



## Installation Guide

IG 018 / Rev. 1.1

# eWON Flexy 8DI-4AI-2DO Ext. Card FLX 3402

This installation guide explains how to install the eWON Flexy 8DI-4AI-2DO Extension Card FLX 3402.



[support.ewon.biz](http://support.ewon.biz)



# Table of Contents

- 1. Introduction ..... 3**
- 2. Safety, Environmental & Regulatory Information ..... 4**
  - 2.1. Scope ..... 4
  - 2.2. ESD Damage Prevention ..... 4
  - 2.3. Applicable Directives, Standards and Compliance ..... 4
  - 2.4. Applicable European Directives ..... 4
    - 2.4.1. Applicable Safety Standards ..... 5
    - 2.4.2. FCC Compliance ..... 5
    - 2.4.3. Certifications ..... 5
- 3. Hardware Description ..... 6**
  - 3.1. Mechanical Layout and Interfaces ..... 6
  - 3.2. Extension Card Label ..... 7
    - 3.2.1. Label Location and Information Included ..... 7
    - 3.2.2. Part Number Structure for Extension Cards ..... 8
  - 3.3. Front Panel LEDs ..... 8
  - 3.4. IO Specifications ..... 9
    - 3.4.1. Analog inputs configuration ..... 9
    - 3.4.2. Connector Pin out ..... 10
    - 3.4.3. Typical Wiring Diagram ..... 11
    - 3.4.4. Analog Inputs (4) ..... 12
    - 3.4.5. Digital Inputs (8) ..... 12
    - 3.4.6. Output Relays (2) ..... 12
  - 3.5. eWON Flexy Extension Cards Environmental Conditions ..... 13
  - 3.6. Plugging the Extension Card into the Base Unit ..... 13
    - 3.6.1. eWON Firmware compatibility ..... 13
    - 3.6.2. Base Unit Slot Compatibility ..... 13
    - 3.6.3. Extension Card Insertion ..... 14
    - 3.6.4. Multiple 8DI-4AI-2DO Extension Cards ..... 15
    - 3.6.5. Basic Principles of the eWON Flexy I/O Tag Addresses ..... 15
    - 3.6.6. Power Requirements ..... 17
- 4. Powering On the Base Unit with its Extension Cards ..... 18**
- 5. Check Card Detection on the Embedded Web Page ..... 18**
  - 5.1. Connecting to the Embedded Web Server ..... 18
  - 5.2. Detected Cards Displayed in the System Page ..... 19
- 6. Analog input measurement ..... 20**
  - 6.1. Analog input scaling ..... 20
  - 6.2. Real physical conversion value formula ..... 20
  - 6.3. Example ..... 20
- Revision ..... 22**
  - Revision History ..... 22

## 1. Introduction

The present Installation Guide describes the hardware of the **8DI-4AI-2DO Extension Card - FLX 3402** of the eWON Flexy family.

This guide concerns the 8DI-4AI-2DO extension card produced since July 2016.

- Part number is **FLX3402\_00/S0**
- Serial number must be higher than **0854-1627-0001-27**

The new FLX3402 IO card has the same functionalities than the FLX3401 but has furthermore the possibility to measure 4-20mA & 0-10 VDC signals.

If you are using the **FLX 3401 - 8DI-4AI-2DO Extension Card** version, please refer to IG-018-0-EN.

The eWON Flexy family is a range of modular industrial gateway/router.

As the name eWON Flexy suggests, it has been designed to enable numerous different combinations of **Extension Cards** and **Base Units**.

The present Installation Guide is focusing on an extension card which, as such, needs to be inserted in one of the Base Units in order to work.

The Base Units have their individual Installation Guide IG-014-0-EN "eWON Flexy - Base Units".

The present guide addresses shortly how the Extension Cards can be integrated in the Base Units as we give some recommendations to mount them (see § [3.6 Plugging the Extension Card into the Base Unit](#)).

### - Note -

*Though being referred as Digital Outputs, these 2 outputs are actually Normally Open (NO) relays.*

## 2. Safety, Environmental & Regulatory Information

### 2.1. Scope

The present section addresses Safety, Environmental & Regulatory Information for the 8DI-4AI-2DO Extension Card FLX 3402. This Extension Card is basically belonging to the same compliance frame than the Base Units.

### 2.2. ESD Damage Prevention

**- Caution -**

*Contains parts and assemblies susceptible to be damaged by electrostatic discharge (ESD). Always use ESD precautions when handling Extension Cards and the opened Base Unit.*

The Extension Card described in the present Installation Guide is a module exposing both sides of an electronic printed circuit board. Therefore, it is packed in an anti-static ESD bags. In order to avoid ESD damage, the product must be handled with the necessary precaution including:

- Grounded ESD protective work surface
- Personnel grounding

### 2.3. Applicable Directives, Standards and Compliance

The Extension Card described in the present Installation Guide belongs to class A Information Technology Equipment (ITE). In a domestic environment this product may cause radio interference in which case the user may be required to take appropriate measures.

### 2.4. Applicable European Directives

The Extension Card described in the present Installation Guide is in conformity with the following EC directives:

- RoHS Directive 2011/65/EU
- EMC Directive 2014/30/EU
- RE directive 2014/53/EU(\*)

(\*) When applicable, the product conforms to the corresponding R&TTE articles: RF spectrum efficiency: Art 3(2); EMC: Art. 3(1)(b); Safety: Art. (3)(1)(a)

#### 2.4.1. Applicable Safety Standards

The Extension Card described in the present Installation Guide is in conformity with the following safety standards:

- IEC/EN 60950-1
- UL 60950-1
- CSA-C22.2 No 60950-1-07

#### 2.4.2. FCC Compliance

The Extension Card described in the present Installation Guide complies with Part 15 of the FCC Rules. Operating is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

#### 2.4.3. Certifications

The Extension Card described in the present Installation Guide has been certified by authorized bodies:

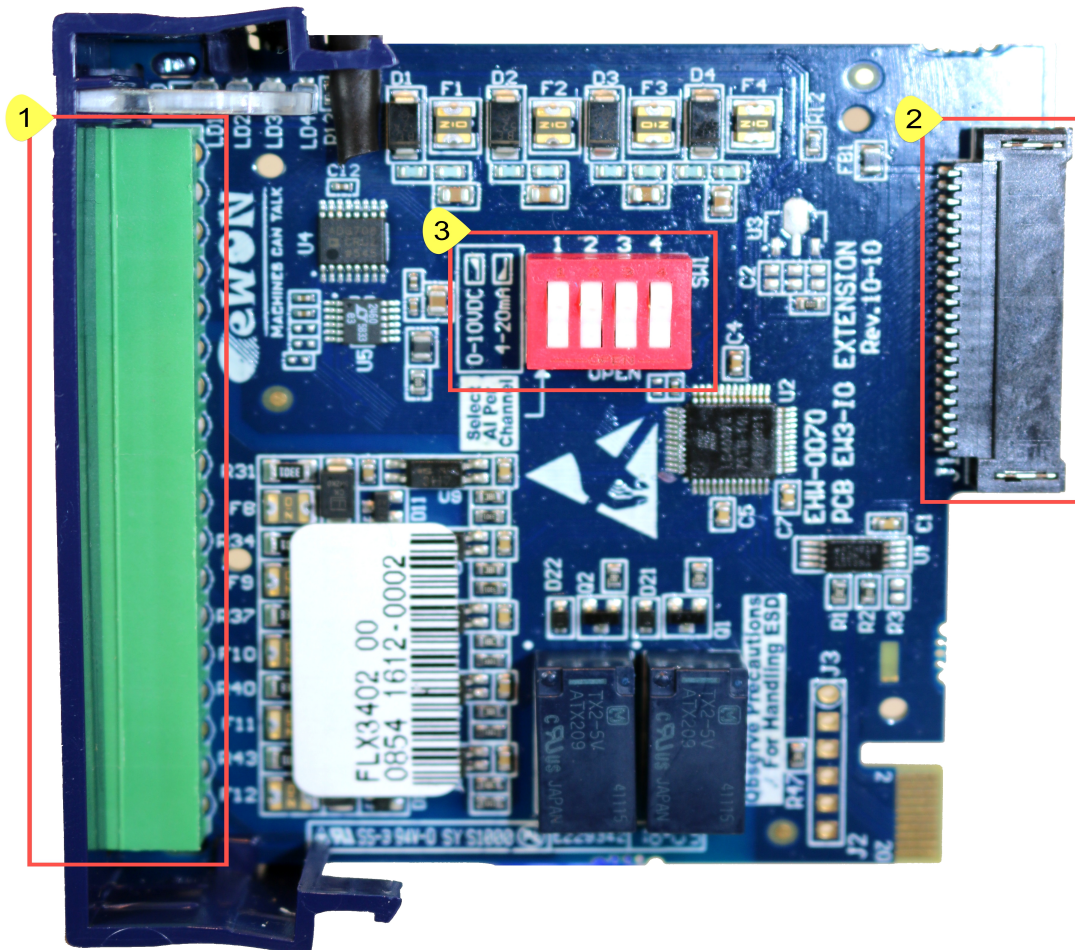
- UL Certificate of Compliance (COC) # 20160502-E350576
- CB certificate # DK-53957-UL

#### -Note-

*These certificates can be downloaded as PDF files on the eWON Support web site:*  
<https://ewon.biz/support/docs/flexy#5>

### 3. Hardware Description

#### 3.1. Mechanical Layout and Interfaces

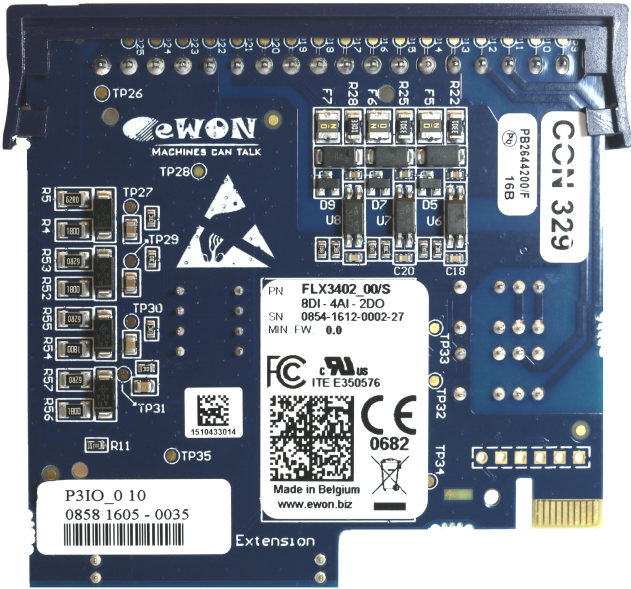


- |   |  |
|---|--|
| 1 | IO mating connector 18 screw terminals     |
| 2 | Back-plane connector                       |
| 3 | Dip Switch analogue input voltage selector |

**3.2. Extension Card Label**

**3.2.1. Label Location and Information Included**

The identification label of the extension cards is placed on the solder side of the PCB.



The different parts of the label are described below:

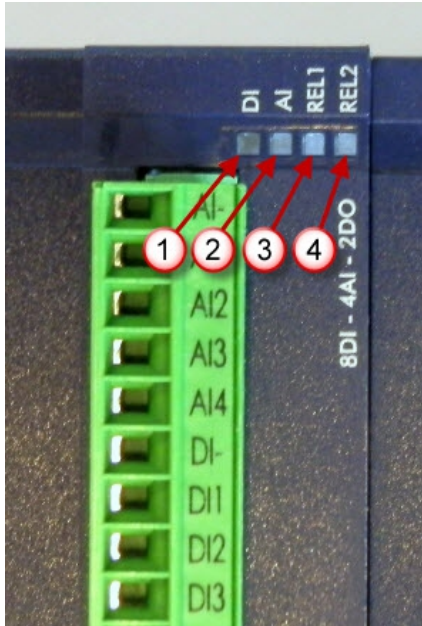


<b>PN</b>	<b>Part Number:</b> identifies the type of the card. Description see <a href="#">3.2.2 Part Number Structure for Extension Cards</a>
<b>SN</b>	<b>Serial Number</b> Structure of the Serial Number 1111-2233-0001-44  1111 = MTID (product related) 2233 = Year Week 0001 = sequential mfg order 44 = product type
<b>Min FW</b>	Minimum firmware needed in the eWON Flexy base unit
<b>Marks</b>	CE, UL,... certificate number and logos if applicable.

### 3.2.2. Part Number Structure for Extension Cards

FLX 3401_00				
<b>FL</b>	FL is the prefix for the extensions of the eWON Flexy family	Only FL (constant)		
<b>X</b>	1 alphabetic sign (CAP) Defines the slots of the base module in which the extension can be inserted. See also <a href="#">3.6.2 Base Unit Slot Compatibility</a>	A	2 first slots only	●●○○
		B	2 last slots only	○○●●
		X	In any slot	●●●●
<b>3402_00</b>	8DI-4AI-2DO Extension Card. The suffix _00 is used for software options.			

### 3.3. Front Panel LEDs

Item	Mark	Function	Picture
<input type="checkbox"/>	DI	Reflects a DI status change. Toggles between ON and OFF at every DI status change (see Note 2)	
<input type="checkbox"/>	AI	Blinking Green = Acquisition running on all AI (permanent even if no tag was configured and/or no input was wired)	
<input checked="" type="checkbox"/>	REL1	ON Green when relay 1 is closed	
<input type="checkbox"/>	REL2	ON Green when relay 2 is closed	

**- Note -**

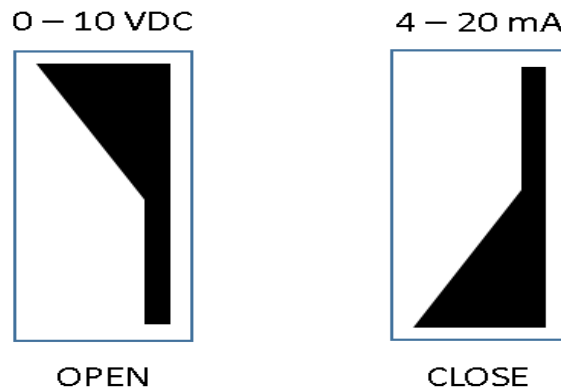
*During boot time all 4 LEDs are off.  
Two simultaneous status changes on different DI will result in no LED status change.*



### 3.4. IO Specifications

#### 3.4.1. Analog inputs configuration

The 4 analog inputs can be reconfigured to measure voltage or current  
The configuration is made by setting the dip switch selector in the needed mode.



**- Note -**

*The default dip switch configuration is 0 – 10 VDC for Voltage measurement*

Examples of configuration:

All AI configured in 0-10 VDC for voltage measurement	
All AI configured in 4-20 mA for current measurement	
AI 1, AI 2 in 0-10 VDC AI 3, AI 4 in 4-20 mA	

**- Caution -**

*The dip switch has to be set while the extension board is powered off.*

### 3.4.2. Connector Pin out

AI-	Ground of the analog input (isolated)
AI1	Analog Input 1
AI2	Analog Input 2
AI3	Analog Input 3
AI4	Analog Input 4
DI-	Ground of the digital input (isolated)
DI1	Digital Input 1
DI2	Digital Input 2
DI3	Digital Input 3
DI4	Digital Input 4
DI5	Digital Input 5
DI6	Digital Input 6
DI7	Digital Input 7
DI8	Digital Input 8
R11	Relay 1 NO terminal 11 (*)
R14	Relay 1 NO terminal 14 (*)
R21	Relay 2 NO terminal 21 (*)
R24	Relay 2 NO terminal 24 (*)



(\*) Terminal numbers R11, R14, R22 and R24 are derived from 11 (Common) and 14 (NO) that refer to the Single Pole, Single Throw, Normally Open (SPST NO) relay terminal numbering as per standard EN 50005.

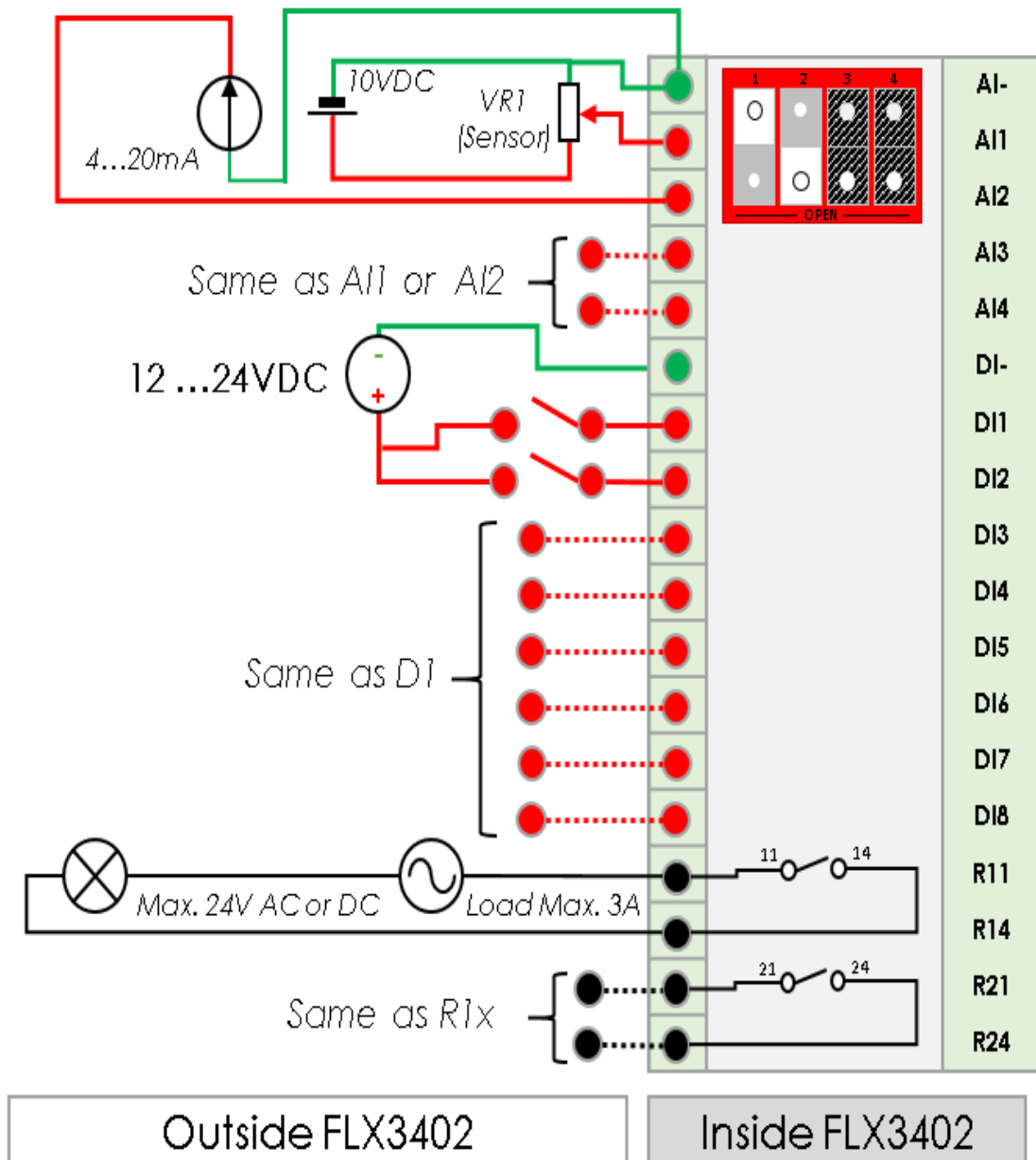
**- Note -**

*The maximal tightening torque is 0.25Nm*

### 3.4.3. Typical Wiring Diagram

As example, in this wiring diagram the AI dip switch is set:

- in 0-10 VDC for AI1 (dip switch selector: open)
- in 4-20 mA for AI2 (dip switch selector: close)



### 3.4.4. Analog Inputs (4)

Characteristic	Value
AI Terminal count	5 (4 channels + common ground)
Isolation between AI	None (common ground)
AI rated input range (According Dip Switch settings, see <a href="#">3.4.1.</a> )	Rated 0 to 10 VDC (max. -0.6 V to 12 VDC) Rated 4 to 20 mA (max. 0 mA to 25 mA)
AI max. input range	Over-voltage protection
AI max. input impedance	< 260R
AD converter resolution	16 bits
Sampling rate	4 sps
Max. gain error	0,40%
Input low pass filter cut-off	@ 1.3 Hz
Functional Isolation	1.5 kV

### 3.4.5. Digital Inputs (8)

Characteristic	Value
DI terminal count	9 (8 + common ground)
Isolation between DI	None (common ground)
DI voltage range	0 to 24 VDC
DI protection	33 VDC Max
DI OFF state input voltage range	0 to 5 VDC
DI ON state input voltage range	10 to 30 VDC
DI ON state current range	< 2 mA @ 12 VDC to < 6 mA @ 24 VDC
Functional Isolation	1.5 kV from DGND (internal isolated ground)

### 3.4.6. Output Relays (2)

Characteristic	Value
Terminal count	4 (2 independent outputs)
Relay type	Single Pole, Single Throw, Normally Open = SPST NO
Input voltage max.	24 VDC/VAC
Max. current (ext. source)	3 A
Functional Isolation	1,5 kV

### 3.5. eWON Flexy Extension Cards Environmental Conditions

Characteristic	Value
Operating temperature	-25 to +70 °C
Storage temperature	-40 to +70 °C
Relative humidity	10 to 95% non-condensing
Operating altitude	Up to maximum 2000m
Storage altitude	Up to maximum 3000m

### 3.6. Plugging the Extension Card into the Base Unit

#### 3.6.1. eWON Firmware compatibility

Before inserting the Extension Card into the Base Unit, verify that your eWON Flexy is running a required firmware supporting the new extension card. The required firmware version is indicated on the label of the extension card.

For example: Min. FW.: 11.2 ( see [3.2.1.Label Location and Information Included](#))

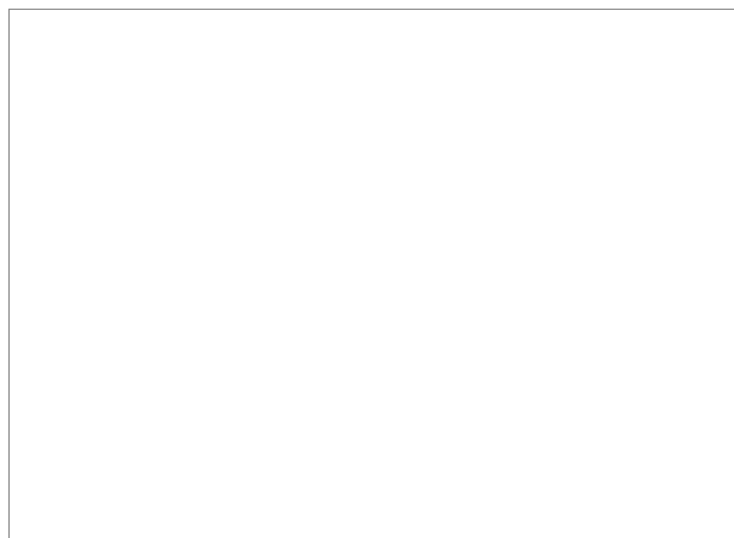
#### 3.6.2. Base Unit Slot Compatibility

The **8DI-4AI-2DO Extension Card** (FLX 3402) can be inserted in **all slots of the Base Unit**.

Explanation:

The Flexy Base Units feature two type of slots. The A slots are the two first slots starting from the left. The B slots are the two last slots. Some cards fit in A and B slots. Some don't.

Cards that fit only one type of slot have a mechanical mistake-proof security.



The reference code of the Extension Cards includes a letter that defines their compatibility either with “A” slots, “B” slots or both:

- **FLA** xxxx - designates cards that fit into “A” slots
- **FLB** xxxx - designates cards that fit into “B” slots
- **FLX** xxxx - designates cards that fit into both “A” and “B” slots

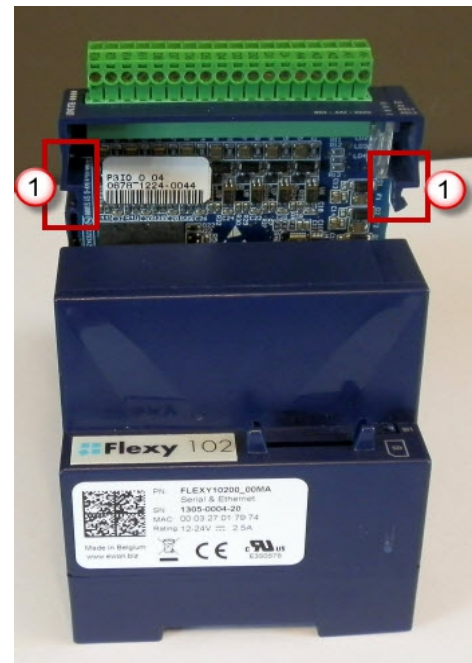
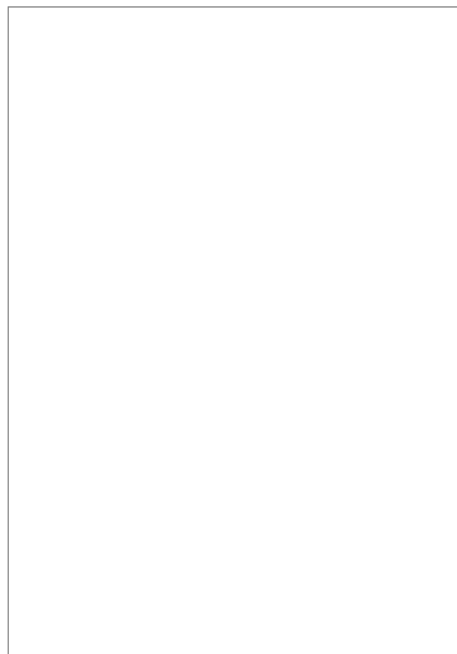
In addition to the card reference, each type of extension card bears a visual compatibility symbol on its front panel. The visual symbols are shown in the table below:

●●○○	2 first slots only (A)
●●●●	In any slot (X)
○○●●	2 last slots only (B)

### 3.6.3. Extension Card Insertion

Please wait 30 seconds after powering off the equipment before inserting (or removing) an extension card. This is to avoid possible damage to the Base Unit and Extension Card.

Remove the slot filler of the location you want to insert the new card in. To do this, press on both ends of the cover, note that the hooks (1) are out-centered like shown in the pictures.



Hooks to be pressed are off-centered – press while pulling upwards

Insert the Extension Card carefully and slide it down until the hooks click.  
Make sure the card is completely inserted.

**- Remember -**

*The dip switch has to be set before inserting the extension card and powering ON the Flexy base unit.*

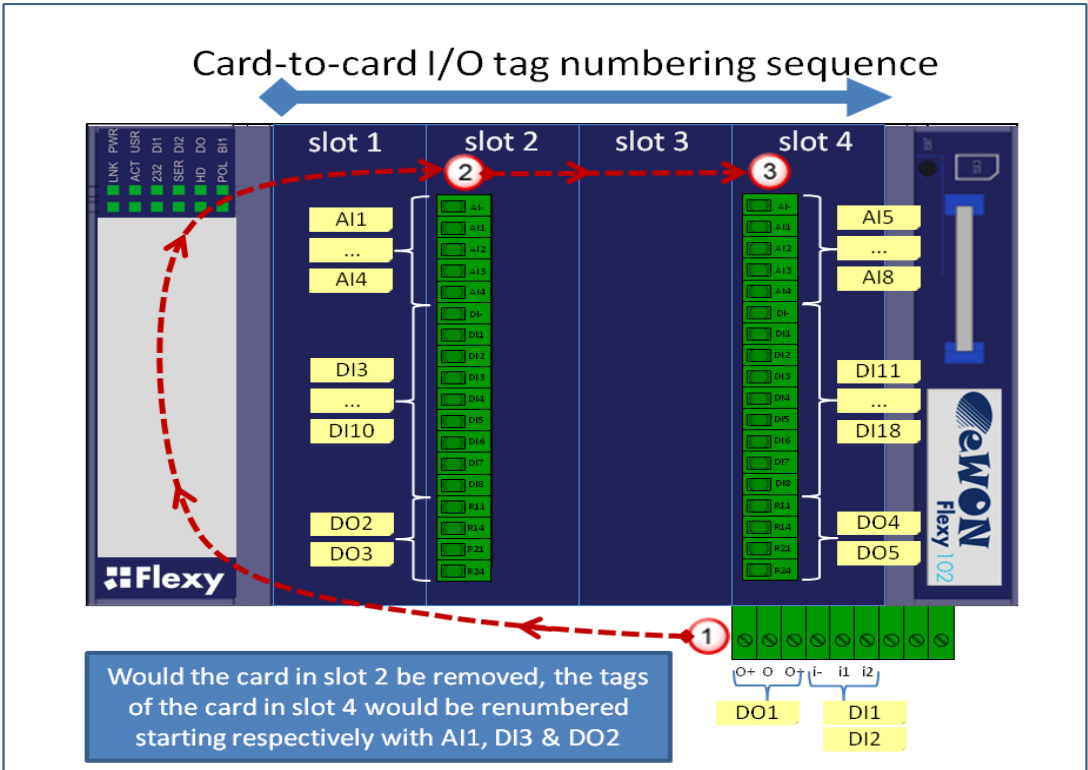
**3.6.4. Multiple 8DI-4AI-2DO Extension Cards**

The boot process of the Base Unit includes an automatic detection of the inserted Extension Cards. This detection is done sequentially, slot per slot starting from left to right.  
The Extension Cards of type FLX 3402 can be inserted in all slots. The eWON Flexy firmware supports up to 4 Extension Cards of this type.

**3.6.5. Basic Principles of the eWON Flexy I/O Tag Addresses**

The internal tag addressing of the Flexy range always starts with the Inputs/Outputs of the Base Units. Remember that all Base Units feature 1 Digital Output and 2 Digital Inputs, those are the first ones that have to be considered when creating tags in the eWON.

The example below helps you to understand the syntax of the I/O Server tag addresses in the case of 2 I/O Extension Cards.



**- Note -**

Following the left-to-right order of slots, the first card to be detected is Extension Card plugged in the most left slot, then the next on its right and so on.

Removing an I/O card other than the utmost right one will result in an internal reallocation of tag addresses that may result in a mismatch between physical I/Os and their software configuration.

The software tag addresses can be "frozen" by adding the slot number in the tag definition. This prevents accidental I/O mismatch (see next page).

Slot number appends to prevent tag address mismatch:

Let's take the example of an eWON Flexy featuring 2 IO cards FLX 3402 in slots #2 and #4 as shown in the picture above. The tag address for the eWON IO server can be extended as follows:

- ABx,Ey

Where:

- AB is the type of IO (DI, AI, DO)
- x is the order number
- E is a constant prefix to the slot number
- y is the slot number of the card (0 = main board, 1 = slot #1, 2 = Slot #2, etc..)

Delete Selected Tag		Create New Tag (like first selected)				Page: Default
	L	Tag Name	Description	Type	IO Server	Topic
<input type="checkbox"/>	△	DO1		Floating point	EWON	DO1,E0
<input type="checkbox"/>	△	DO2		Floating point	EWON	DO2
<input type="checkbox"/>	△	DO3		Floating point	EWON	DO3,E2
<input type="checkbox"/>	△	DO4		Floating point	EWON	DO4,E4
<input type="checkbox"/>	△	DO5		Floating point	EWON	DO5,E4

The main IO syntax and order numbering remains unchanged.

In the example above, the IO server tag addresses are as follows:

Tag Syntax	Explanation
DO1,E0	Digital Output 1, main board (though E0 is not necessary in this case)
DO2	Digital Output 2, no position specified = second detected DO = first DO on first extension card detected (slot #2 most left).
DO3,E2 #2	Digital Output 3, board in slot #2 = second DO on extension card in slot #2
DO4,E4	Digital Output 4, board in slot #4 = first DO on extension card in slot #4
DO5,E4#4	Digital Output 5, board in slot #4 = second DO on extension card in slot #4



Behavior if the card in slot #2 is removed:

In the **Tag View** page,

- **DO2** will appear normally as it was not frozen by a slot number append. But it can no longer reflect the status of the first DO of the board in slot #2 that was removed. DO2 now reflects the status of the first DO of the board in slot #4.
- The 3 other DOs with specified slot number E2 and E4 will all appear in error (red cross, value 0), because:
  - a) The address of DO3,E2 of the card in slot #2 could no longer be found, and
  - b) The software addresses of DO4,E4 and DO5,E4 of the card in slot #4 do no longer match with the detected order of physical addresses.

The error messages in the **Trace** log file are “Invalid IO Tag name (DOx, addr. DOx,Ex)”.

To have the DOs of the card in slot #4 responding, edit the tags and change their software addresses as follows:

- DO4,E4 to DO2,E4 and
- DO5,E4 to DO3,E4.

### 3.6.6. Power Requirements

The internal power converter of the eWON Flexy Base units has been designed to cover a broad range of different combinations of Extension Cards.

Users should make sure the total power demand of the Extension Cards does not exceed the capabilities of the Base Unit. That is why the notion of “Energy Points” has been introduced.

The Installation Guide IG-014-0-EN “eWON Flexy - Base Units” includes a section giving the **Available Energy Points** of each type of Base Unit.

The power requirements of each Extension Card is expressed in **Energy Demand Points**. This number is meant to check whether the balance with the **Available Energy Points** of a given Base Unit with Extension Cards is OK or not.

	8DI-4AI-2DO Extension Card FLX 3402
Energy Demand Points	2

The Installation Guide IG-014-0-EN “eWON Flexy - Base Units” includes practical examples of power balance calculations.

## 4. Powering On the Base Unit with its Extension Cards

When the Base Unit is powered on, it takes approximately 25 seconds for the unit to go through its self-test procedure. The slots in which the extension cards have been inserted and their type are detected during this process.

If the boot process completes normally, you should observe the following LED status

- Base Unit                    **USR**    flashing green slowly
- Extension Card            **AI**     flashing green (acquisition running)

## 5. Check Card Detection on the Embedded Web Page

The eWON Flexy Extension Card requires no software configuration.

It is automatically detected by the Base Unit when it boots.

### - Note -

*The minimum firmware version required for the FLX3402 - extension card is 11.2s0.*

### 5.1. Connecting to the Embedded Web Server

Configure the network parameters of your configuration PC to encompass the IP range of the eWON LAN.

Connect the PC to one of the LAN port of the eWON Flexy.

Open your Internet browser and access the eWON Flexy internal Web page by typing the LAN IP address in the URL field (the default address is <http://10.0.0.53>).

The default

- login is adm
- password is adm

### - Warning -

*For security reasons, changing the default password adm is absolutely required.*

*To change the adm password, from the menu bar, click on Configuration, Users Setup and double click on the adm entry to edit its parameters. Enter the new password twice and click Save.*

## 5.2. Detected Cards Displayed in the System Page

The detected card appears in the eWON **System** hardware configuration page like shown below.

The path to the **System** hardware configuration page showing the cards detected by the Base Unit is: **Diagnostic (1) > Status (2) > System Info (3) > System (4).**

The screen capture below gives an example of an FLX 3402 extension card that has been detected in slot 3 (5).



The screenshot shows the eWON web interface. The top navigation bar includes 'View I/O', 'Alarm Summary', 'Diagnostic' (1), and 'Configuration'. Below this is a secondary bar with 'Alarm History', 'Files Transfer', and 'Log off'. The main content area has a left sidebar with various system information links, including 'System Info' (3). The 'System Info' section is expanded to show 'System' (4). The 'System' page displays a table of detected cards:

Description	Value	Unit	Stat	?
<b>MB Part Num</b>	FLEXY20100_00			
<b>MB Serial Num</b>	1305-0004-21			
<b>MB Ext. Info</b>	PType:0, MTID:712			
<b>Ext1 Part Num</b>				
<b>Ext1 Serial Num</b>				
<b>Ext1 Ext. Info</b>				
<b>Ext2 Part Num</b>	Single Eth Debu			
<b>Ext2 Serial Num</b>	675-1224-0085-09			
<b>Ext2 Ext. Info</b>				
<b>Ext3 Part Num</b>	FLX3402_00/X			
<b>Ext3 Serial Num</b>	854-1612-0004-27			
<b>Ext3 Ext. Info</b>				
<b>Ext4 Part Num</b>				
<b>Ext4 Serial Num</b>				
<b>Ext4 Ext. Info</b>				

## 6. Analog input measurement

### 6.1. Analog input scaling

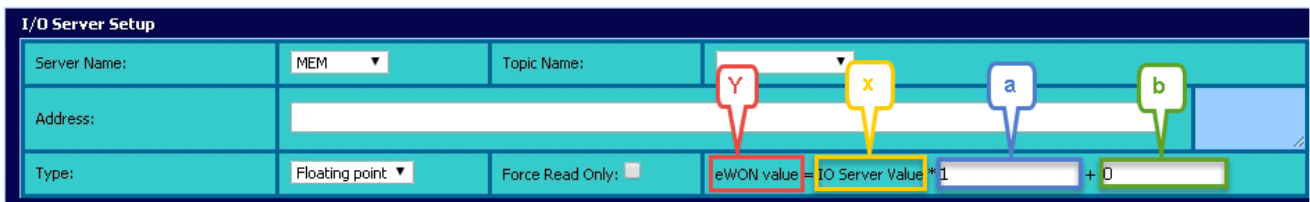
The firmware will detect whether the dip-switch is configured as current or voltage measurement.

In both cases, the range will be 0...65535

Raw Value (AI)	Voltage	Current
0	0V	0 mA
65535	10V	20mA

### 6.2. Real physical conversion value formula

We can use the function  $Y = ax + b$



The screenshot shows the 'I/O Server Setup' interface. It includes fields for 'Server Name' (MEM), 'Topic Name', 'Address', and 'Type' (Floating point). A formula field contains 'eWON value = IO Server Value \* 1 + 0'. Callouts labeled Y, X, a, and b point to the 'eWON value', 'IO Server Value', the multiplier '1', and the constant '0' respectively.

- Where Y equals the value displayed in the eWON
- Where X equals the real measurement of the value
- Where A equals the slope
- Where B equals the constant term

#### - Note -

*eWON will use a maximum of 6 significant digits for the value  
eWON will automatically adapt the value if more digits is used in a field*

### 6.3. Example

#### Situation:

Using a temperature sensor (Min. -20°C Max +50°C) on the AI1 of an eWON Flexy

#### Question:

Which values need to be added in a & b?

**Used formulas:**

$$Y = ax + b$$

$$a = (Y2 - Y1) / (X2 - X1)$$

$$b = Y2X1 - Y1X2 / (X1 - X2) \text{ if } X1 = 0 \rightarrow b = Y1$$

Description	Value	Raw Value (AI)
Minimum	-20°C (Y1)	0 (X1)
Maximum	50°C (Y2)	65535 (X2)

In our example:

$$a = 0,00106813$$

$$b = -20$$

**I/O Server Setup**

Server Name:	EWON ▼	Topic Name:	▼
Address:	AI1		
Type:	Floating point ▼	Force Read Only: <input type="checkbox"/>	eWON value = IO Server Value * 0.00106813 + -20

## Revision

### Revision History

Revision Level	Date	Description
1.0	13/07/2016	Official Document
1.1	27/07/2016	Update of Legal References

#### **Document build number: 33**

#### **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 the manufacturer's responsibility could be called for direct, indirect, accidental or other damage occurring from any defect of the product or errors 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.

eWON sa,