eWON

MACHINES CAN TALK

Polling Data Registers
from Allen-Bradley PLCs

PLC5

SLC500

MicroLogix

CompactLogix

ControlLogix

FlexLogix

Contents

This short guide explains how to poll data registers from Allen-Bradley® PLCs.

Rockwell Automation
Encompass™
Product Partner
Europe

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1. Objective

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

Polling PLC data registers implies the following steps :

1. Linking the eWON with the PLC
2. Configuring the eWON IO Server
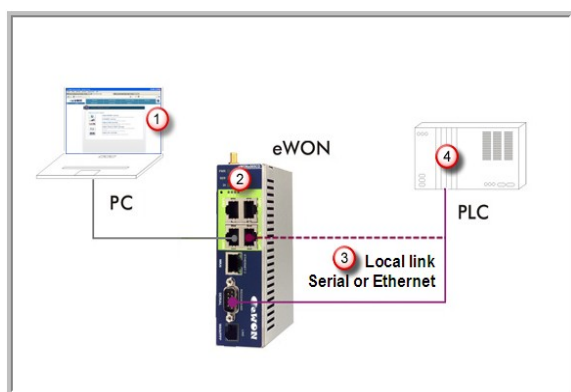3. Creating tags in the eWON
4. Monitoring tags

Advanced explanations are indicated by this icon.

2. Hardware requirements

In order to follow this guide you'll need:

◆ PC suitable to connect to the eWON
◆ An Allen Bradley[i] PLC (PLC5, SLC500, MicroLogix, CompactLogix, ControlLogix, FlexLogix)

① From a computer running a web-browser, you will configure the IO Server in the eWON to poll different type of PLC data registers.

② Access to the eWON web server is done either by using (one of) its local LAN port(s) or by another type of access like VPN IP address, etc.

③ Connection to the PLC can be either serial or Ethernet depending on the available interfaces on the PLC

④ The serial or Ethernet connected PLC will have its registers read by the tags configured in the IO Server of the eWON.

3. Software requirements

eWON configuration software:

The eWON is configured through its web server. All you need is a standard Web Browser software like Internet Explorer or Firefox.

Additionally we suggest you to download the **eBuddy** utility on our website http://support.ewon.biz/

This utility allows to list all the eWONs on your network and to change the default IP address of an eWON to match your LAN IP address range. With eBuddy you can also easily upgrade the firmware of your eWON (if required).

eWON Firmware Version

The screen-shots of this guide reflect firmware version 6.3 S0 (2011), but you can expect the basic principles to remain the same in earlier/later versions. A simple way to upgrade the eWON firmware is to use eBuddy.

4. PLC protocol compatibility

The table below shows the protocols that are supported and, for each of those, which IO Server you need to use inside the eWON to connect your Allen-Bradley PLC.

The table below shows the supported protocols and the associated eWON IO Server.

PLC-Family	DF1 protocol (RS232 link)	EIP protocol (Ethernet link)	EWON IO Server name
SLC500	YES	YES	DF1 (*)
MicroLogix	YES	YES	DF1 (*)
PLC5	YES	YES	DF1 (*)
CompactLogix	YES	YES	ABLOGIX
ControlLogix	YES	YES	ABLOGIX
FlexLogix	YES	YES	ABLOGIX

(*) Contrary to what may seem, DF1 as the eWON IO Server name DOES NOT mean that this server is limited to the DF1 protocol & associated serial link. The DF1 IO Server handles without problem the EIP protocol of the listed PLC families.

 Note: Though eWON does not provide direct DH+ compatibility, an indirect connectivity can be established using a ControlLogix unit equipped with a DHRIO card as gateway. This feature allows the eWON to poll PLC tags located on a DH+ network. Polling is done using eWON EIP protocol. For more details please refer to the General Reference Guide RG-001 available here: http://wiki.ewon.biz/Support/07_Documentations/01_RG.

5. Step 1. Linking eWON and PLC

5.1 Serial link configuration
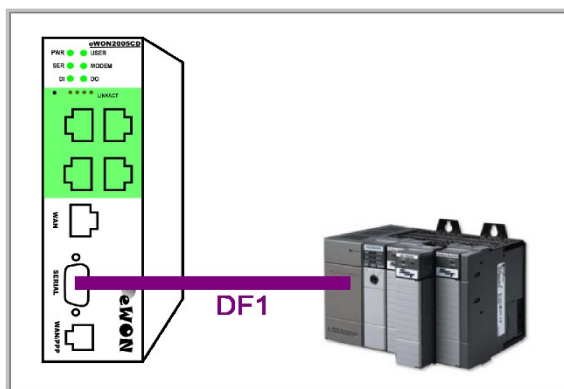
1. Use the Allen Bradley DF1 crossed serial cable ref 1747-CP3 or equivalent to interconnect the eWON with the PLC. The pinout of the serial cable is given in Appendix 2 – Serial DF1 cable pinout.

2. Set the serial port dip switch of the eWON to RS232 mode (all OFF) to allow the DF1 communication with the PLC. The settings of the switches are indicated on the eWON sticker on the left hand side of its housing.
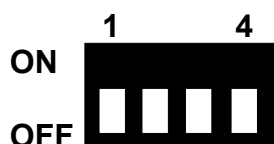

Note: In the PLC configuration, the serial port must be configured in **DF1 Full Duplex** mode. This is the standard setting for the PLC interface when used for program maintenance.

5.2 Ethernet link configuration

1. Link the LAN interface of the eWON with the Ethernet card of the PLC and make sure that the eWON LAN IP address is in the same range as the PLC IP address. Use eBuddy to change the eWON LAN IP address if it is not within the same range as the PLC.
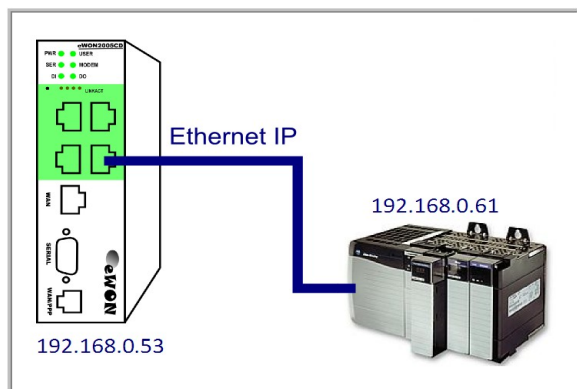
Note: The eWON types with 4 LAN ports (2005CD or 4005CD) can be connected to the Ethernet port of the PLC directly. The eWON types with a single LAN port (2101CD or 4101CD) need[1] to be connected with a **crossed cable** (single PLC) or an **external switch** (multiple PLCs) as the eWON LAN port does not have auto-sense.
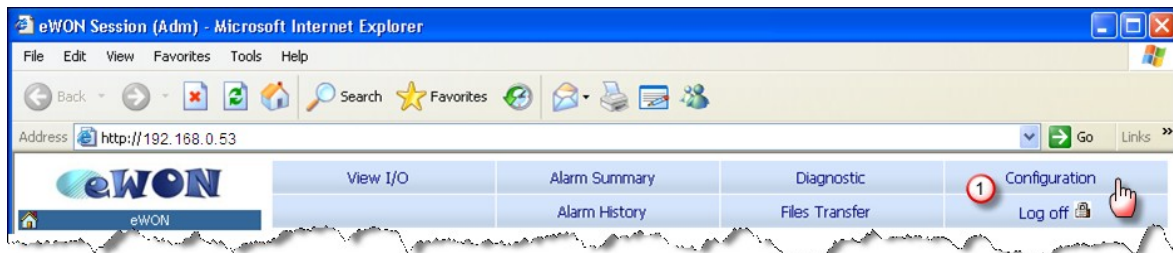

---
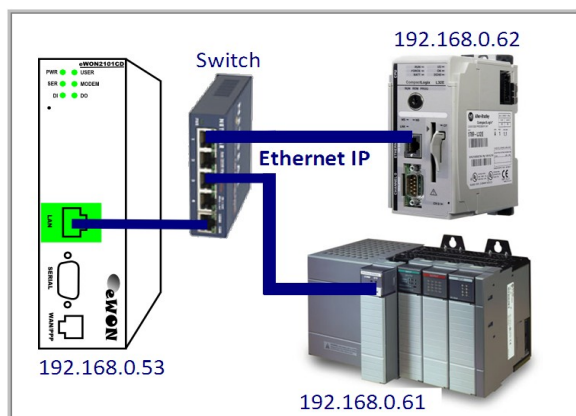
1 Actually both straight and crossed cables are acceptable if the PLC features an auto-sense Ethernet port.

6. Step 2. Configuring the IO Server

6.1 Common to serial and Ethernet link

1. Go to the eWON Web page. Open the *Configuration* page and go to the *IO Server Config* page

2. Open the *Configuration* page and go to the *IO Server Config* page

3. In the drop down field select the IO Server corresponding to your PLC type

● *DF1* IO Server for SLC500, MicroLogix and PLC5 devices

● *ABLogix* IO Server for CompactLogix, ControlLogix and FlexLogix devices
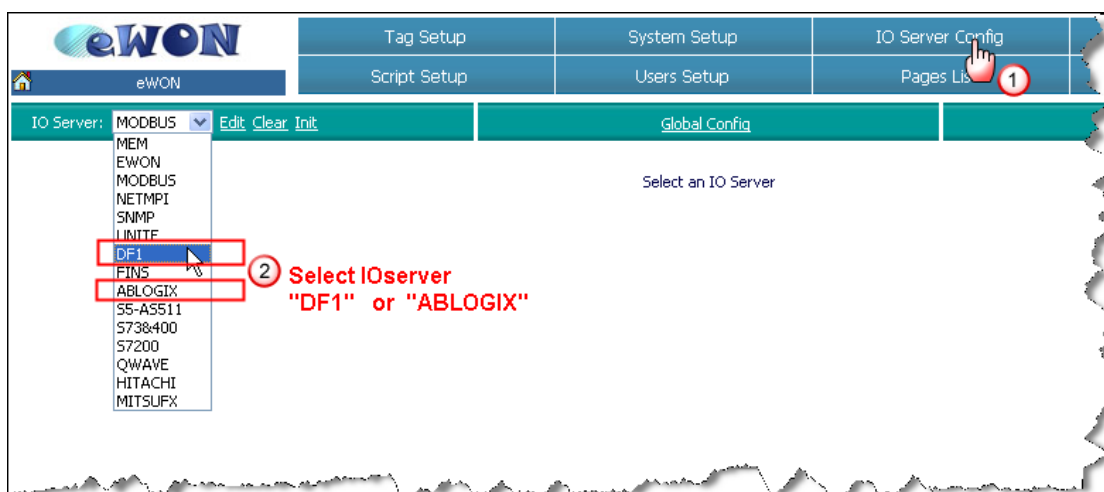
6.2 Specific to serial link

1. Set the *Baudrate*, *Parity*, *Stop Bit* and *Frame Error detection* parameters as defined in the PLC you want to connect (see PLC example):

HW Mode: Select *Full Duplex NO Handshaking*

Leave all other fields blank (default).

On an SLC500 PLC you can find the communication settings in the *Channel Configuration* window of your PLC project. An example is shown in the picture below:

2. To be able to poll data registers out of your PLC, you need to define 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** polling, **Poll Rate** and **Destination Device Address**).

3. **Enable** at least Topic A by ticking the appropriate box.

4. Enter valid address in **Destination Device Type and Address** as per table below:

PLC-Family	EWON IO Server name	Address syntax DF1 protocol (Serial link)
SLC500	DF1	1
MicroLogix	DF1	1
PLC5	DF1	PLC5-1
CompactLogix	ABLOGIX	1
ControlLogix	ABLOGIX	1
FlexLogix	ABLOGIX	1

Table – Device Address syntax for **serial** link (DF1)

5. In **Poll Rate**, you can define the refresh rate in ms (milliseconds) applicable to all data registers that will be included in this this topic. If you leave this field blank, the default value applied will be 2000 ms (2 seconds).

The polling rate specified here applies to all tags associated with this topic. If you have tags that need to refreshed at a different rates, enable and configure multiple topics.

6. Save your settings by clicking on **Update Config.**

6.3 Specific to Ethernet link

1. If you communicate only with Ethernet-connected PLC(s) and do not use the serial link, then set the **Baudrate** to **Disabled** and leave all other parameters in the **COM Setup** part as they are. If you use both type of communication simultaneously, keep your serial settings as described before.

IO Server: DF1 ▼	Edit Clear Init		Global Config
DF1 IO Server & Gateway settings (eWON is acting as a EIP to DF1 adapter and DF1 IO slave)			
COM Setup			
Baud Rate:	Disabled ▼	Default 9600	
Parity:	None ▼	Default: NO	
Stop Bit(s):	1 ▼	Default: 1	
Frame Error Detection:	CRC ▼	Default: CRC	
HW Mode:	Half Duplex ▼	Default: Full Duplex	
Master response timeout:	MS	20..60000, default: 1000	
Rx message timeout:	MS	1000..60000, default 3000	
Tx message timeout:	MS	1000..60000, default 3000	
eWON DF1 Address		Device address of eWON on DF1 link (0..254, default: 4)	
Destination DF1 Address		Device address of destination on DF1 link when EIP is used (0..254, default: 1)	
Bridge EIP Connection	☑ Enabled	Forwarding of EIP open connection requests is mandatory for LOGIX PLCs	
Topic A :	☑ Enabled		
Topic Name:	A		
Destination Device Type and Address:	SLC500-192.168.0.61	SLC500-Device Address (0..254)	
Poll Rate	2000 MS	Default: 2000	
Topic B :	☐ Enabled		
Topic Name:	B		
Destination Device Type and Address:		SLC500-Device Address (0..254)	
Poll Rate	MS	Default: 2000	

2. To be able to poll data registers out of your PLC, you need to define 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**, **Poll Rate** and **Destination Device Address**).

3. Enable at least Topic A by ticking the appropriate box.

4. Enter valid address in **Destination Device Type and Address** as per table below:

PLC-Family	EWON IO Server name	Address syntax EIP protocol (Ethernet link)	Syntax key
SLC500	DF1	192.168.0.61	IP Address
MicroLogix	DF1	192.168.0.61	IP Address
PLC5	DF1	PLC5-192.168.0.61	Device type-IP Address
CompactLogix	ABLOGIX	192.168.0.61,1,0	IP Address,Port,Link (*)
ControlLogix	ABLOGIX	192.168.0.61,1,0	IP Address,Port,Link (*)
FlexLogix	ABLOGIX	192.168.0.61,1,0	IP Address,Port,Link (*)

Table - Address syntax for **Ethernet** link (EIP)
IP address is the one of the PLC (example)
(*) Basic syntax is: IP Address,1,CPU slot number (no spaces after commas).

Note: You might conclude the eWON cannot connect to more than 3 PLC from the fact there are 3 topics (A, B and C). In this case, the destination PLC is NOT specified in the Topic but in the Tag itself. If you need to poll tags on more than 3 PLCs, refer to the Knowledge Base page of our Wiki here: http://wiki.ewon.biz/Support/06_Knowledge_Base/ type **How to reach more than 3 PLC** in the search field.

For further information on routing features you can also refer to the General Reference Guide RG-001 available here:

http://wiki.ewon.biz/Support/07_Documentations/01_RG.

5. In **Poll Rate**, you can define the refresh rate in ms (milliseconds) applicable to all data registers that will be included in this this topic. If you leave this field blank, the default value applied will be 2000 ms (2 seconds).

The polling rate specified here applies to all tags associated with this topic. If you have tags that need to refreshed at a different rates, enable and configure multiple topics.

6. Save your settings by clicking on **Update Config**.

7. Step 3. Creating tags in the eWON

7.1 Common to all families

1. Go back to the configuration menu and select *Tag Setup*. If you are starting from scratch, the list of tags should be empty.
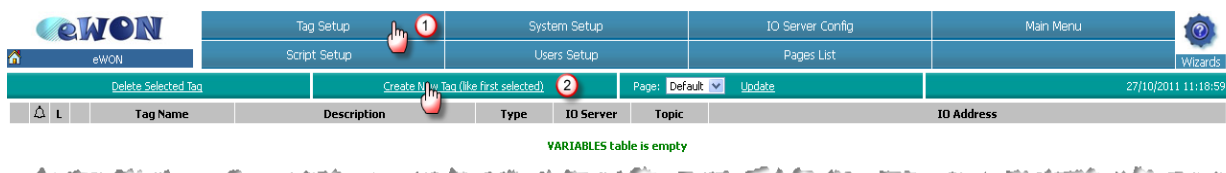
2. Select *Create New*, to open the tag configuration window and enter the parameters of the tag you want to create.

① Enter a *Tag Name* – free text, no spaces, no symbols -, =, %, $, @, # etc.

② Enter a *Description* – free text

③ Select *DF1 or ABLogix* as IO server depending on product family of the relevant PLC *(refer to compatibility tables)*

④ In the *Address* field, enter the PLC register to be polled in the PLC.

Typical examples for the *DF1* IO Server (SLC500)	Typical examples for the *ABLogix* IO Server (ControlLogix)
N7:1	myvar
B3:4	PROGRAM:myprog.myvar
T4.ACC	myvar/4
F8:10	mytable[6]

Table – Examples of syntax for tag **Address** field

Note: For more information on data register ID **syntax** see § Appendix 1 – Rockwell tag address syntax. The register configured in the eWON must exist in the PLC. If you enter a wrong address (syntax problem or non existing register) the tag creation will be rejected (an error message will be displayed). For error messages see next point.

⑤ Enter a *Topic Name* A, B or C. The topic must have been configured in the IO server page (see § 6 Step 2. Configuring the IO Server).

The remaining fields are mostly left with their default value:

⑥ *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 decide the format depending on the IOServer register/modifier type.

⑦ *Force Read Only*: Unchecked is the default. When it is checked, users will not be able to write a value by using the *Update* command in the *View IO page*.

The tag remains however read/write for commands written in the embedded BASIC program.

⑧ *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.
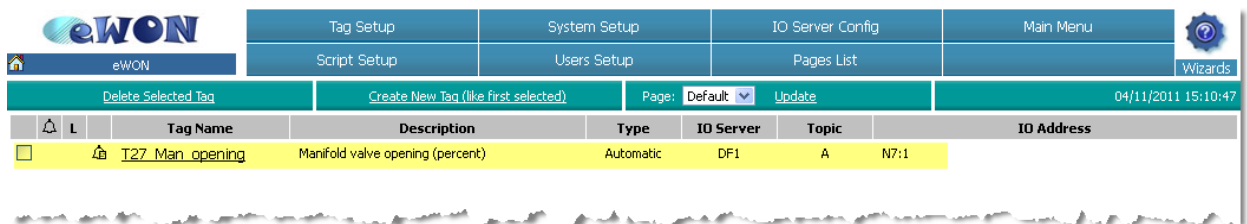
For advanced explanations for these fields, please refer to the General Reference Guide RG-001 available here:

http://wiki.ewon.biz/Support/07_Documentations/01_RG.

3. Click on the *Add/Update* Only button when your tag configuration is complete

Activation Delay:	0	sec	Auto acknowledge:	☐ (Auto ACK on RTN)
Alarm Hint:				

[Add/Update Only] ☐ Then Edit Notification [Cancel]

4. If everything is OK our new tag appears in the tag list:

If not, here are a couple of examples of error messages that can appear:

Tag name empty: check tag name field and type name in it.

Invalid character in tag name: check name for spaces and invalid characters.

Invalid IO name for tag: check tag address syntax.
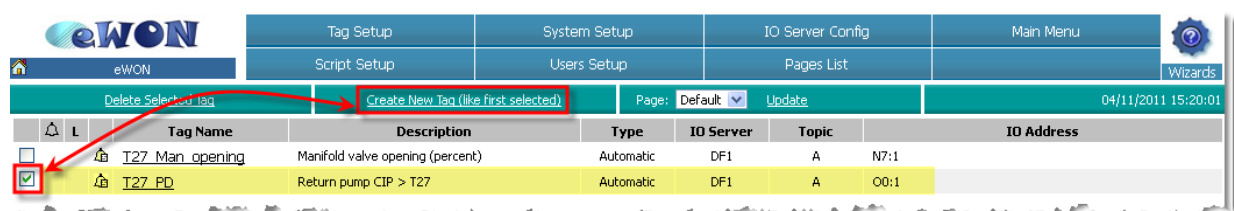
Invalid topic name for tag: check if topic was enabled in IO server, check topic field and name.

5. Redo the same sequence from point 1 for the other tags you need to create. If you need to create new tags that have almost the same properties as an existing tag in the list, then check the box next to the source tag before clicking on the **Create New Tag (like first selected)** link.

6. All (*) properties of the existing tag will be copied in the new tag creation wizard. It is the first selected tag that will be copied if more than one single tag is selected in the list.

(*) Copied properties include the **Tag Name.** Since the Tag Name must be unique, make sure you change the name of the new tag.

In our case we created the following additional tags: F8:10 and O0:1

8. Step 4. Monitoring tags

1. Go to the **View I/O** page from the **Main Menu** to check tag values and status

2. 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 edit the **New Value** field and click on the **Update** ① link as shown below.

Note: clicking this **Update** ① link send the new value in the register of the PLC. The value will actually be returned with the next poll. In addition, you need to instruct your browser to refresh the value shown on screen. To update the value on the screen, click the page **Update** ② link.

Tags in error appear with a red icon as shown below:

Please refer to § 9 Troubleshooting tags in error if this appears.

9. Troubleshooting tags in error

A tag value displayed in red in the **View IO** page indicates that the **quality** for this value is considered as **bad**. When the quality of the tag is *bad,* a red icon is displayed in the column between the tag's name and the tag's value. 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 as shown below:


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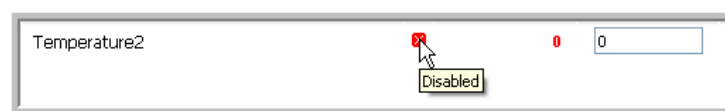
Note: a single tag in error (*truly bad*) can cause a number of other (*good*) tags to appear in error as well because for communication optimization purposes tag requests and responses are grouped in one single *envelope*. The whole group is then affected with the same error status.


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 Config** parameters as shown below:
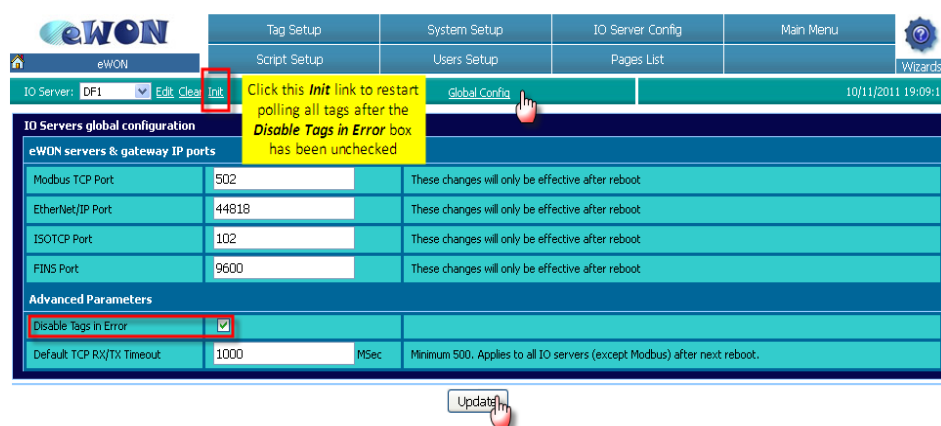
The relevant tag will no longer being polled and it will no longer be included in a group (and hence it will not affect other tags). Remind yourself to **uncheck this box** and initialize the IO Server, by clicking the **Init** link as shown above, as soon as you finished your commissioning or maintenance task.

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**. The **Event Log** ② is accessed through the **Main Menu, Diagnostic** ① .
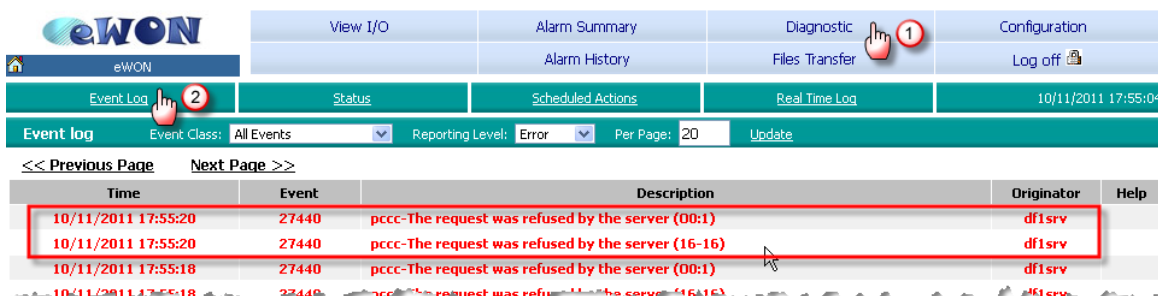
In case of communication error, check the cabling and dip switch settings (serial link).

To find the explanation of a particular error message, refer to the Knowledge Base document in our WIKI (or type the error code in the Find field) :

http://wiki.ewon.biz/Support/06_Knowledge_Base/Z_Error_Code
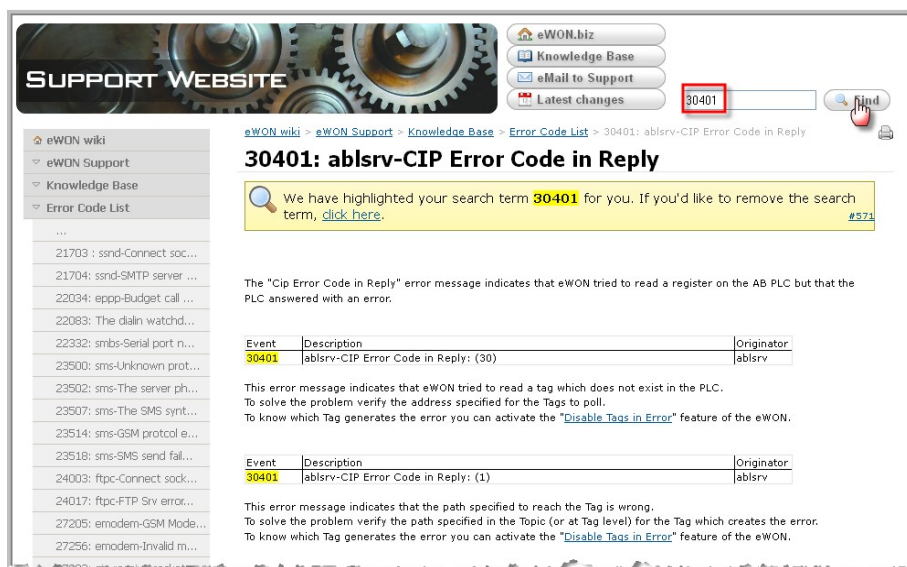
Example : Results on search error code **30401.**

10. Appendix 1 – Rockwell tag address syntax

10.1 SLC500-Family

10.1.1 Examples by file item types

The syntax of the tag addresses is explained in the next paragraph. A range of typical examples is given in the table below :

Item type	Address to use in the eWON	Description
Integer File Items	N7:10	Integer N7:10
	N7:10/14	Bit 14 of Integer N7:10
Output File Items	O:1.0	Output 1, element 0
	O:1.0/5	Bit 5 of Output 1, element 0
Input File Items	I:1.0	Input 1, element 0
	I:1.0/5	Input 1, element 0, bit 5
Status File Items	S2:42	Seconds info of PLC
	S2:10/2	Forces enabled on PLC
Binary File Items	B3:5/1	Bit 1 of element 5
Timer File Items	T4:1.ACC	Accumulator of timer T4:1
	T4:1.PRE	Preset of of timer T4:1
Counter File Items	C5:2.ACC	Accumulator of counter C5:2
	C5:2.PRE	Preset of counter C5:2
Control File Items	C6:1.LEN	Len of control file C6:1
	C6:1.POS	POS of control file C6:1
Floating File Items	F8:5	Floating point F8:5

Table – Examples of syntax for tag **Address** field

10.1.2   Syntax of tag addresses

General tag address format:

```
X[file]:element [.field][/bit]
```

X   Identifies the file type
             The table below summarizes the valid file types, the default file number for each type
             and the fields allowed.
file   File number, must be 0-255 decimal
element   Element number within the file
field   Used only for **Counter**, **Timer** and **Control** files
/bit   Valid for all types except **Floating**

X	File Type	Default File Nb	Fields	Tag format in eWON (*)
O	Output	0		DWord
I	Input	1		DWord
S	Status	2		DWord
B	Binary	3		DWord
T	Timer	4	.PRE, .ACC, .EN, .TT, .DN	DWord
C	Counter	5	.PRE, .ACC, .CU, .CD, .DN, .OV, .UN, .UA	DWord
R	Control	6	.LEN, .POS, .EN, .DN, .ER, .UL, .IN, .FD	DWord
N	Integer	7		DWord
F	Floating	8		Floating point
A	ASCII	None		DWord

(*) Tag format defined by the eWON if it was configured as **Automatic**, see § 7 Step 3. Creating tags in the eWON. **DWord** = an unsigned 32 bits integer. **Floating point** = IEEE single precision float representation.

10.2   ContolLogix-Family

10.2.1   Controller tags

```
<SymbolicTagName>[/bit]
```

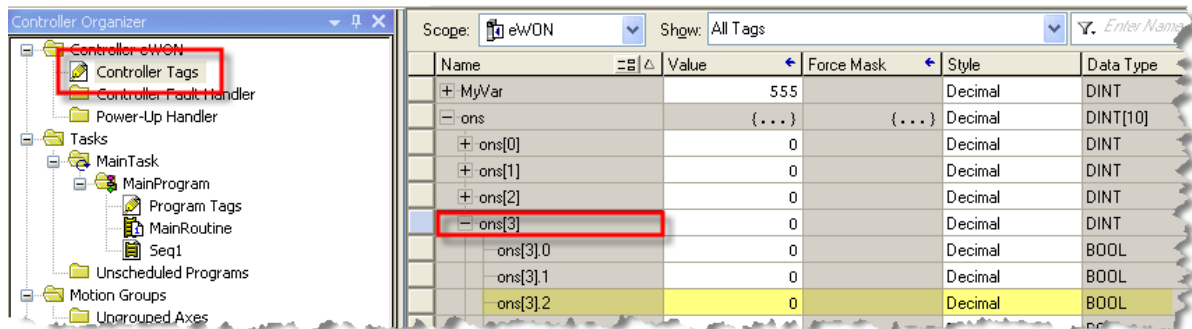| Tag name	Address to use in the eWON	Description
Local:1:O	Local:1:O.Data	Local IO module 1:O
	Local:1:O.Data/2	Bit 2 of Local IO module 1:O
ons	ons[3]	3d element of INT Array
	ons[3]/2	Bit 2 of 3d element of INT Array **Note** .2 replaced by /2 while eWON does not support . before a number
TON	TON[0].PRE	Preset of Timer TON[0]
Myvar	Myvar	DINT

Table – Examples of syntax for controller tag **Address** fields

To read *Controller Tags* use the *Symbolic TagName* created inside the controller tag section of your PLC as shown in the screen-shots below (a summary table of the corresponding eWON syntax is given after the screen-shots) :

To read an Array :

To read Timer, Control or Counter :

```
<SymbolicTagName>.acc (or .ctl or .pre)
```
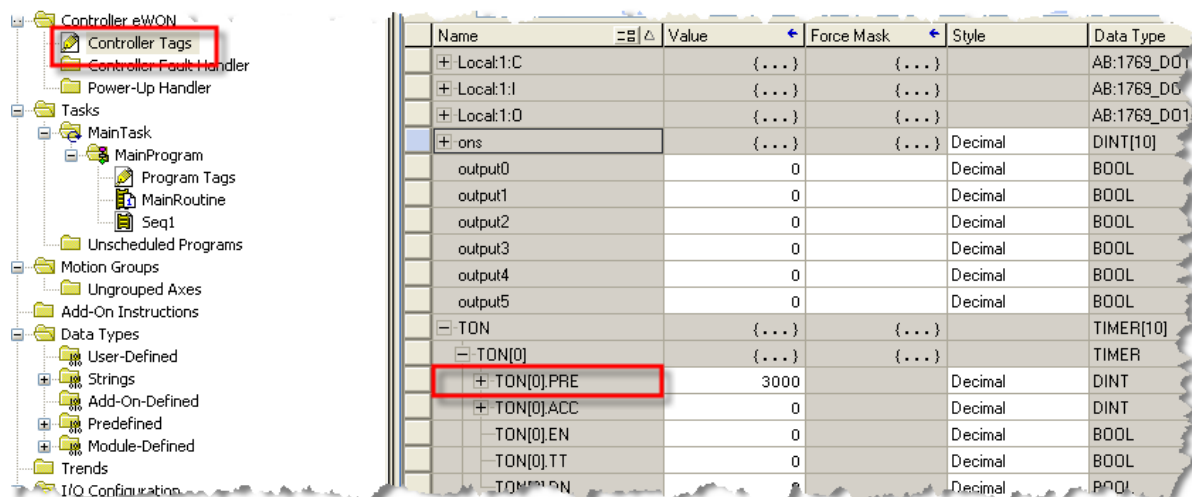
## 10.2.2   Program Tags

```
PROGRAM:ProgName.]SymbolicTagName
```
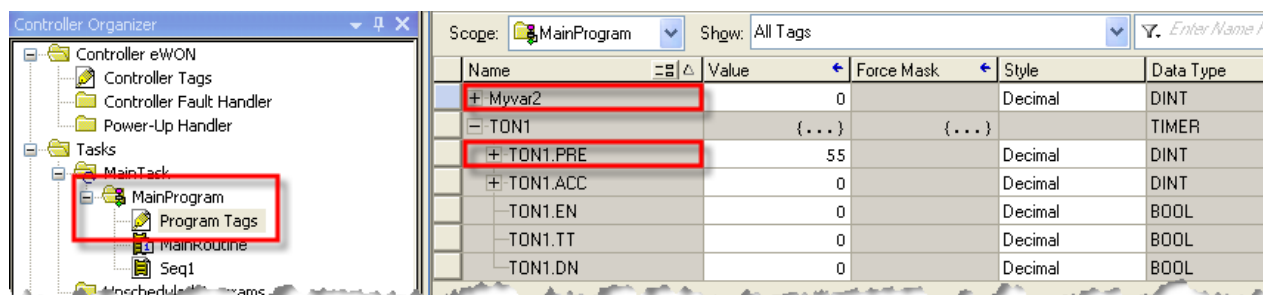

Tag name	Address to use in the eWON	Description
Myvar2	PROGRAM:MainProgram.Myvar2	tag Myvar2 inside MainProgram
	PROGRAM:MainProgram.Myvar2/4	bit 4 of tag Myvar2 inside MainProgram
TON1	PROGRAM:MainProgram.TON1.PRE	preset of Timer TON1 inside MainProgram

Table – Examples of syntax for program tag **Address** fields

11. Appendix 2 – Serial DF1 cable pinout

1747-CP3 cable between eWON and SLC-500 - pinout

SLC-500		eWON	
1		1	
2		2	Rx
3		3	Tx
4		4	
5		5	GND
6		6	
7		7	RTS
8		8	CTS
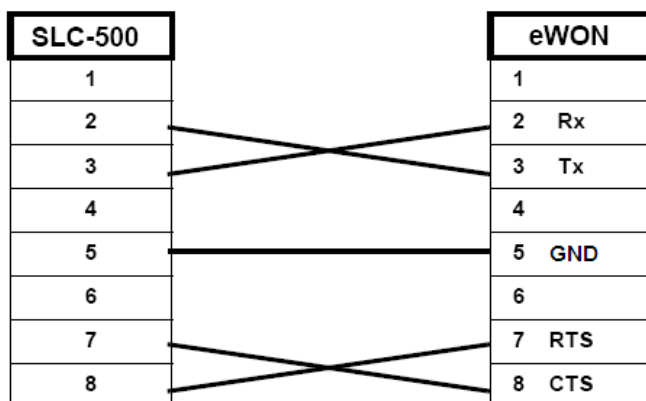
The cable you can use is the standard Allen-Bradley serial cable.

You can use a standard Allen-Bradley serial cable such as reference 1747-CP3.

Revision history

Revision Level	Date	Description
1.0	12/12/11	First issue

i

Document build number: *2*