



## Application User Guide

---

AUG 049 / Rev. 1.0

# Data Registers from Siemens S7-200 PLC Series

This short guide explains how to poll data registers from a Siemens Device.

# SIEMENS



# Table of Contents

- 1. Objective ..... 3**
- 2. Hardware requirements ..... 4**
- 3. Software requirements ..... 5**
  - Software configuration: ..... 5
  - Firmware Version ..... 5
- 4. PLC protocol compatibility ..... 6**
  - eWON with an MPI port ..... 6
  - eWON with an Serial Port ..... 6
- 5. Configuring the IO Server ..... 8**
  - eWON Flexy with serial port (not MPI) ..... 9
  - eWON Flexy with MPI port ..... 9
  - PPI connection ..... 10
  - ISOTCP connection ..... 10
- 6. Linking the PLC with the eWON Flexy ..... 11**
  - PPI link connection ..... 11
  - ISOTCP Ethernet connection ..... 12
- 7. Creating tags in the eWON Flexy ..... 12**
- 8. Monitoring tags ..... 16**
- 9. Troubleshooting tags in error ..... 17**
- Appendix A - Syntax of S7-200 tag addresses ..... 19**
  - General tag address format ..... 19
  - Memory types ..... 19
  - Modifiers ..... 20
  - Bit access modifier ..... 20
  - Status register ..... 21
- Appendix B - PPI cables ..... 23**
  - Connection with MPI port ..... 23
- Revision ..... 24**
  - Revision History ..... 24

## 1. Objective

The objective of this document is to explain how the eWON Flexy can poll data registers out of one or more S7-200 PLCs.

- Polling PLC data registers implies the following steps :
- Linking the eWON Flexy with the PLC
- Configuring the eWON Flexy IO Server
- Creating tags in the eWON Flexy
- Monitoring tags

**- Note -**

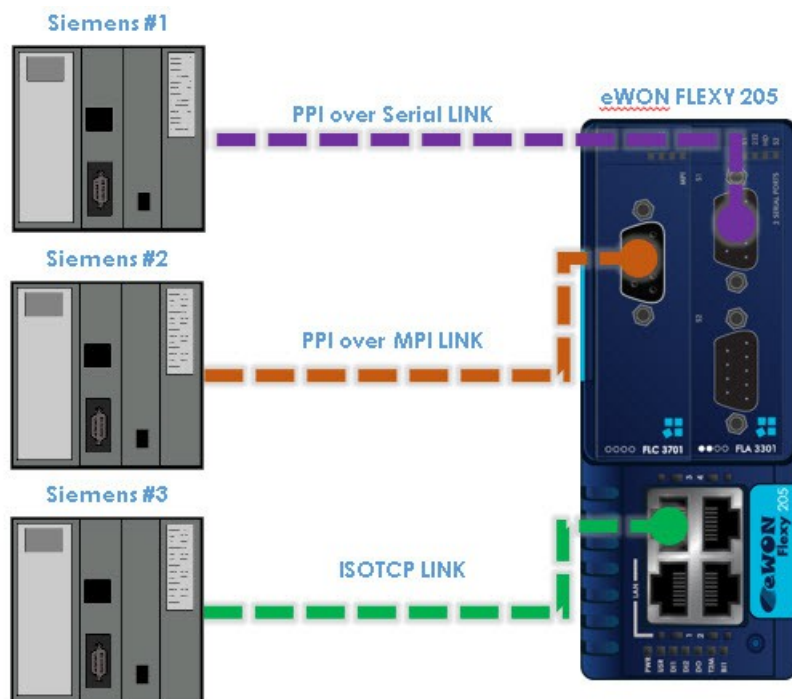
*Advanced explanations are indicated by this icon*



## 2. Hardware requirements

In order to follow this guide you'll need:

- An eWON Flexy
- A PC to connect the eWON Flexy through its web interface
- A Siemens PLC (S7-200)
- A serial extension card or MPI extension card may be required to poll using the PPI protocol.





## 3. Software requirements

### Software configuration:

The eWON Flexy is configured through its web interface. Which is accessible with any modern web browser as shown here below:

- Firefox 15+
- Chrome 16+
- Safari 6+
- Edge 13+
- IE 11

Additionally, we suggest you to download eBuddy companion tool available on our website: <http://support.ewon.biz/>

This tool allows you to list all the eWON Flexy on your network and execute changes such as IP address change, firmware upgrade or device recovery (if required).

### Firmware Version

This guide targets devices running a firmware version 12.2 or higher.

## 4. PLC protocol compatibility

The table below shows the Siemens protocols that are supported and, for each of those, which IO Server you need to configure in the eWON Flexy to connect your Siemens PLC.

### eWON with an MPI port

PLC-Family	MPI/Profibus protocols	PPI protocol (over MPI port)	Ethernet ISOTCP (Ethernet link)	EWON IO Server name
S7-300 (*)	YES	NO	YES	S73&400 (*)
S7-400 (*)	YES	NO	YES	S73&400 (*)
S7-1200 (*)	NO	NO	YES	S73&400 (*)
S7-200	NO	YES	YES	S7200

### eWON with an Serial Port

PLC-Family	MPI/Profibus protocols	PPI protocol (over serial link)	Ethernet ISOTCP (Ethernet link)	EWON IO Server name
S7-300 (*)	NO	NO	YES	S73&400 (*)
S7-400 (*)	NO	NO	YES	S73&400 (*)
S7-1200 (*)	NO	NO	YES	S73&400 (*)
S7-200	NO	YES	YES	S7200

#### - Note -

The eWON Flexy communicate in both PPI modes (MonoMaster and MultiMaster). The serial port of the eWON Flexy must be configured in RS-485 (with the dips witches) to communicate in PPI.

The eWON Flexy always acts as PPI MASTER.

<b>Function</b>	<b>SERIAL and MPI Ports</b>
MonoMaster	The eWON Flexy is the only Master on the PPI network.
MultiMaster	The eWON Flexy is not the only master, other masters (HMI or PPI multimaster programming cables) may be present at the same time on the PPI bus.

**- Note -**

*For MultiMaster use, an MPI eWON Flexy Extension Card is probably the best choice because it has higher performances to manage multi thread communication.*

## 5. Configuring the IO Server

- Connect your PC to one of the LAN ports of the eWON Flexy
- Open the web browser and enter the IP address of the eWON Flexy
- Log into the eWON Flexy web interface
- Go to Tags menu on the left hand side
- Click on the IO Servers option and a supplementary menu will be displayed
- Select the IO Server "S7200" inside the IO Server list



**Gateway Configuration**

Destination PPI Address:  0..126,default: 2

---

**COM Setup**

COM Port:	<input type="text" value="IO Port1 (COM:1)"/>	
Baud Rate:	<input type="text" value="19200"/>	Default 9600
Parity:	<input type="text" value="Even"/>	Default: EVEN
Databits:	<input type="text" value="8"/>	Default: 8
Stop Bit(s):	<input type="text" value="1"/>	Default: 1
HW Mode:	<input type="text" value="Half Duplex"/>	Default: half duplex no Handshaking
Reply Timeout:	<input type="text" value=""/> MS	50..50000, default: 3000
PPI Address:	<input type="text"/>	Device address of eWON on PPI link (0..126, default: 0)
HSA:	<input type="text"/>	Highest Station Address (MultiMaster Advanced Parameter,default: 31)
StatusInterleave:	<input type="text"/>	status request interleave (MultiMaster Advanced Parameter, default: 0)
Poll Retry:	<input type="text"/>	number of poll request retries (MultiMaster Advanced Parameter, default: 50)
Gw Retry:	<input type="text"/>	number of gateway request retries (MultiMaster Advanced Parameter, default: 0)



### eWON Flexy with serial port (not MPI)

- Set the Protocol Type, Baud Rate, Parity, Reply Timeout, and PPI Address corresponding to those actually configured in the PLC you want to communicate with.

Paramters	Description
Destination PPI Address	Present ValueNot used, unless the eWON Flexy is used as ISOTCP-PPI gateway
Baud Rate	19,2 kbps, 187,5 kbps and 1,5 Mbps, etc...
Hardware Mode	Half Duplex
Reply Timeout	The maximum time the eWON Flexy will wait for a valid PPI message response
PPI Address	The address of the eWON Flexy on the PPI network (0..126, default is 0)
All other fields below	Advanced MultiMaster parameters. These parameters have to be configured only if another master is hooked on the PPI network.

### eWON Flexy with MPI port

- Select the protocol PPI MULTIMASTER. Note: The MPI port configuration is shared by the S7-200 and the S73&400 IO Servers. PPI MultiMaster and MPI/Profibus are mutually exclusive, so it is not possible to use the S7-200 and the S73&400 IO Servers on the MPI port at the same time.
- To be able to poll data registers out of your PLC, you need to define and enable at least one Topic in the lower part of the IO Server configuration page. Topics are meant to allocate common properties to a group of tags (properties include Enable/Disable, Global Device Address, and Poll Rate).
- Poll Rate, defines the refresh rate in ms (milliseconds) applicable to all data registers that will be included in this this topic. If you have tags that need to be refreshed at a different rates, enable and configure multiple topics.

**MPI/PROFIBUS/PPI MultiMaster Setup**

<p>Protocol Type: <input type="text" value="PPI MULTIMASTER"/></p> <p>Baud Rate: <input type="text" value="187500"/></p> <p>Reply Timeout: <input type="text" value=""/> MS</p> <p>MPI/PROFIBUS/PPI MultiMaster Address: <input type="text" value="10"/></p> <p>MPI/PROFIBUS/PPI MultiMaster Highest Station Address: <input type="text" value="31"/></p>	<p>Default MPI. PPI Multimaster may only be used with the S7200 IO server</p> <p>Default 187500</p> <p>50..50000, default: 3000</p> <p>Device address of eWON on link (0..126, default: 0)</p> <p>Default: 31</p>
---	---

---

**Topic A**  Enabled

<p>Global Device Address: <input type="text" value="PPI,4"/></p> <p>Poll Rate: <input type="text" value="0..127"/></p>	<p>Enter PPI node</p> <p>PPI node</p> <p>Default: 2000</p>
--	--

- Enter a valid address in **Global Device Address** as shown in the tables below:

#### PPI connection

Syntax	Typical Global Device Address examples
PPI,PPI node address	PPI,4

#### ISOTCP connection

Syntax	Typical Global Device Address examples
ISOTCP,IP address,CalledTSAP	<p>ISOTCP,192.168.0.1,4D.57</p> <p>For the S7-200 family, you can use the Called TSAP <b>4D.57</b> which is the default TSAP used also for the Step7 Micro/WIN connection.</p>

- Save your settings by clicking on **Update**.

**- Note -**

Save your settings by clicking on Update. If you do not use the default TSAP 4D.57 and specify your own connection in the S7-200, make sure to:

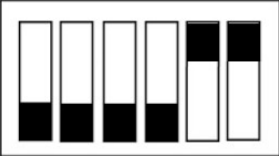
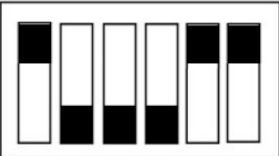
- use the same TSAP for the Server and the Client (ex: Local TSAP:12.00, Remote TSAP:12.00.
- check the "Enable the Keep Alive function for this connection" feature for this connection otherwise the eWON Flexy will not be able to poll the device after a connection lost due to reboot.

## 6. Linking the PLC with the eWON Flexy

The eWON Flexy can be connected to the PLC either using a serial connection supporting PPI, an MPI connection supporting PPI or an Ethernet connection supporting ISOTCP. The eWON Flexy can be connected to PLCs both in PPI and ISOTCP simultaneously.

### PPI link connection

- Connect the PLC with the eWON Flexy using one of the Siemens standard PPI cables or equivalent
- Make sure the position of the dip switch is OK (configurable only for port S1, there is no need to configure the dip switch when using the port S2)
- eWON Flexy with serial-port: positions have to be for RS422, RS485-link

Dip switch positions	Serial mode
 <p><b>OFF</b> <b>ON</b></p>	<p><b>RS485</b>, 4 first switches ON and polarization OFF (last 2 right)</p>
 <p><b>OFF</b> <b>ON</b></p>	<p><b>RS422</b>, first switch OFF, 3 ON and polarization OFF (last 2 right)</p>

**- Note -**

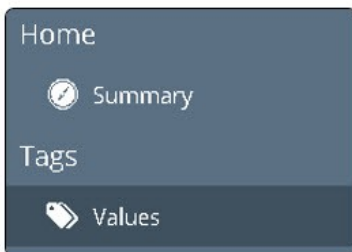
*Check References Guide for further information regarding dip switches.*

**ISOTCP Ethernet connection**

- Connect one of the LAN ports of the eWON Flexy with the Ethernet port of the PLC and make sure the eWON Flexy LAN IP address is in the same range as the PLC IP address.
- Use the eBuddy tool to change the eWON Flexy LAN IP address if it is not within the same range as the PLC.

## 7. Creating tags in the eWON Flexy

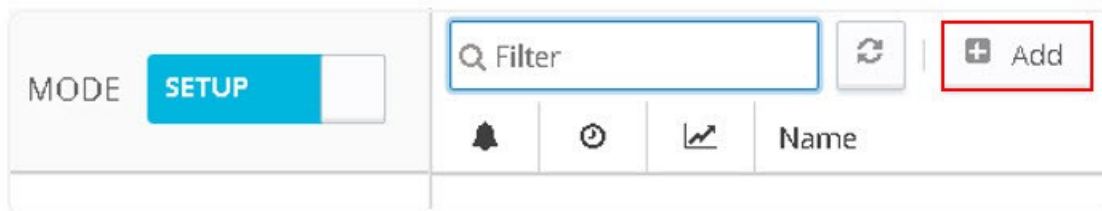
- On the left hand menu, please select the option **Value** under the Tags menu
- Switch to **Setup MODE**



Switch from:



- Click on Add (+)



- Once the create a new Tag window opens proceed to enter the parameters of the Tag you want to create.
- Enter a **Tag Name** – free text, no spaces, no symbols (-, =, %, \$, @, # etc.)
- Enter a **Description** – free text (optional)
- Select **S7200** as IO server
- In the **Address** field, enter the PLC register to be polled in the PLC.
- Enter a **Topic Name** A, B or C. The topic must have been configured in the IO server page.

**Identification**

Tag Name:  Page:  ▼

Tag Description:  G

**I/O Server Setup**

Server Name:  ▼ Topic Name:  ▼

Address:

[Status]	Status
[M]	Internal Memory
[SM]	Special Memory
[V]	Variable Memory
[C]	Counter
[HC]	High Speed Counter
[T]	Timer
[AI]	Analog Inputs
[AQ]	Analog Outputs
[DI]	Discrete Inputs

Type:

**Alarm Setup**

Alarm Enabled

Logging Enabled

**Historical Logging**

**Examples:**

Address	Description
MW4	The Word at address 4 (in bytes) in the Internal Memory
HCL1	The High Speed Counter number 1, read it as Signed Word
AQW5	The Word at address 5 (in bytes) in the Analog Inputs zone
IB3	The Byte at address 3 (in bytes) in the Discrete Output zone
I5#2	The bit 2 from the Byte (read 'Bit access modifier' note below) at address 5 in the Discrete Inputs zone

The remaining fields are mostly left with their default value:



- **Type:** DataType of the tag (Automatic, Floating Point, Boolean, Integer, Dword). All tags are stored on 4 bytes. The default **Automatic** option lets the eWON Flexy decide the format depending on the IO Server register/modifier type.
- **Force Read Only:** Unchecked by default. When it is checked, users will not be able to change the value manually on the View Mode
- **eWON value:** Defaults are \*1+0. 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.  $TAGval = IOSERVERval * scale\ factor + offset$ .

**- Note -**

*The tag remains however read/write for when used inside the embedded BASIC program.*

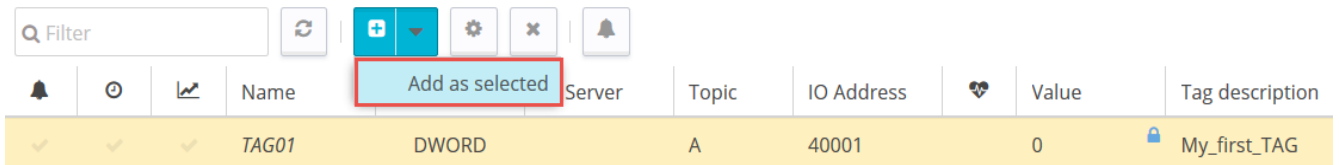
- Click on the **Add Tag** button when your tag configuration is complete
- If everything is OK, your new tag appears in the tag list:

Filter	Refresh	Add	Name	Type	IO Server	Topic	IO Address	Value	Tag description
Filter	↻	+	TAG01	Floating po...		A	Status,MPI,1	0	My_first_Tag

- If not, the table below shows some examples of error messages:

Error	Description
Tag name empty	The Tag name should be written, it is a mandatory field
Invalid character name	Check if the name contains invalid spaces and /or characters.
Invalid IO name for Tag	Check the Tag address syntax
Invalid topic name for Tag	Check if the topic field is A, B or C.

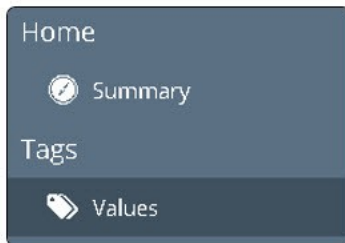
- Execute the same sequence from point 1 for the other tags you need to create.
- If you need to create new tags with similar properties as an existing tag in the list, click on the tag already created and then click on arrow next to **Add (+)** and select **Add as selected**



- Using this option, all properties of the existing tag will be copied in the new tag creation window. Copied properties includes the Tag Name. Since the Tag Name must be unique, make sure you change the name of the new tag.

## 8. Monitoring tags

- Switch to the **View Mode** page to check tag values and status



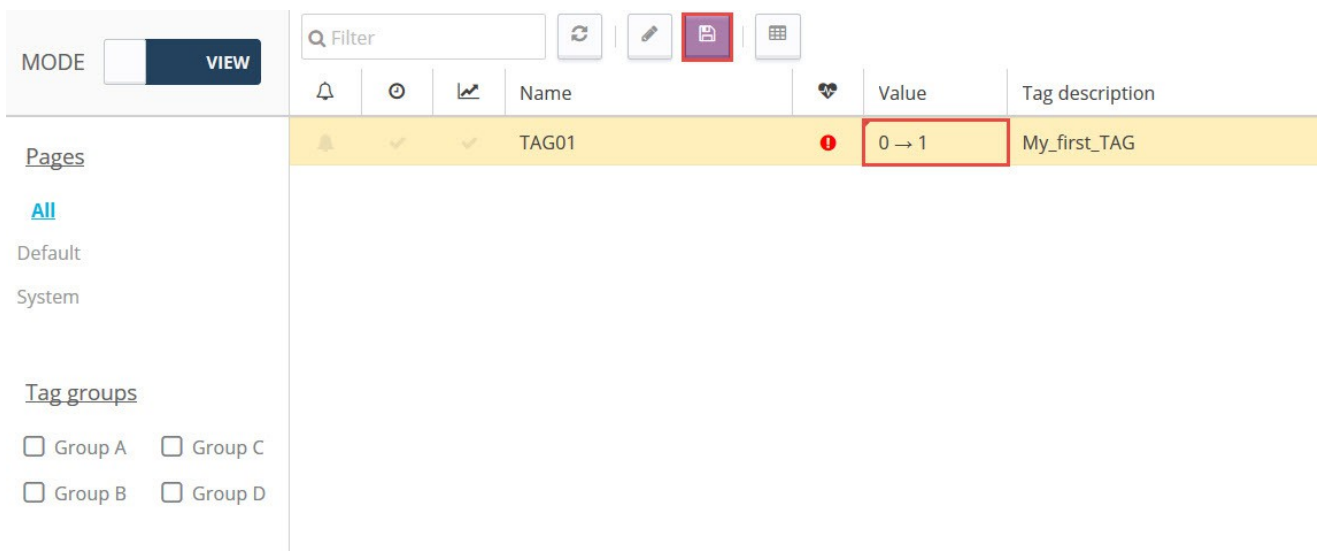
Switch from:



to



- You can change the value of tags that are configured as read/write. To change the tag value, double click on the value field or click on the **Edit Value** icon, enter the new value and click on **Apply**.
- It is also possible to change multiple Tags simultaneously and click on **Apply**



Name	Value	Tag description
TAG01	0 → 1	My_first_TAG

### - Note -

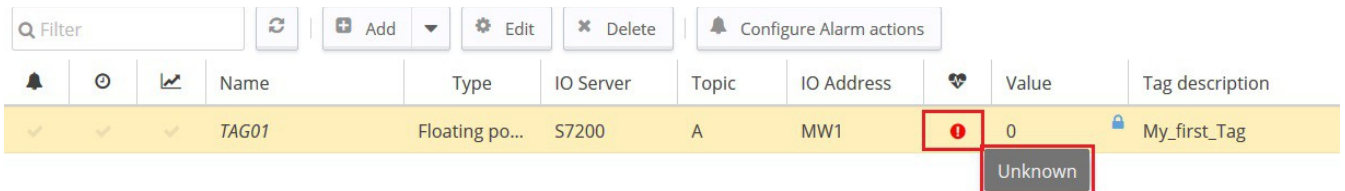
Clicking on Apply sends the new value to the register of the PLC device. The value will actually be returned with the next poll. You don't need to refresh your browser to see the new value on screen (Auto-refresh is ticked by default on the bottom of the page).



## 9. Troubleshooting tags in error

A red icon displayed in the View Mode indicates that the quality of this tag value is not reliable.

Moreover a mouse over will present you a short description about the source of the problem as shown below.



Name	Type	IO Server	Topic	IO Address	Value	Tag description
TAG01	Floating po...	S7200	A	MW1	0	My_first_Tag

Error	Description
No communication	This represents no communication between the eWON Flexy and the at PLC.
Disable	Check if the Topic used for this Tag is enable in the selected IO Server
Unknown	Frequently an issue in the IO server configuration
Device error	Likely wrong or non existing address in the PLC device

### - Note -

*A single tag in error (truly bad) can cause communication errors for other Tags if they are grouped in a single read request (especially when several tags are configured with successive PLC addresses). Indeed, the PLC device will simply respond that the whole request is invalid.*

- To identify what tag caused the issue, check the option Disable Tags in Error:



- Do not forget to deactivate the option (and click "Init" link in S7200 IO Server menu) once the error have been resolved.
- To get more details about the source of the errors and the sequence of events before and after they occurred:



- In the case of a communication error, check the cabling and dip switch settings (serial link).

## Appendix A - Syntax of S7-200 tag addresses

### General tag address format

<Memory Type><Modifier><address>

### Memory types

Memory Type	Description	Acceptable Modifiers	Address
M	Internal memory	B, C, <b>W</b> , S, D, L, F	Byte offset
SM	Special memory	B, C, <b>W</b> , S, D, L, F	Byte offset
V	Variable memory	B, C, <b>W</b> , S, D, L, F	Byte offset
C	Counter	<b>W</b> , S	Object number
HC	High Speed Counter	D, <b>L</b>	Object number
T	Timer	D, <b>L</b>	Object number
AI	Analog Inputs	<b>W</b> , S	Byte offset
AQ	Analog Outputs	<b>W</b> , S	Byte offset
I	Discrete Inputs	B, C, <b>W</b> , S, D, L, F	Byte offset
Q	Discrete Outputs	B, C, <b>W</b> , S, D, L, F	Byte offset

#### - Note -

*All addresses are always in BYTES (except for Counters and Timer that are objects).*

## 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

### - Note -

*If no modifier is included, the modifier-type in bold will be used. Moreover, to avoid loss of precision due to integer to float conversion, choose the right storage DataType for your Tag(s).*

### Examples:

Address	Pointing to
MW4	the Word at address 4 (in bytes) in the Internal Memory
HCL1	the High Speed Counter number 1, read it as Signed Word
AQW5	the Word at address 5 (in bytes) in the Analog Output zone
IB3	the Byte at address 3 (in bytes) in the Discrete Inputs zone
I5#2	the bit 2 from the Byte (read 'Bit access modifier' note below) at address 5 in the Discrete Inputs zone

### Bit access modifier

- For Memory Types M, SM, V, I and Q, 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:**

Modifier	Description
Valid	AQ10#5 is OK because it represents bit 5 of Byte 10 in the Analog Output zone
Invalid	IW5#2 is wrong because there is a Modifier. I5#10 is wrong because the Bit number is greater than 7

**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 Value Name is composed of:

Status[Global Device Address]

**Examples:**

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

**- Note -**

*You can define a status Tag for each PLC used.*

## Appendix B - PPI cables

eWON with serial port You can use a standard straight RS485 cable with the following pinout:

eWON	S7-200
DB9-Female	DB9-Male
pin 3	pin 3
pin 5	pin 5 (or pin 2)
pin 8	pin 8

You can also use a standard Siemens MPI/Profibus cable 6ES7901-0BF00-0AA0 or equivalent **but it requires an additional DB9 female/female mini-gender changer** to connect the eWON Flexy featuring a standard serial port.

### Connection with MPI port

To make a PPI connection between the eWON Flexy with MPI-port and a S7-200 PLC, you can use a standard Siemens MPI/Profibus cable.

A standard Siemens references is 6ES7901-0BF00-0AA0.

There are compatible cables available on the market, but they do not necessarily have all of the same features such as switchable termination resistors.

The eWON Flexy offers a compatible, unshielded cable:

- P/N EW40912 - SUBD9/SUBD9 cable for Siemens S7, Length: 2 meter
- Max baudrate is 1.5 MBit/s.



## Revision

### Revision History

Revision Level	Date	Description
1.0	15/01/2018	Description

**Document build number: 4**

**Note concerning the warranty and the rights of ownership:**

The information contained in this document is subject to modification without notice. Check <https://ewon.biz/support> for the latest documents releases.

The vendor and the authors of this manual are not liable for the errors it may contain, nor for their eventual consequences.

No liability or warranty, explicit or implicit, is made concerning the quality, the accuracy and the correctness of the information contained in this document. In no case can the manufacturer's responsibility be called for direct, indirect, accidental or other damage occurring from any defect of the product or mistakes coming from this document.

The product names are mentioned in this manual for information purposes only. The trade marks and the product names or marks contained in this document are the property of their respective owners.

This document contains materials protected by the International Copyright Laws. All reproduction rights are reserved. No part of this handbook can be reproduced, transmitted or copied in any way without written consent from the manufacturer and/or the authors of this handbook.

HMS Industrial Networks