Polling Data from Siemens PLC

Using Ethernet Protocol

Important User Information

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1 Preface

1.1 About This Document

This document explains in a few steps how the Flexy can poll data registers from a Siemens 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	2011-12-12	First release
2.0	2019-09-04	Changed: General update (AUG-0048-00 is for Ethernet protocol, AUG-0081-00 is for MPI protocol)

1.3 Related Documents

Document	Author	Document ID
Polling Data from Siemens PLC using MPI protocol	HMS	AUG-0081-00
Ewon Flexy Base Units	HMS	IG-0014-00
Ewon Flexy 205	HMS	IG-0028-00
IO Servers	HMS	RG-0007-00
Flexy Family Reference Guide	HMS	RG-0008-00

1.4 Trademark Information

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2   Objectives

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

Polling PLC data registers implies the following steps:

1.   Link the Flexy with the PLC;

2.   Configure theFlexy IO server;

3.   Create tags in the 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 Flexy to poll different types of PLC data registers.

→ You access the 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 Siemens PLC: S7-300, -400, -1200, or -1500.

→ Connection between the Ewon Flexy and the Siemens PLC must be done through Ethernet protocol. For polling tags over MPI, see "Polling Data from Siemens PLC using MPI protocol" from *Related Documents, p. 3*.

→ The device will have its registers read by the tags configured in the IO server of the Flexy.

3.2 Software

3.2.1 eBuddy

The 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 Flexy to match your LAN IP address range. With eBuddy you can also easily upgrade the firmware of your Flexy if required.

3.2.2 Ewon Flexy Firmware

The screenshots of this guide reflect firmware version 13.3s0, but you can expect the basic principles to remain the same in earlier/later versions.

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

3.3 PLC Protocol Compatibility

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

PLC Family	Ethernet ISOTCP (Ethernet link)	Flexy IO server
S7-300	Yes	S73&400
S7-400	Yes	S73&400
S7-1200	Yes	S73&400
S7-1500	Yes	S73&400
S7-200 (*)	Yes	S7200

The S7-200 family is addressed in a separate guide as it uses a different IO server and syntax. The reference for this guide is "IO Servers" from *Related Documents, p. 3*.

4   Implementation Steps

4.1   Link the Flexy and the PLC

1.   Link the LAN interface of the Flexy with the Ethernet card of the PLC.

2.   Make sure that the Flexy's LAN IP address is in the same range as the PLC IP address.

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

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

For a 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 Flexy's web interface.

2.   Select the *IO Servers* menu option.

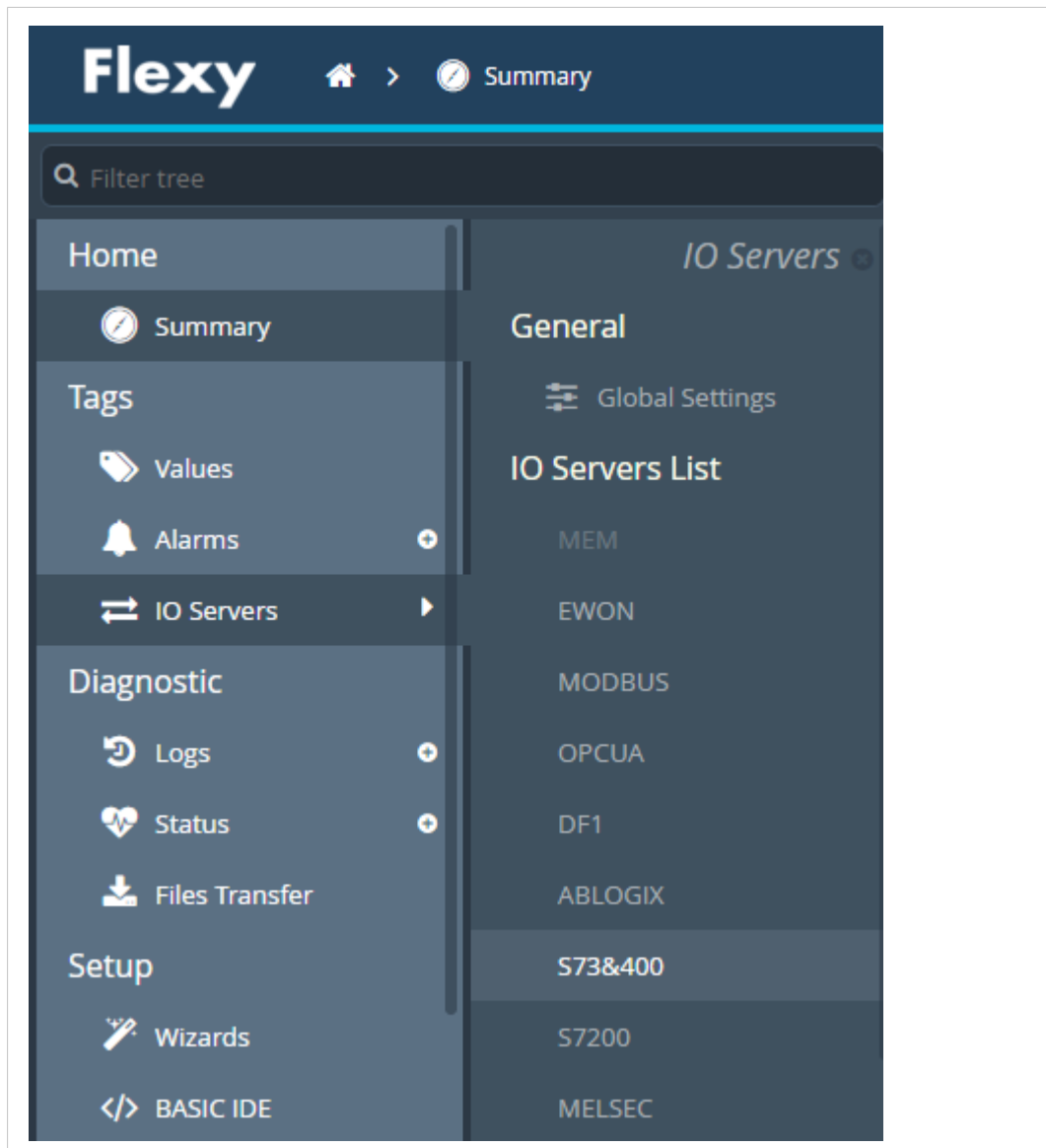3.   Select the *IO Server* corresponding to your PLC type, which in this case is S73&400.

Fig. 1   IO server selection

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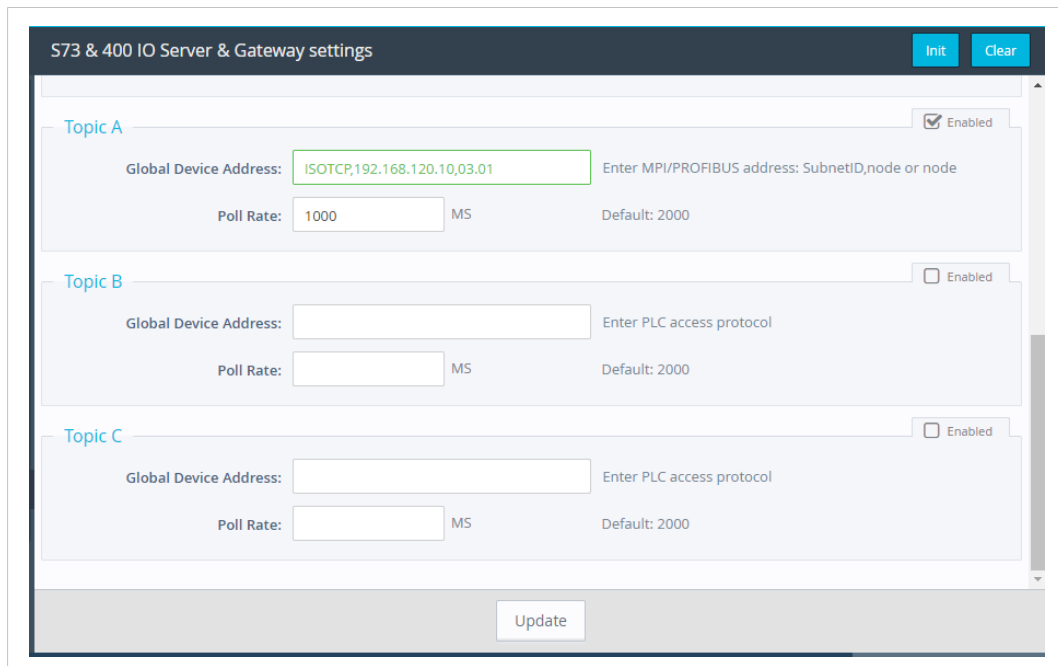

Fig. 2 **S73&400 IO server settings**

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.

Syntax to use	Defintions
ISOTCP,IP address,CalledTSAP	*IP address* : IP address of the PLC (e.g.: 10.0.120.204). *Called TSAP* (Transport Service Access Point): – For the S7-300 family, the *Called TSAP* value is usually 03.02 as the CPU is generally plugged in second slot. – For the S7-400 family, it depends in which rack & slot number the CPU has been plugged. For example: if the CPU is plugged in slot 4 of rack 0, the *Called TSAP* value would be 03.04. – For the S7-1200 & S7-1500 family, the *Called TSAP* value is usually 03.01. For *Called TSAP* syntax, refer to *Called TSAP syntax, p. 9*

Even though there are only three topics, the 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 refreshed at a different rates, enable and configure multiple topics.

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

Called TSAP syntax

Example: Remote TSAP: 03.02 (channel number, rack and slot number of the CPU).

Channel number	Use channel number 03 for Ewon connections.
Rack and Slot Number of the CPU	Here you address the CPU. By default the CPU is slotted in the central control module rack (rack number = 0). The slot of your CPU is to be found in your *STEP7 project* in the **Hardware Configuration**.

4.3 Create Tags in the Flexy

1. Select the *Values* option from the Tags menu.

2. Switch the "Mode" to **Setup**.
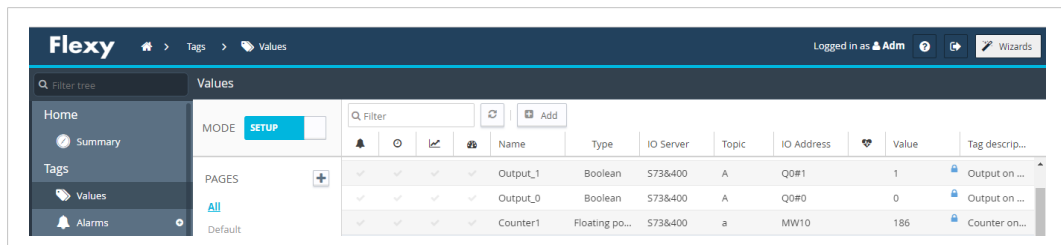
Fig. 3   Tag setup

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, no spaces, no symbols -, =, %, $, @, # etc.

    b. Enter a **Description**.
        Free text.

    c. Select **S73&400** as IO server depending on the product family of the relevant PLC.

    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:

S73&400 IO server	Target
MW4	the **Word** at address 4 (in bytes) in the Internal Memory.
CS1	the **Counter** number 1, read it as Signed Word.
BD2L5	the **DWord** at address 5 (in bytes) in the Data Block 2.
IB3	the **Byte** at address 3 (in bytes) in the Discrete Inputs zone.

        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 *Siemens 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 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.

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.

Fig. 6 **Edit a tag**

By clicking the *Apply* button, the 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*.

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.

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*.

Fig. 9   S73&400 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.

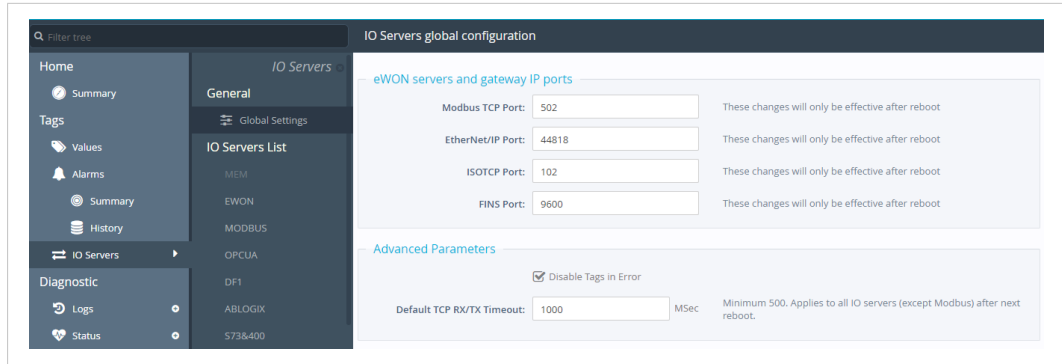This can be done in the *IO Server ▸ Global Settings* parameters.

Fig. 10   Disable tags in error

A Siemens Tag Address Syntax

The following convention for the address syntax is in place:

IO server configuration		
IO server name	S73&400	
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
DBx	Data block number x	B, C, W, S, D, L, F	Byte offset
M	Internal memory	B, C, **W**, S, D, L, F	Byte offset
C	Counter	**W**, S	Object number
T	Timer	**W**, S	Object number
I	Discrete Inputs	B, C, **W**, S, D, L, F	Byte offset
Q	Discrete Outputs	B, C, **W**, S, D, L, F	Byte offset
PI	Peripheral Inputs	B, C, **W**, S, D, L, F	Byte offset
PQ	Peripheral Outputs	B, C, **W**, S, D, L, F	Byte offset

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

Timer and *Counter* cannot be polled on S7-1200 series because they are addressed as an instance datablock in the PLC.

A.2 Modifiers

Modifier	Modifier Type	Value Range	Automatic Tag Type
B	Byte	0...255	DWord
C	signed Byte	-128...127	Integer
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 S7–300, –400 and –1200	
Address	Target
MW4	the **Word** at address 4 (in bytes) in the Internal Memory.
CS1	the **Counter** number 1, read it as Signed Word.
BD2L5	the **DWord** at address 5 (in bytes) in the Data Block 2.
IB3	the **Byte** at address 3 (in bytes) in the Discrete Inputs zone.

A.3 Bit Access Modifier

In any *Memory Type* (excluding **Counter** and **Timer**), it is possible to access a single Bit.

A *[#x]* must be appended to the **Value Name**.

As the address refers to a starting byte, the Bit index goes only from 0 to 7. No other Modifier than B is allowed.

The syntax can be used for reading Bits and for writing them as well.

Examples	
Valid Syntax	**DB1B13#3** OK because it represents bit 3 of Byte 13 in DB 1.
Invalid Syntax	IW5#2 Wrong because there is a Modifier.
	I5#10 Wrong because the Bit number is greater than 7.

A.4 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

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