

Polling Data from Mitsubishi PLC

Using Ethernet Protocol

APPLICATION NOTE

AUG-0088-00 1.0 en-US ENGLISH

Important User Information

Disclaimer

The information in this document is for informational purposes only. Please inform HMS Networks of any inaccuracies or omissions found in this document. HMS Networks disclaims any responsibility or liability for any errors that may appear in this document.

HMS Networks reserves the right to modify its products in line with its policy of continuous product development. The information in this document shall therefore not be construed as a commitment on the part of HMS Networks and is subject to change without notice. HMS Networks makes no commitment to update or keep current the information in this document.

The data, examples and illustrations found in this document are included for illustrative purposes and are only intended to help improve understanding of the functionality and handling of the product. In view of the wide range of possible applications of the product, and because of the many variables and requirements associated with any particular implementation, HMS Networks cannot assume responsibility or liability for actual use based on the data, examples or illustrations included in this document nor for any damages incurred during installation of the product. Those responsible for the use of the product must acquire sufficient knowledge in order to ensure that the product is used correctly in their specific application and that the application meets all performance and safety requirements including any applicable laws, regulations, codes and standards. Further, HMS Networks will under no circumstances assume liability or responsibility for any problems that may arise as a result from the use of undocumented features or functional side effects found outside the documented scope of the product. The effects caused by any direct or indirect use of such aspects of the product are undefined and may include e.g. compatibility issues and stability issues.

Table of Contents

Page

1	Preface	3
1.1	About This Document	3
1.2	Document history	3
1.3	Related Documents	3
1.4	Trademark Information	3
2	Objectives	4
3	Requirements	5
3.1	Hardware	5
3.2	Software.....	5
3.3	PLC Protocol Compatibility.....	5
4	Implementation Steps.....	6
4.1	Link the Ewon Flexy and the PLC.....	6
4.2	Configure the IO Server.....	6
4.3	Create Tags in the Flexy	8
4.4	Monitor Tags.....	10
5	Troubleshoot Tags in Error	12
5.1	False Positive	12
A	Mitsubishi Tag Address Syntax.....	15
A.1	Memory Types	15
A.2	Modifiers.....	16
A.3	Status Register.....	16

This page intentionally left blank

1 Preface

1.1 About This Document

This document explains in a few steps how the Ewon Flexy can poll data registers from an Mitsubishi PLC based on Ethernet protocol.

For additional related documentation and file downloads, please visit www.ewon.biz/support.

1.2 Document history

Version	Date	Description
1.0	2021-02-18	First release

1.3 Related Documents

Document	Author	Document ID
Ewon Flexy Base Units	HMS	IG-0014-00
Ewon Flexy 205	HMS	IG-0028-00
Flexy Family Reference Guide	HMS	RG-0008-00

1.4 Trademark Information

Ewon® is a registered trademark of HMS Industrial Networks SA. All other trademarks mentioned in this document are the property of their respective holders.

2 Objectives

The objective of this document is to explain how the Ewon Flexy can poll data registers out of one or more Mitsubishi PLCs using Ethernet protocol.

Polling PLC data registers implies the following steps:

1. Link the Ewon Flexy with the PLC;
2. Configure the Ewon Flexy IO server;
3. Create tags in the Ewon Flexy;
4. Monitor tags.

3 Requirements

3.1 Hardware

To follow this guide, you need:

- ▶ A computer suitable to connect to the Ewon Flexy.
 - From a computer running a web-browser, you will configure the IO server in the Ewon Flexy to poll different types of PLC data registers.
 - You access the Ewon Flexy web server either by using (one of) its local LAN port(s) or by another type of access such as VPN IP address.
- ▶ A Mitsubishi PLC: Q, A, L, R, FX3U or FX5U series.
 - Connection between the Ewon Flexy and the Mitsubishi PLC must be done through Ethernet protocol.

Some Mitsubishi PLC models can also poll tags over serial protocol using the MITSUFX IO server of your Ewon Flexy.
 - The device will have its registers read by the tags configured in the IO server of the Ewon Flexy.

3.2 Software

3.2.1 eBuddy

The Ewon Flexy is configured through its web server. All you need is a standard web browser software such as Google Chrome® or Mozilla Firefox®.

Additionally, we suggest downloading the **eBuddy** utility on [our website](#).

This utility can list all the Ewon Flexy on your network and change the default IP address of a Ewon Flexy to match your LAN IP address range. With eBuddy you can also easily upgrade the firmware of your Ewon Flexy if required.

3.2.2 Ewon Flexy Firmware

The screenshots of this guide reflect firmware version 14.3s0, but you can expect the basic principles to remain the same in earlier/later versions.

A simple way to upgrade the Ewon Flexy firmware is to use eBuddy.

3.3 PLC Protocol Compatibility

The table below shows the protocols that are supported by the Ewon Flexy and, for each of those protocols, which IO server you need to use inside the Ewon Flexy to connect your Mitsubishi PLC.

PLC Family	Ethernet protocol	Ewon Flexy IO server
Mitsubishi A series	Yes	MELSEC
Mitsubishi L series	Yes	MELSEC
Mitsubishi R series	Yes	MELSEC
Mitsubishi Q series	Yes	MELSEC
Mitsubishi FX3U series	Yes	MELSEC
Mitsubishi FX5U series	Yes	MELSEC

4 Implementation Steps

4.1 Link the Ewon Flexy and the PLC

1. Link the LAN interface of the Ewon Flexy with the Ethernet card of the PLC.
2. Make sure that the Ewon Flexy's LAN IP address is in the same range as the PLC IP address.

You can use eBuddy to change the Ewon Flexy's LAN IP address if it is not within the same range as the PLC.

For an Ewon Flexy with configurable LAN / WAN ports such as the Ewon Flexy 205, a LAN port is indicated by a green LED and a WAN port is indicated by a red LED.

For an Ewon Flexy with permanent LAN ports such as the Flexy 201 or 101, the LAN ports are the Ethernet ports on the base unit itself.

4.2 Configure the IO Server

1. Go to the Ewon Flexy's web interface.
2. Select the **IO Servers** menu option.
3. Select the **IO Server** corresponding to your PLC type, in this case MELSEC.

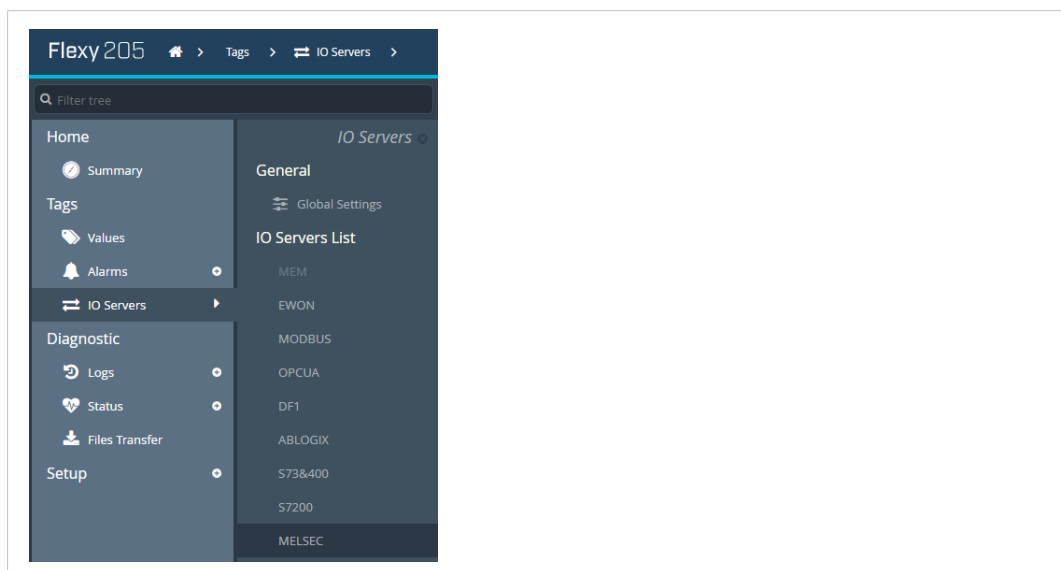


Fig. 1 IO server selection

4. Enable at least one **Topic** to be able to poll data registers — called tags — out of your PLC.

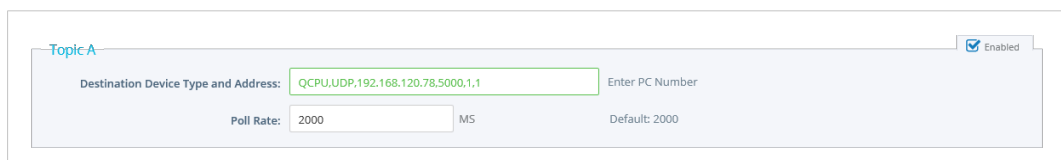


Fig. 2 MELSEC IO server settings

Topics are meant to allocate common properties to a group of tags.

Properties include *Enable/Disable* polling, *Poll Rate*, and *Global Device Address*.

- a. Enter a valid address in the **Global Device Address** as per the table below.

PLC Family	Flexy IO server	Syntax key
Q series	MELSEC	<p>Syntax: <Model>,<Protocol>,<IP Address>,<Port Number>,<Network Number>,<PC Number> [,<ReqDestModuleIOno>,<ReqDestModuleStationNo>] where:</p> <ul style="list-style-type: none"> - <Model>: QCPU,QnACPUor QOCPU - <Protocol>: TCP or UDP - <IP Address>: the IP address of the PLC - <Port Number>: the port of the PLC it is listening on for MC protocol - <Network Number>: network number of the target (1..239) (0) - <PC Number>: Target Station Number (1..64) (FF) - [Optional] <ReqDestModuleIOno> default FF 03 - [Optional] <ReqDestModuleStationNo> default 0 <p>Example: QCPU, UDP, 198.162.120.155, 5000, 1, 1</p>
R series L series	MELSEC	<p>Syntax: <Model>,<Protocol>,<IP Address>,<Port Number>,<Network Number>,<PC Number> [,<ReqDestModuleIOno>,<ReqDestModuleStationNo>] where:</p> <ul style="list-style-type: none"> - <Model>: QCPU,QnACPUor QOCPU - <Protocol>: TCP or UDP - <IP Address>: the IP address of the PLC - <Port Number>: the port of the PLC it is listening on for MC protocol. It must also be declared in the PLC itself. - <Network Number>: network number of the target (1..239) (0) - <PC Number>: Target Station Number (1..64) (FF) - [Optional] <ReqDestModuleIOno> default FF 03 - [Optional] <ReqDestModuleStationNo> default 0 <p>Example: QOCPU, TCP, 192.168.120.39, 1025, 0, 255</p>

PLC Family	Flexy IO server	Syntax key
A series	MELSEC	Syntax: <Model>,<Protocol>,<IP Address>,<Port Number>,<PC Number> where: <ul style="list-style-type: none"> – <Model>: ACPU – <Protocol>: TCP, UDP – <IP Address>: is the IP address of the PLC – <Port Number>: is the Port of the PLC it is listening on for MC protocol – <Network Number>: network number of the target (1..239) (0) Example: ACPU, UDP, 198.162.120.155, 5000, 1
FX series	MELSEC	Syntax: <Model>,<Protocol>,<IP Address>,<Port Number> where: <ul style="list-style-type: none"> – <Model>: FX3UCPU – <Protocol>: TCP, UDP. – <IP Address>: the IP address of the PLC – <Port Number>: the port of the PLC it is listening on for MC protocol Example: FX3UCPU, UDP, 198.162.120.155, 5000

Even though there are only three topics, the Ewon Flexy can support polling from more than three PLCs on the same IO server.

To poll from more than three PLCs, do not specify the device address in the topic. Instead, include the device address as part of the tag address as described later in this document.

When entering a device address, a helper appears to indicate if the address uses a valid syntax for this IO server. An address using a valid syntax is displayed in green and an invalid syntax in red.

- b. Set the **Poll rate**.

The poll rate is the refresh rate in ms (milliseconds) applicable to all data registers that is included in this topic. If you leave this field blank, the default value applied will be 2000 ms (2 seconds).

If you have tags that need to be refreshed at different rates, enable and configure multiple topics.

5. Click on **Update** to save your settings.

4.3 Create Tags in the Flexy

1. Select the **Values** option from the Tags menu.
2. Switch the “Mode” to **Setup**.

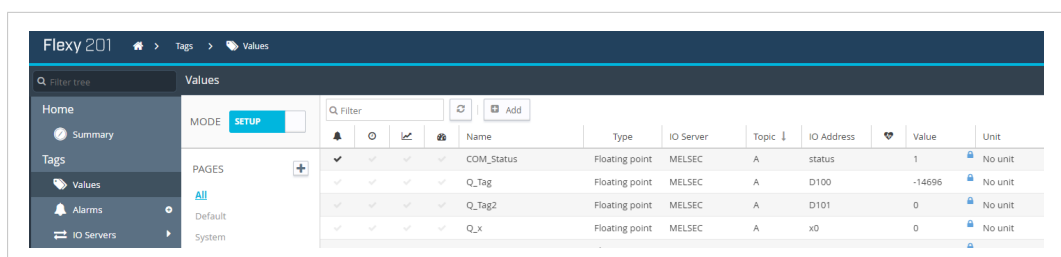


Fig. 3 Tag setup

3. Click the **Add** button to open the tag configuration window.
4. Enter the **parameters of the tag** you want to create:
 - a. Enter a **Tag Name**.
Free text: only alphanumerical and “_” (no spaces, no symbols “-, =, %, \$, @, #, ...” or special character).
It must begin with a character (no figures, special character, ...).
 - b. Enter a **Description**.
Free text.
 - c. Select **MELSEC** as IO server.
 - d. Enter a **Topic Name**: A, B or C.
The topic must have been configured in the IO server page (see [Configure the IO Server, p. 6](#)).
 - e. Enter the **PLC register** in the “Address” field which will be polled from the PLC.
As the address is entered, a tag helper appears to help properly format the tag address.

Typical examples addresses:

MELSEC IO server	Target
X14	input bit at octal address 14
D3	data register at address 3 (read as Signed Word)
DD3	data register at address 3 (read as DWord)
DF3	data register at address 3 (read as Float)
D8010	special data register at address 8010 (read as Signed Word)

If you enter a wrong address syntax, the tag creation will be rejected and an error message will be displayed.

For more information on data register ID syntax, see [Mitsubishi Tag Address Syntax, p. 15](#).

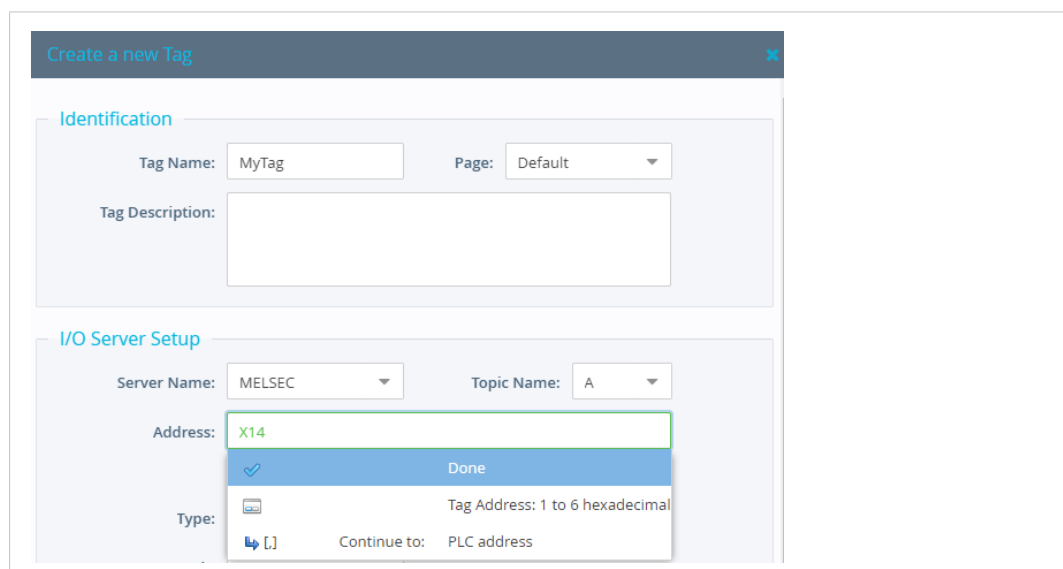


Fig. 4 Tag setup 2

- f. **Type**: The data type of the tag such as *Floating Point* or *Boolean*.
The **Automatic** option lets the Ewon Flexy decide the format depending on the IO server register/modifier type.

5. [Optional] The remaining fields are mostly left with their default value:

- **Force Read Only:** Unchecked is the default.

When it is checked, users will not be able to change a value in **View** mode on the **Values** page.



The tag remains read/write for commands written in the embedded BASIC script program or on custom webpages.

- **Ewon value:** Defaults are $*1+0$.

This field applies a **scale factor** and an **offset** to the raw value coming from the IO server.

The scale factor and offset are float values. Negative values are accepted.

$TAGval = IOSERVERval * scale\ factor + offset.$

6. Click the **Add** button when your tag configuration is complete.

If everything is OK the new tag appears in the tag list.

You can repeat the same sequence for any other tags. If you need to create new tags that have almost the same properties as an existing tag in the list, select the source tag and click the **Add as selected** option.

All properties of the existing tag will be copied in the new tag creation wizard. Copied properties include the tag name. Since the tag name must be unique, make sure you change the name of the new tag.

It is the first selected tag that will be copied if more than one single tag is selected in the list.

4.4 Monitor Tags

You can change the mode to **View** to monitor tags values and their status.

MODE		VIEW	Q Filter	Historical Logging Table	Name	Value	Unit	Tag description
VIEW MODE SETTINGS		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	COM_Status	1	No unit	Communication Status with Mitsubishi (1=OK, 2= NOT OK)
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Q_Tag	-14597	No unit	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Q_Tag2	0	No unit	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Q_x	0	No unit	
PAGES		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Q_0	0	No unit	

Fig. 5 Monitor tags

This page shows the tags and their last polled values as well as alarm information and logging information for tags with alarming and logging enabled.

The page refreshes automatically at the rate set on the bottom of the page.

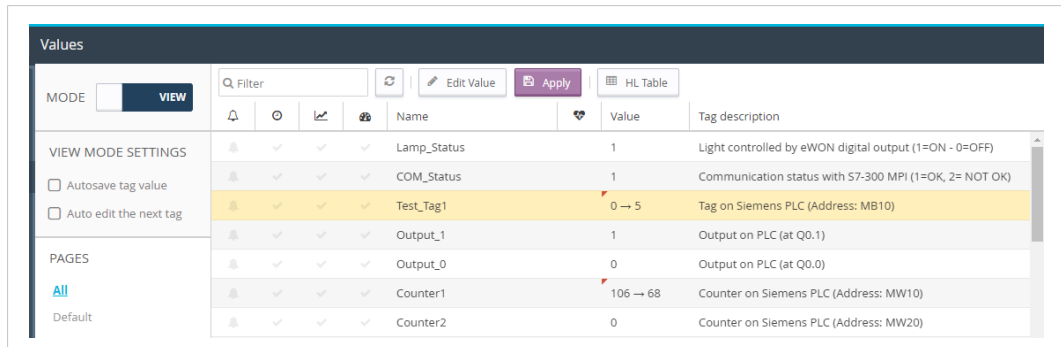
On this page, you can sort, filter, and search for tags to easily find specific tags.

Information about configuring additional tag features is available in the *Flexy Family Reference Guide*, see [Related Documents, p. 3](#).

You can change the value of tags that are configured as read/write (unless the box **Force Read Only** was ticked in the tag creation wizard).

To change the value of a tag:

1. Select the tag and press the **Edit Value** button, or double click its current value.
2. Enter the new value.
3. Click the **Apply** button to update all of the edited tags.



The screenshot shows a web interface titled "Values" with a table of tags. The table has columns for Name, Value, and Tag description. The "Test_Tag1" row is highlighted in yellow, and the value "0 → 5" is displayed in the Value column. The "Apply" button is visible in the top right corner of the interface.

MODE	VIEW	Q Filter	Edit Value	Apply	HL Table	Name	Value	Tag description
VIEW MODE SETTINGS						Lamp_Status	1	Light controlled by eWON digital output (1=ON - 0=OFF)
<input type="checkbox"/> Autosave tag value						COM_Status	1	Communication status with S7-300 MPI (1=OK, 2= NOT OK)
<input type="checkbox"/> Auto edit the next tag						Test_Tag1	0 → 5	Tag on Siemens PLC (Address: MB10)
PAGES						Output_1	1	Output on PLC (at Q0.1)
All						Output_0	0	Output on PLC (at Q0.0)
Default						Counter1	106 → 68	Counter on Siemens PLC (Address: MW10)
						Counter2	0	Counter on Siemens PLC (Address: MW20)

Fig. 6 Edit a tag

By clicking the **Apply** button, the Ewon Flexy sends the new values to the registers of the PLC. Since the value displayed in the value column is the last value read from the PLC, the new value will not appear until the next poll takes place.

5 Troubleshoot Tags in Error

A tag value displayed with a red icon in the *Quality/Status* column indicates that the quality for this value is considered as *bad*.

MODE		VIEW	Q Filter	Historical Logging Table	Name	Value	Unit	Tag description
VIEW MODE SETTINGS		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	COM_Status	1	No unit	Communication Status with Mitsubishi (1=OK, 2= NOT OK)
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Q_Tag	-14597	No unit	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Q_Tag2	0	No unit	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Q_x	0	No unit	
PAGES		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Q_0	0	No unit	

Fig. 7 Tag error

As long as the quality of the displayed value is *good*, no icon appears in this column.

More information about the nature of the problem can be obtained by placing the mouse cursor on the icon.

MODE		VIEW	Q Filter	Historical Logging Table	Name	Value	Unit	Tag description
VIEW MODE SETTINGS		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	COM_Status	1	No unit	Communication Status with Mitsubishi (1=OK, 2= NOT OK)
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Q_Tag	No communication	No unit	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Q_Tag2	0	No unit	
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Q_x	0	No unit	
PAGES		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Q_0	0	No unit	

Fig. 8 Tag error with description

To get more information about the nature of the error and the sequence of events before and after the error occurred, you can check the events appearing in the *Event Log*.

Time	Event	Description	Originator
13/06/2019 21:37:50	22307	smbs-Connect socket failed	mbsio
13/06/2019 21:37:47	22307	smbs-Connect socket failed	mbsio
13/06/2019 21:37:19	-22503	mbsios-Tag disabled (Nb Tag: 1)	http

Fig. 9 Mitsubishi IO server — Error logs

5.1 False Positive

A single tag in error (*truly bad*) can cause a number of other (*good*) tags to appear in error as well because tag requests and responses are grouped in one single *envelope* for communication optimization purposes. The whole group is then affected with the same error status.

During commissioning or maintenance, you may want to isolate the *truly bad* tag from the others. Therefore, you have to disable the polling of tags in error. Disabling the polling of tags in error is especially useful for debugging purpose.

This can be done in the *IO Server* ► *Global Settings* parameters.



Fig. 10 Disable tags in error

This page intentionally left blank

A Mitsubishi Tag Address Syntax

The following convention for the address syntax is in place:

IO server configuration

IO Server Configuration		
IO server name	MELSEC	
Topic name	A	
	B	
	C	
Address	ValueName, Global Device Address	PLC address is defined tag by tag.
	ValueName	Topic PLC address is used.

A.1 Memory Types

Memory Type	Description	Acceptable Modifiers	Address
X	Input		1 to 6 hexadecimal bits
DX	Direct Input		1 to 6 hexadecimal bits
Y	Output		1 to 6 hexadecimal bits
DY	Direct Output		1 to 6 hexadecimal bits
B	Link Relay		1 to 6 hexadecimal bits
SB	Special Link Relay		1 to 6 hexadecimal bits
M	Internal Relay		1 to 6 decimal digits
SM	Special Internal Relay		1 to 6 decimal digits
L	Latch Relay		1 to 6 decimal digits
F	Annunciator Relay		1 to 6 decimal digits
V	Edge Relay		1 to 6 decimal digits
S	Step relay		1 to 6 decimal digits
TS	Timer Contact		1 to 6 decimal digits
TC	Timer Coil		1 to 6 decimal digits
TN	Timer Value	W, S	1 to 6 decimal digits
SS	Integrating Timer Contact		1 to 6 decimal digits
SC	Integrating Timer Coil		1 to 6 decimal digits
SN	IntegratingTimer Value	W, S	1 to 6 decimal digits
CS	Counter Contact		1 to 6 decimal digits
CC	Counter Coil		1 to 6 decimal digits
CN	Counter Value	W, S	1 to 6 decimal digits
D	Data Register	S, W, L, D, F	1 to 6 decimal digits
SD	Special Data Register	S, W, L, D, F	1 to 6 decimal digits
W	Link Register	S, W, L, D, F	1 to 6 decimal digits
SW	Special Link Register	S, W, L, D, F	1 to 6 decimal digits
R	File Register	S, W, L, D, F	1 to 6 decimal digits
Z	Index Register	S, W, L, D, F	1 to 6 decimal digits

If no modifier is included, the modifier-type in bold will be used.

A.2 Modifiers

Modifier	Modifier Type	Value Range	Automatic Tag Type
W	Word	0 .. 65535	DWord
S	signed Word	-32768 .. 32767	Integer
D	DWord	0 .. 4294967296 (*)	DWord
L	signed DWord	-2147483648 .. 2147483647 (*)	Integer
F	Float	+/- 3.4e38	Float

To avoid loss of precision due to integer to float conversion, choose the right storage *DataType* for your tag(s).

Examples of modifiers use for MELSEC

Address	Target
X14	input bit at octal address 14
D3	data register at address 3 (read as Signed Word)
DD3	data register at address 3 (read as DWord)
DF3	data register at address 3 (read as Float)

A.3 Status Register

The status tag is a special tag that returns information about the current state of the communication for a given device.

The status tag address syntax is as follows:

Status[Global Device Address]

You can define a status tag for each PLC used.

If you use the status address, the tag must be configured as an analog data type such as floating point or integer.

Status value	Description
0	Communication not initialized: Status UNKNOWN. If no tag is polled on that device address, the communication status is unknown.
1	Communication OK
2	Communication NOT OK

This page intentionally left blank

