSYSTEM axis. This instruction links to the CiA402 touch probe function of the axis.

When the instruction is called, a registration event is armed based on the selected Registration Input (*InputNumber*) and the specified Trigger Condition (*TriggerEdge*). As the Registration Input satisfies the Trigger Condition, the motor position will be latched and stored. The latest latched position will be responded at the axis input data (.InData) TouchProbe_1_PositiveEdge (word 14~15) or TouchProbe_2_PositiveEdge (word 16~17). For example, a HAxis1 tag is created for H_Axis. The HAxis1 tag has HAxis1.InData and HAxis1.OutData, as Figure 2.12.1 shows. The parameter of the TouchProbe_1_PositiveEdge of HAxis1 tag will be “HAxis1.InData.TouchProbe_1_PositiveEdge.”

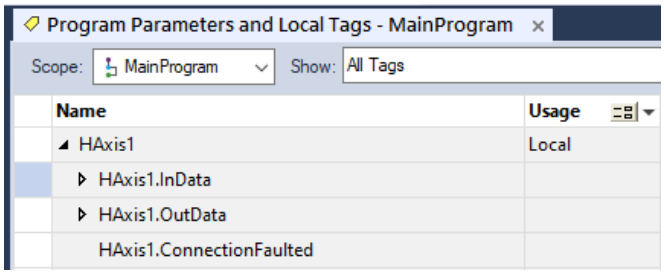
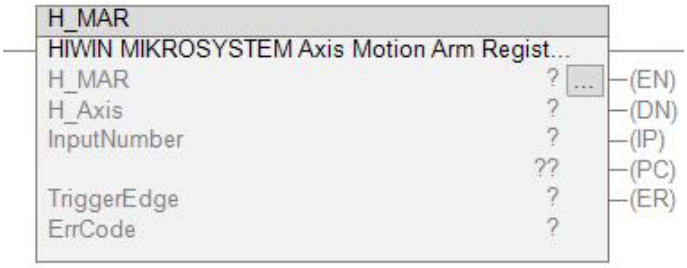


Figure 2.12.1

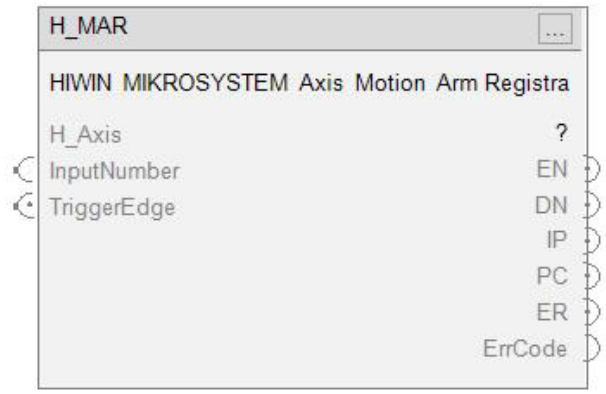
To disarm the event checking process, call H_MDR instruction.

■ Available Languages

Relay Ladder



Function Block



Structured Text

```
H_MAR(H_MAR,H_Axis,InputNumber,TriggerEdge);
```

■ Parameters

Required	Name	Data Type	Usage	Description
x	H_MAR	H_MAR	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	H_Axis	HIWIN_MIKRO_AXIS	InOut	HIWIN MIKROSYSTEM Servo Axis Object
x	InputNumber	DINT	Input	0: Encoder index; 1: Ext_Probe1; 2: Ext_Probe2
x	TriggerEdge	BOOL	Input	0: Positive edge; 1: Negative edge
	EN	BOOL	Output	1: Instruction is enabled
	DN	BOOL	Output	1: Command is executed
	IP	BOOL	Output	1: An event checking is in process
	PC	BOOL	Output	1: A registration event occurs
	ER	BOOL	Output	1: Instruction detects an error
	ErrCode	INT	Output	Instruction error code

■ Instruction Error Codes

Error Code	Description
-1	PLC not controllable
-6	Invalid setting value

■ Revision

Version	Revision Contents
1.2	Fix the error of *PC* status when *EnableIn* is false.
1.1	First edition.

2.13 H_MDR - HIWIN MIKROSYSTEM Axis Disarm Registration

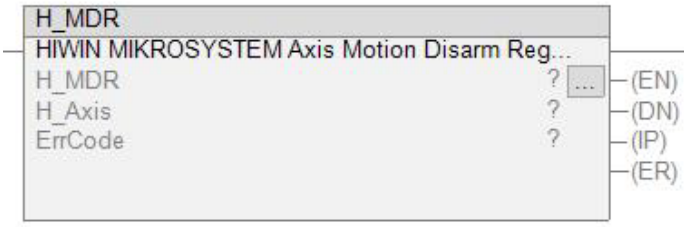
HIWIN MIKROSYSTEM Axis Disarm Registration instruction.

■ Description

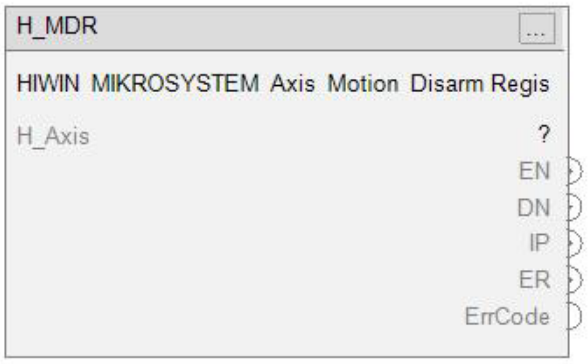
H_MDR is used to disarm a checking event enabled by H_MAR of a HIWIN MIKROSYSTEM axis. When H_MDR is executed, the touch probe function enabled by H_MAR will be disabled.

■ Available Languages

Relay Ladder



Function Block



Structured Text

```
H_MDR(H_MDR,H_Axis);
```

■ Parameters

Required	Name	Data Type	Usage	Description
x	H_MDR	H_MDR	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	H_Axis	HIWIN_MIKRO_AXIS	InOut	HIWIN MIKROSYSTEM Servo Axis Object
	EN	BOOL	Output	1: Instruction is enabled
	DN	BOOL	Output	1: A checking event is disarmed
	IP	BOOL	Output	1: Instruction is in process
	ER	BOOL	Output	1: Instruction detects an error
	ErrCode	INT	Output	Instruction error code

■ Instruction Error Codes

Error Code	Description
-1	PLC not controllable

■ Revision

Version	Revision Contents
1.1	First edition.

2.14 H_MAW - HIWIN MIKROSYSTEM Axis Arm Watch

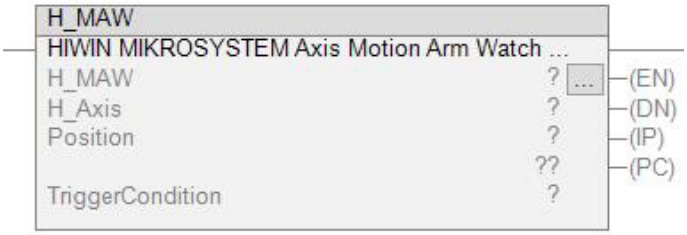
HIWIN MIKROSYSTEM Axis Arm Watch instruction.

■ Description

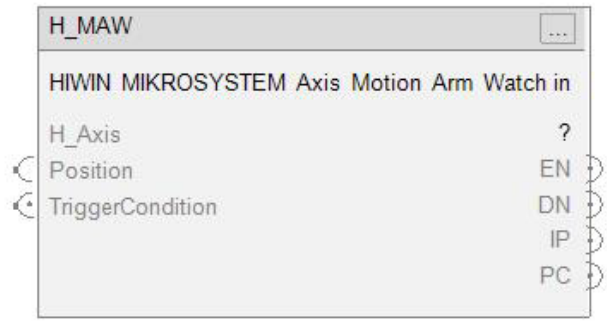
H_MAW is used to check the event with a set watch position and a trigger condition to a HIWIN MIKROSYSTEM axis. The PC signal will output “True” if both the watch position and the trigger condition fulfill the setting during the motion. To disarm a watching process, call H_MDW instruction and link it to H_MAW.

■ Available Languages

Relay Ladder



Function Block



Structured Text

```
H_MAW(H_MAW,H_Axis,Position,TriggerCondition);
```

■ Parameters

Required	Name	Data Type	Usage	Description
x	H_MAW	H_MAW	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	H_Axis	HIWIN_MIKRO_AXIS	InOut	HIWIN MIKROSYSTEM Servo Axis Object
x	Position	DINT	Input	The watch position
x	TriggerCondition	BOOL	Input	0: Forward direction; 1: Reverse direction
	EN	BOOL	Output	1: Instruction is enabled
	DN	BOOL	Output	1: A watch event is armed successfully
	IP	BOOL	Output	1: An event is in process
	PC	BOOL	Output	1: A watch event occurs
	flg_watchDisarmed	BOOL	Input	DO NOT CHANGE (used by H_MDW)

■ Input Parameters Unit

Parameter	Unit
Position	control unit

Note:

“control unit” is the basic unit defined by servo drive, and it can be set via Thunder. Please refer to section 6.11 **Electronic gear ratio** in “E2 Series Servo Drive User Manual” for details.

■ Revision

Version	Revision Contents
1.1	First edition.

2.15 H_MDW - HIWIN MIKROSYSTEM Axis Disarm Watch

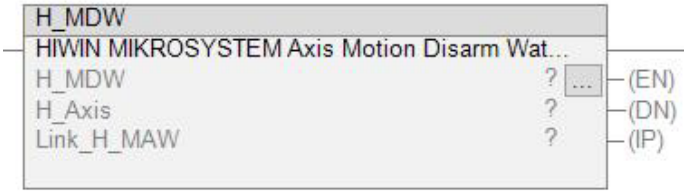
HIWIN MIKROSYSTEM Axis Disarm Watch instruction.

■ Description

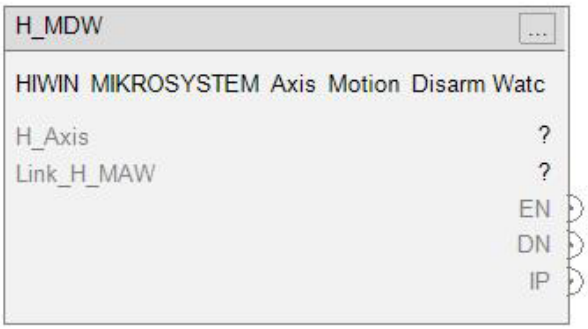
H_MDW is used to disarm a position watch event enabled by H_MAW of a HIWIN MIKROSYSTEM axis. H_MAW must be linked to this instruction.

■ Available Languages

Relay Ladder



Function Block



Structured Text

```
H_MDW(H_MDW,H_Axis,Link_H_MAW);
```

■ Parameters

Required	Name	Data Type	Usage	Description
x	H_MDW	H_MDW	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	H_Axis	HIWIN_MIKRO_AXIS	InOut	HIWIN MIKROSYSTEM Servo Axis Object
x	Link_H_MAW	H_MAW	InOut	HIWIN MIKROSYSTEM Axis Arm Watch instruction
	EN	BOOL	Output	1: Instruction is enabled
	DN	BOOL	Output	
	IP	BOOL	Output	

■ Revision

Version	Revision Contents
1.1	First edition.

2.16 H_ParmRead_Single - Read a HIWIN MIKROSYSTEM Axis Parameter

Read a HIWIN MIKROSYSTEM axis parameter.

■ Description

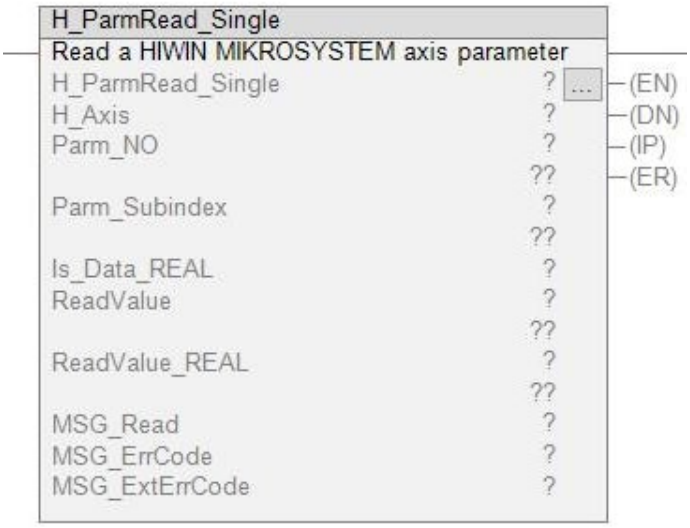
H_ParmRead_Single is used to read a parameter of a HIWIN MIKROSYSTEM axis. When the instruction is called, it will start an MSG read process one time. This instruction is executed at the rising edge of enabling. Refer to servo drive's EtherNet/IP communication command manual for a parameter NO and the subindex.

If the flag of *Is_Data_REAL* is set, the data received from an axis will be considered as a REAL type and displayed at *ReadValue_REAL*. Otherwise, the data received from an axis will be considered as an integer type and displayed at *ReadValue*.

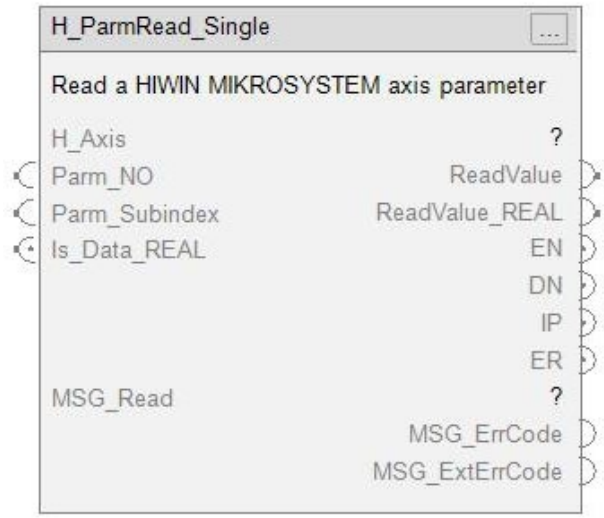
MSG_ErrCode and *MSG_ExtErrCode* respectively display the error code and the extension error code of the MSG instruction of Logix 5000, please refer to chapter 4 **Input/Output Instructions** in "Logix 5000 Controllers General Instructions."

■ Available Languages

Relay Ladder



Function Block



Structured Text

```
H_ParmRead_Single(H_ParmRead_Single,H_Axis,Parm_NO,Parm_Subindex,Is_Data_REAL,ReadValue,ReadValue_REAL,MSG_Read);
```

■ Parameters

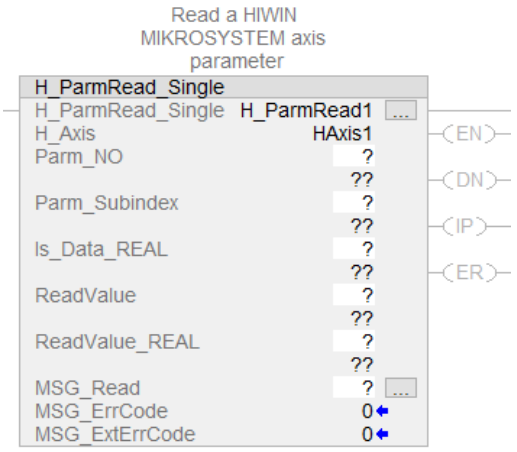
Required	Name	Data Type	Usage	Description
x	H_ParmRead_Single	H_ParmRead_Single	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	H_Axis	HIWIN_MIKRO_AXIS	InOut	HIWIN MIKROSYSTEM Servo Axis Object
x	Parm_NO	INT	Input	Parameter NO
x	Parm_Subindex	SINT	Input	Parameter subindex
x	Is_Data_REAL	BOOL	Input	0: Read data as integer type; 1: Read data as REAL type
x	ReadValue	DINT	Output	integer type reading value
x	ReadValue_REAL	REAL	Output	REAL type reading value
	EN	BOOL	Output	1: Instruction is enabled
	DN	BOOL	Output	1: Reading process is completed or error
	IP	BOOL	Output	1: A reading request is in process
	ER	BOOL	Output	1: Instruction detects an error
x	MSG_Read	MESSAGE	InOut	
	MSG_ErrCode	INT	Output	MSG error code
	MSG_ExtErrCode	DINT	Output	MSG extended error code
	MsgReadData	DINT	Input	DO NOT CHANGE (used for MSG setting window)

■ Input Parameters Unit

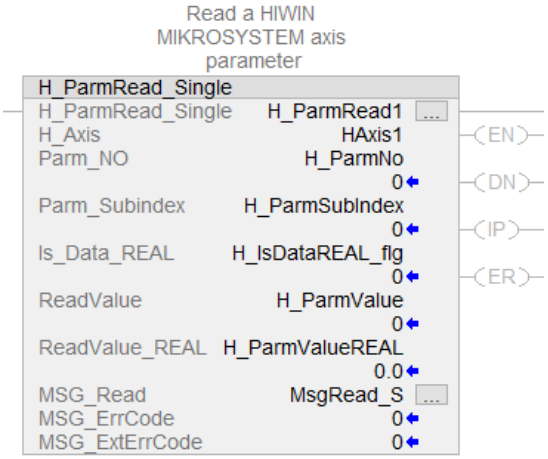
Parameter	Unit
Parm_NO	The hex value of the object number of the target parameter
Parm_SubIndex	The hex value of the subindex of the target parameter

■ Ladder Setting Example

Step1. Create a H_ParmRead_Single tag and assign a target axis to *H_Axis*.



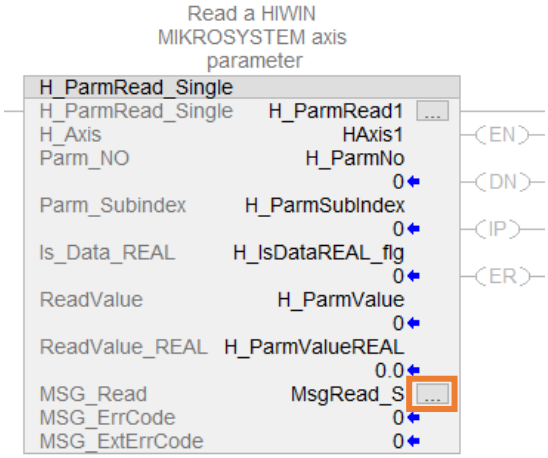
Step2. Assign parameters to the required input items.

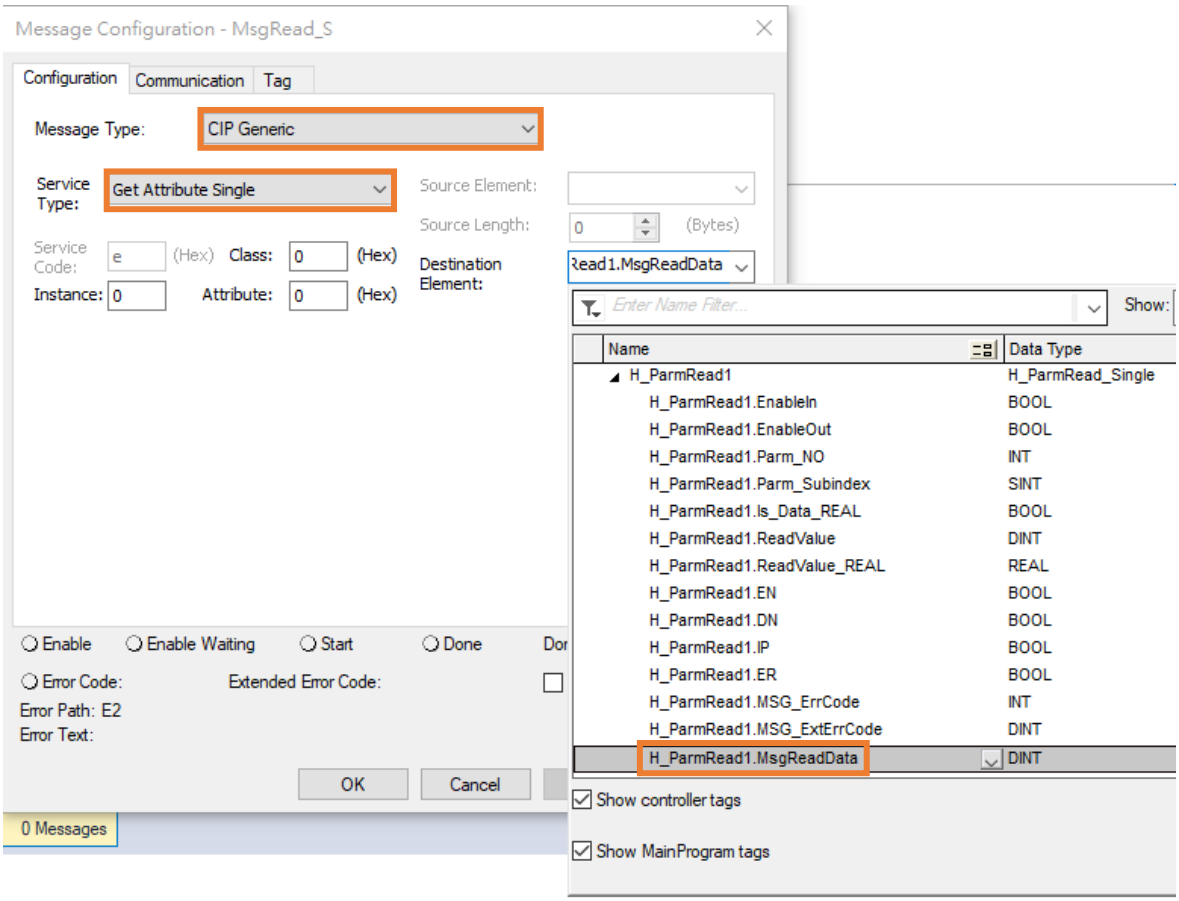


Step3. Open the configuration dialog of *MSG_Read*. Set Message Type to **CIP Generic** and Service Type to **Get Attribute Single**. Set Class, Instance and Attribute to 0.

Select the parameter of *MsgReadData* from the created H_ParmRead_Single tag for Destination Element. In this example, select **H_ParmRead1.MsgReadData**.

Then, click **OK** to complete the configuration.





■ Revision

Version	Revision Contents
1.1	First edition.

2.17 H_ParmWrite_Single - Write a HIWIN MIKROSYSTEM Axis Parameter

Write a HIWIN MIKROSYSTEM axis parameter.

■ Description

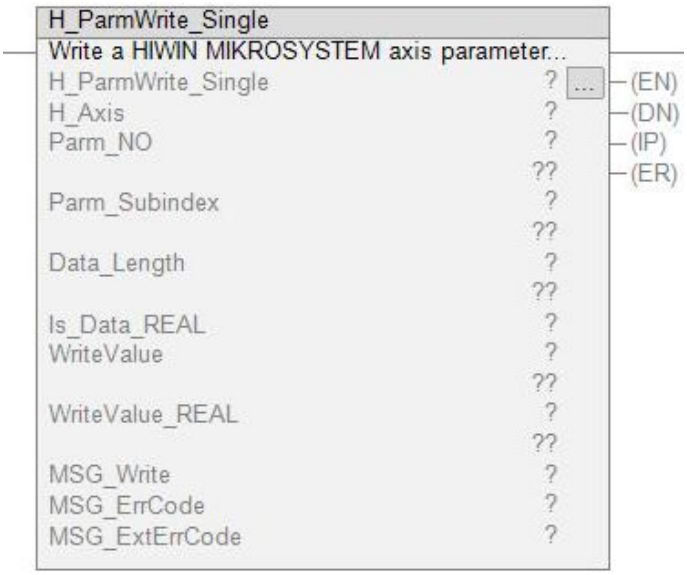
H_ParmWrite_Single is used to write a parameter of a HIWIN MIKROSYSTEM axis. When the instruction is called, it will start an MSG write process one time. This instruction is executed at the rising edge of enabling. Refer to servo drive's EtherNet/IP communication command manual for a parameter NO and the subindex.

If the flag of *Is_Data_REAL* is set, the instruction will use *WriteValue_REAL* as the input source to send it to the axis. Otherwise, *WriteValue* will be used as the input source to send it to the axis. *Data_Length* must be correctly set according to the parameter data type. Otherwise, an error will occur.

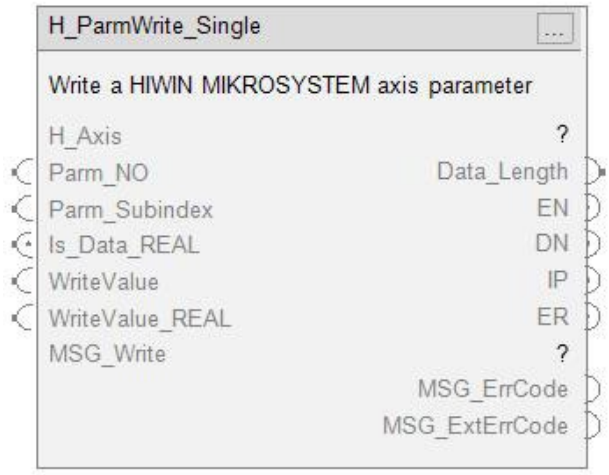
MSG_ErrCode and *MSG_ExtErrCode* respectively display the error code and the extension error code of the MSG instruction of Logix 5000, please refer to chapter 4 **Input/Output Instructions** in "Logix 5000 Controllers General Instructions."

■ Available Languages

Relay Ladder



Function Block



Structured Text

```
H_ParmWrite_Single(H_ParmWrite_Single,H_Axis,Parm_NO,Parm_Subindex,Data_Length,Is_Data_REAL,WriteValue,WriteValue_REAL,MSG_Write);
```

■ Parameters

Required	Name	Data Type	Usage	Description
x	H_ParmWrite_Single	H_ParmWrite_Single	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	H_Axis	HIWIN_MIKRO_AXIS	InOut	HIWIN MIKROSYSTEM Servo Axis Object
x	Parm_NO	INT	Input	Parameter NO
x	Parm_Subindex	SINT	Input	Parameter subindex
x	Data_Length	INT	Input	Parameter data length
x	Is_Data_REAL	BOOL	Input	0: Write data from *WriteValue*; 1: Write data from *WriteValue_REAL*
x	WriteValue	DINT	Input	integer type writing value
x	WriteValue_REAL	REAL	Input	REAL type writing value
	EN	BOOL	Output	1: Instruction is enabled
	DN	BOOL	Output	1: Writing process is completed or error
	IP	BOOL	Output	1: A writing request is in process
	ER	BOOL	Output	1: Instruction detects an error
x	MSG_Write	MESSAGE	InOut	
	MSG_ErrCode	INT	Output	MSG error code
	MSG_ExtErrCode	DINT	Output	MSG extended error codes
	MsgWriteData	DINT	Input	DO NOT CHANGE (used for MSG setting window)

■ Input Parameters Unit

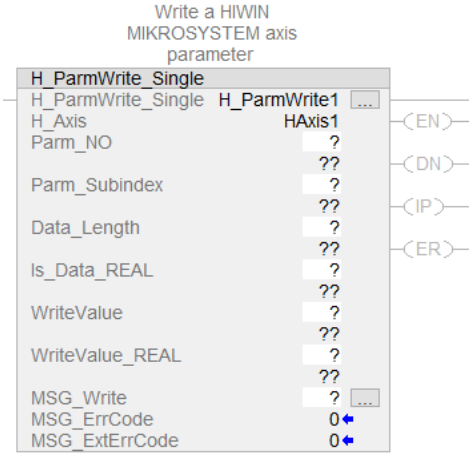
Parameter	Unit
Parm_NO	The hex value of the object number of the target parameter
Parm_SubIndex	The hex value of the subindex of the target parameter
Data_Length	Byte

Note:

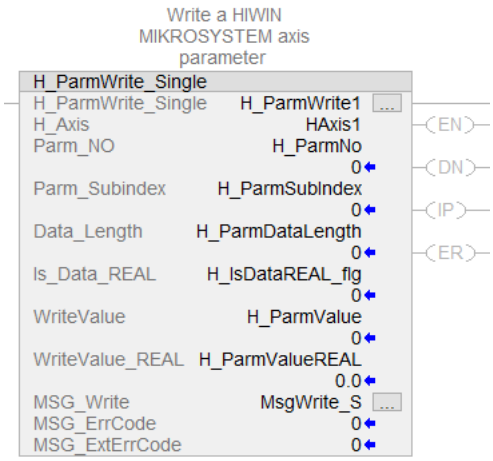
Set Data_Length based on the size of servo drive's Pt parameter. There are two data types for Pt parameter, 2 or 4. Please refer to section 15.2 **List of parameters** in "E2 Series Servo Drive User Manual" for details.

■ Ladder Setting Example

Step1. Create a H_ParmWrite_Single tag and assign a target axis to *H_Axis*.



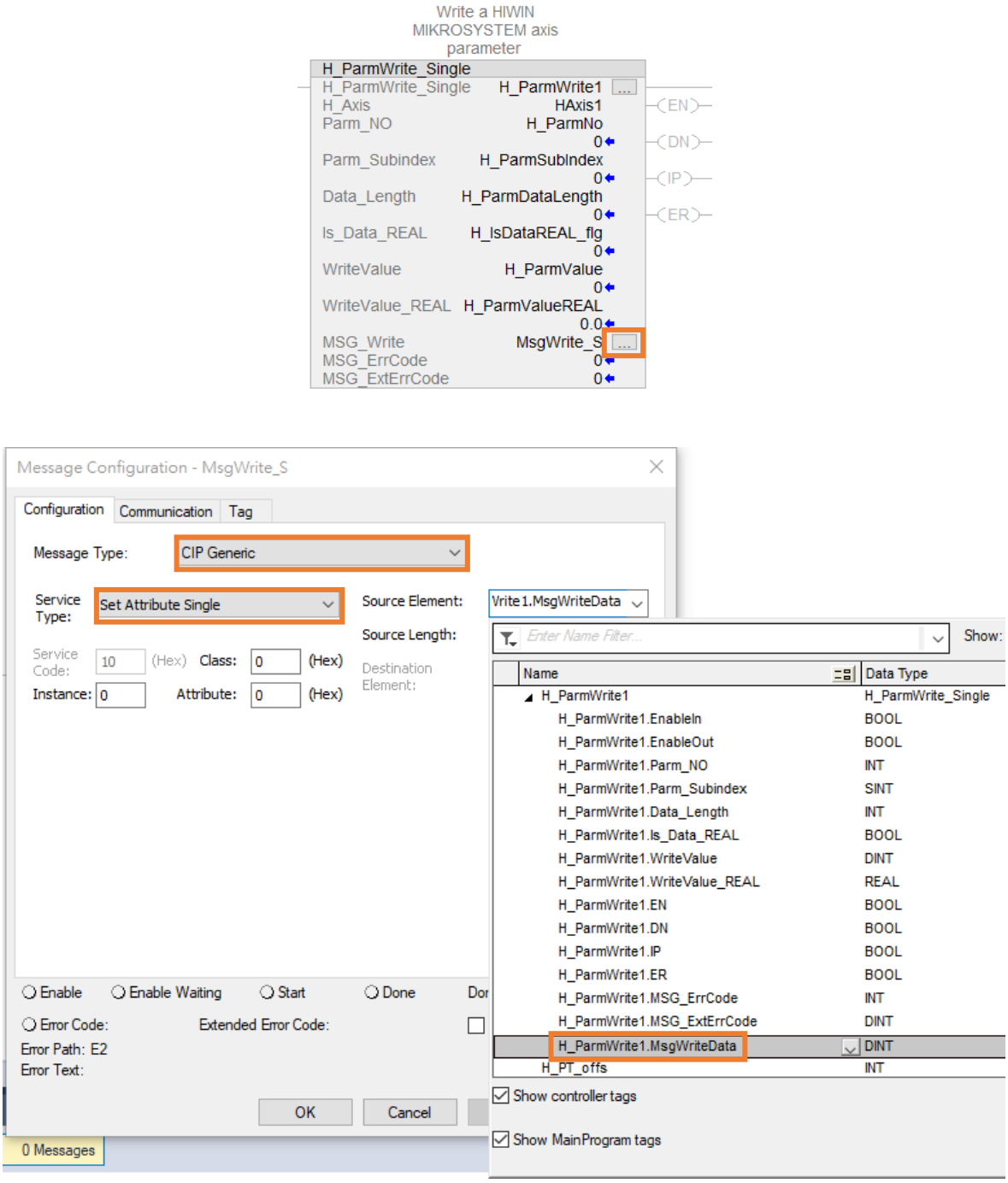
Step2. Assign parameters to the required input items.



Step3. Open the configuration dialog of *MSG_Write*. Set Message Type to **CIP Generic** and Service Type to **Set Attribute Single**. Set Class, Instance and Attribute to 0.

Select the parameter of *MsgWriteData* from the created H_ParmWrite_Single tag for Source Element. In this example, select **H_ParmWrite1.MsgWriteData**.

Then, click **OK** to complete the configuration.



■ Revision

Version	Revision Contents
1.2	Correct the attribute of *Data_Length*'s usage to Input.
1.1	First edition.

2.18 H_AStatus – HIWIN MIKROSYSTEM Axis Status

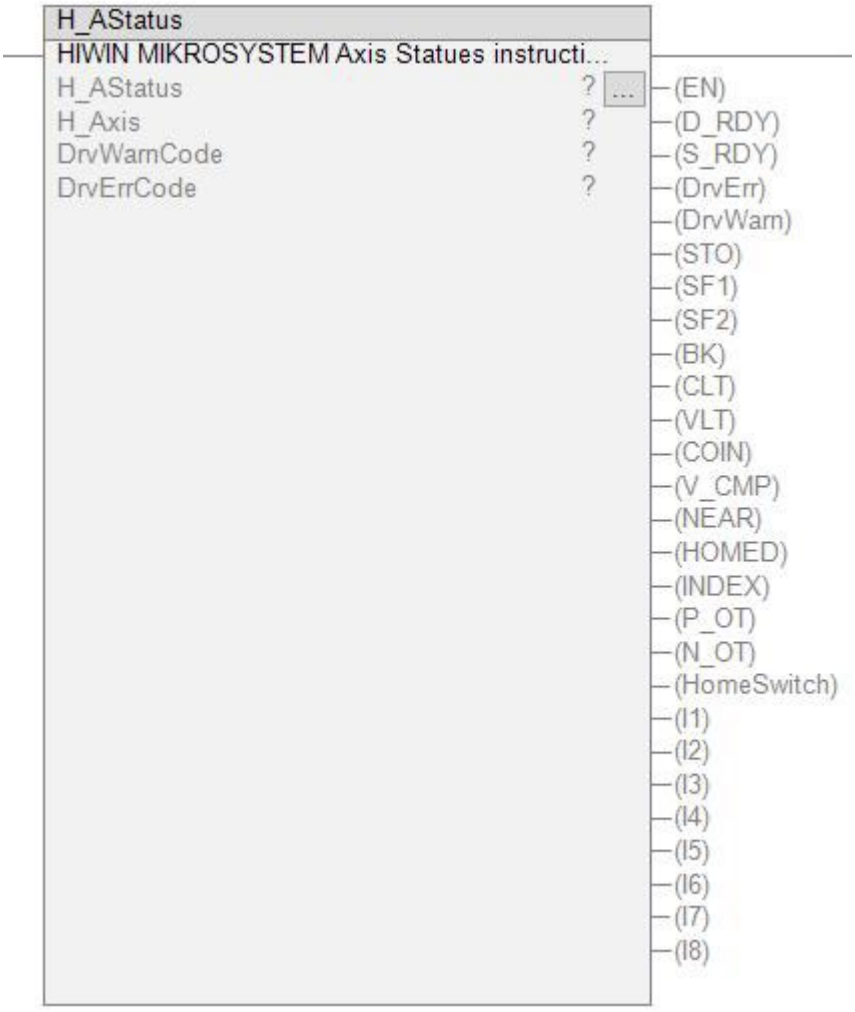
■ Description

H_AStatus is used to monitor the status of a HIWIN MIKROSYSTEM axis. This instruction outputs an axis status of Statusword 2, digital input status, error codes, and warning codes.

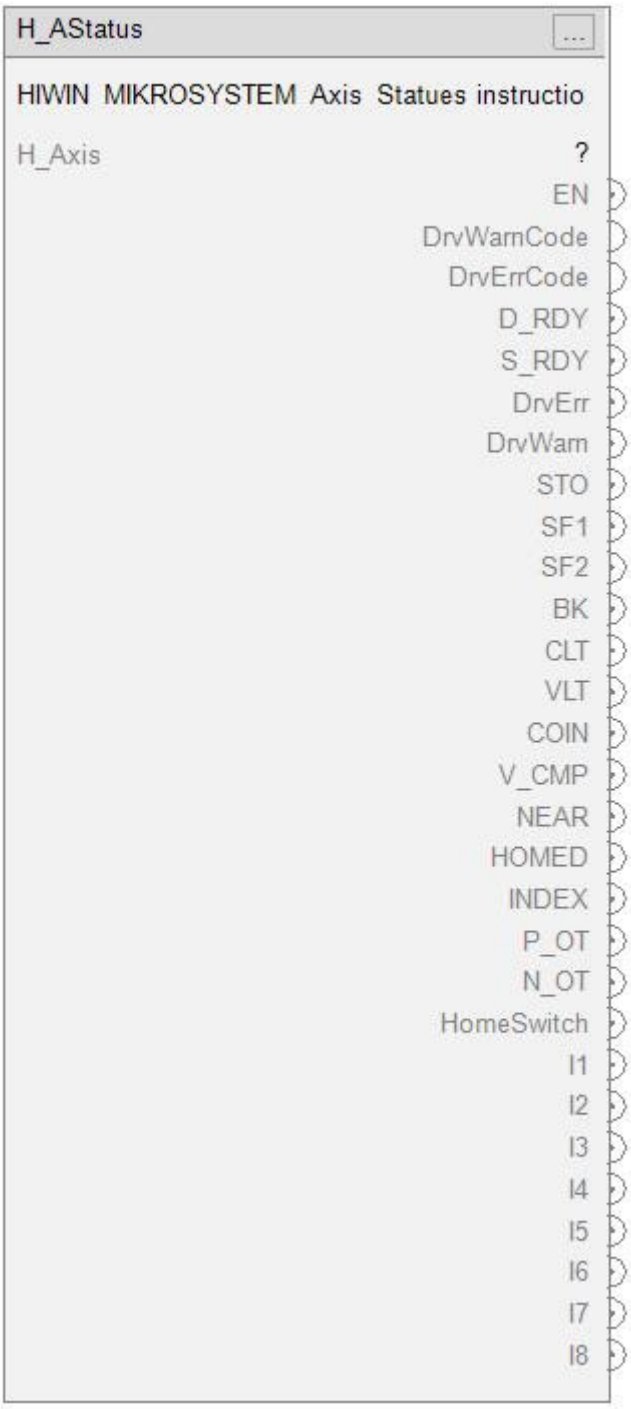
Note:
For detailed information on Statusword 2, please refer to “E2 Series Servo Drive EtherNet/IP Communication Command Manual.”

■ Available Languages

Relay Ladder



Function Block



Structured Text

```
H_AStatus(H_AStatus,H_Axis);
```

■ Parameters

Required	Name	Data Type	Usage	Description
x	H_AStatus	H_AStatus	InOut	
	EnableIn	BOOL	Input	
	EnableOut	BOOL	Output	
x	H_Axis	HIWIN_MIKRO_AXIS	InOut	HIWIN MIKROSYSTEM Servo Axis Object
	EN	BOOL	Output	1: Instruction is enabled
	DrvWarnCode	INT	Output	Drive warning code
	DrvErrCode	INT	Output	Drive error code
	D_RDY	BOOL	Output	Drive Ready state
	S_RDY	BOOL	Output	Servo Ready state
	DrvErr	BOOL	Output	Drive error status
	DrvWarn	BOOL	Output	Drive warning status
	STO	BOOL	Output	STO active state
	SF1	BOOL	Output	STO SF1 input state
	SF2	BOOL	Output	STO SF2 input state
	BK	BOOL	Output	Brake active state
	CLT	BOOL	Output	Torque limit detection state
	VLT	BOOL	Output	Velocity limit detection state
	COIN	BOOL	Output	Positioning completion state
	V_CMP	BOOL	Output	Velocity reach state
	NEAR	BOOL	Output	Positioning near state
	HOMED	BOOL	Output	Homing state
	INDEX	BOOL	Output	Index signal output
	P_OT	BOOL	Output	Positive limit switch
	N_OT	BOOL	Output	Negative limit switch
	HomeSwitch	BOOL	Output	Home switch (DOG)
	I1	BOOL	Output	Digital input status
	I2	BOOL	Output	Digital input status
	I3	BOOL	Output	Digital input status
	I4	BOOL	Output	Digital input status
	I5	BOOL	Output	Digital input status
	I6	BOOL	Output	Digital input status
	I7	BOOL	Output	Digital input status
	I8	BOOL	Output	Digital input status

■ Revision

Version	Revision Contents
1.1	First edition.