

# Contents

<b>INTRODUCTION</b> .....	<b>1</b>
1.1 What is the Web-server feature? .....	2
1.2 Brief Specifications of the Web Server .....	3
1.3 Getting the Web Server running .....	3
<b>CREATING GATEWAY PROJECT</b> .....	<b>4</b>
2.1 Configuring the Gateway Project .....	5
2.2 Note on coils (Bit data type) .....	7
<b>CONFIGURATION AND CREATION OF HTML PAGES</b> .....	<b>8</b>
3.1 Adding Labels .....	11
3.2 Adding Tags .....	12
3.3 Embedding dynamic information .....	13
3.4 Adding Bitmaps .....	15
3.5 Adding Buttons (Navigation to other HTML pages) .....	16
3.6 Other Features of the HTML utility .....	21
<b>CONFIGURING IP</b> .....	<b>22</b>
<b>DOWNLOADING DRIVER (S), FIRMWARE</b> .....	<b>24</b>
<b>DOWNLOADING HTML FILES</b> .....	<b>26</b>
<b>LIMITATIONS</b> .....	<b>31</b>
<b>ENHANCEMENTS PLANNED</b> .....	<b>33</b>
<b>RECOMMENDED SETTINGS FOR IMPROVED PERFORMANCE</b> .....	<b>35</b>

## List of Illustrations (Screens)

Screen-1: Port configuration of the GWY-610 .....	5
Screen-2: Sample project (register mapping with Web server register) .....	6
Screen-3: Initiating the HTML configuration utility .....	7
Screen-4b: Default screen .....	9
Screen-5: New Screen and Tag(s) addition .....	10
Screen-6: Adding Labels (text) .....	11
Screen-7: Web server Tag addition .....	12
Screen-8a: Embedding Dynamic data into HTML page(s) .....	13
Screen-8b: Embedding Dynamic data into HTML page(s): Signed/unsigned .....	14
Screen-9: Changing foreground/background colour of Dynamic Data .....	14
Screen-10: Adding Bitmaps (images) .....	15
Screen-11a: Adding Buttons (Creating Button) .....	16
Screen-11b: Editing Action property to Buttons (Adding Link) .....	17
Screen-11c: Linking Screen 2 (On-click action set to "goto Screen 2") .....	18
Screen-11d: Creating new Screen (Screen2) .....	18
Screen-11e: Setting Page-Link property of "Text" object. ....	19
Screen-12a: Creating HTML pages .....	20
Screen-12b: Successful conversion of HTML files. ....	20
Screen-13: IP configuration of the GWY unit .....	23
Screen-14: Download device drivers, firmware, etc. ....	25
Screen-15a: Downloading HTML pages (menu) .....	27
Screen-15b: Downloading HTML pages in process .....	28
Screen-15c: Downloading HTML pages complete .....	29
Screen-16: Internet Explorer (web server up and runningScreen-15c: Downloading HTML pages complete) .....	30

## **INTRODUCTION**

In this chapter. . . .

- ◆ Webservice features
- ◆ Brief specification of web server
- ◆ Getting Started

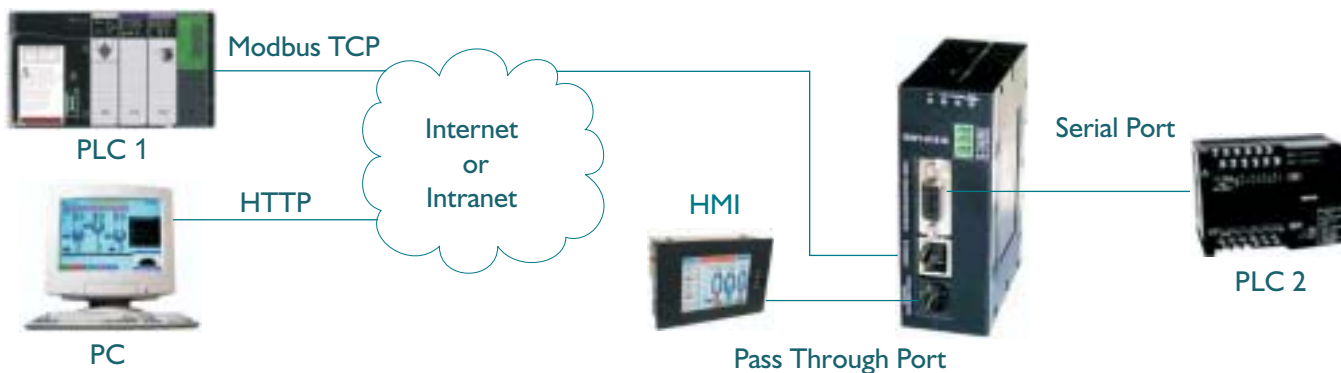
## Introduction

The purpose of this application note is ONLY to introduce and describe the configuration of HTML pages for the web server feature Gateway 610 unit for more information on the Gateway 610, please refer to the User Manual: **UMAN\GWY-610\1106** is available for download from our website.

This application note is a step-by-step guide to using the Gateway Software to configure, design, and download the HTML pages and the Gateway Project to get the Web Server up and running.

Throughout this application note, the terms “GWY” and “Software” will be used to represent the Gateway 610 unit and the Gateway setup Software respectively, unless stated explicitly.

Typical webserver application:



GWY-610-B is the ideal solution for serial devices such as PLCs, Drives and Other serial device in many applications where connectivity such as Modbus TCP/IP is needed. The GWY-610-B is a powerful module designed with both Client and Server support, which enables easy connectivity for serial devices with Modbus TCP/IP Devices. It can be also used as Modbus RTU /ASCII to Modbus TCP/IP Gateway.

Now, GWY-610-B also provides the capability to monitor run-time parameters of the controller / serial device using any standard HTTP client (Internet Explorer, Mozilla, etc.) via the embedded web (HTTP) server. The setup software provides flexibility to choose the controller parameters to be monitored, configure the HTML pages and download them to the Ethernet Gateway module.

### 1.1 What is the Web-server feature?

The web server feature allows you to monitor the parameters of the serial device (PLC, etc.) attached to the GWY unit, using any standard Java-enabled Internet Browser. The configuration software that helps the end-user customize the web pages, company logo, parameters (registers) to be monitored, etc., complements this web server feature.



#### NOTE:

This feature is a **MONITORING-ONLY feature**; the parameters cannot be changed/controlled from the Internet browser.

The Web Server feature is a unique feature that has been integrated into the GWY unit; what makes this feature a unique is:

- No additional software/resources are required to create HTML pages.
- A one-stop-shop to design, create and download the web pages.
- The end-user can design his custom web site within minutes.
- No knowledge of HTML scripting is required.
- Easy-to-use HTML configuration utility.

## 1.2 Brief Specifications of the Web Server

1. Supports HTTP/1.1
2. Simultaneous operation of HTTP and ModbusTCP server.
3. Maximum of SIX HTTP clients can be connected simultaneously.
4. ModbusTCP server and the HTTP server can work simultaneously with a small (approximately 0.03% frame loss) compromise on the ModbusTCP sever performance.
5. Maximum FIVE ModbusTCP clients and a maximum of SIX HTTP clients can operate simultaneously.
6. Can monitor a maximum of 200 device register values (including all data types).

## 1.3 Getting the Web Server running

To get the Web Server feature running, following steps are to be followed. (These steps would seem complicated at first instance, but once understood are, subsequently, very easy to follow):

1. Creating the Gateway project where in the Web server registers are mapped to the registers of the Master driver on the COM-1 port. Only the mapped registers can be monitored on the Internet browser.
2. Configuring and creating the web page using the HTML conversion utility. There are other small steps under this step. The TAG list contains the web server registers (dynamic data) that are to be monitored.
3. Configuration the IP address of the GWY unit.
4. Downloading the driver(s), firmware
5. Downloading Project.
6. Downloading HTML pages

*Steps 3 and 4 can be ignored if they have been executed before.*



### NOTE:

Please note that **ONLY** the Gateway-610 units with **Boot Block versions 3.0D** and above will be able to support the Web Server feature. All customers with Boot Block version(s) lower than 3.0D will be able to use the Web Server feature **ONLY** after updating their Boot block versions to 3.0D; the Boot block update utility will be made available soon for download on our website; we request all our customers to check our website for all the latest updates and utilities OR contact factory for instructions to update the Boot Block.

## **CREATING GATEWAY PROJECT**

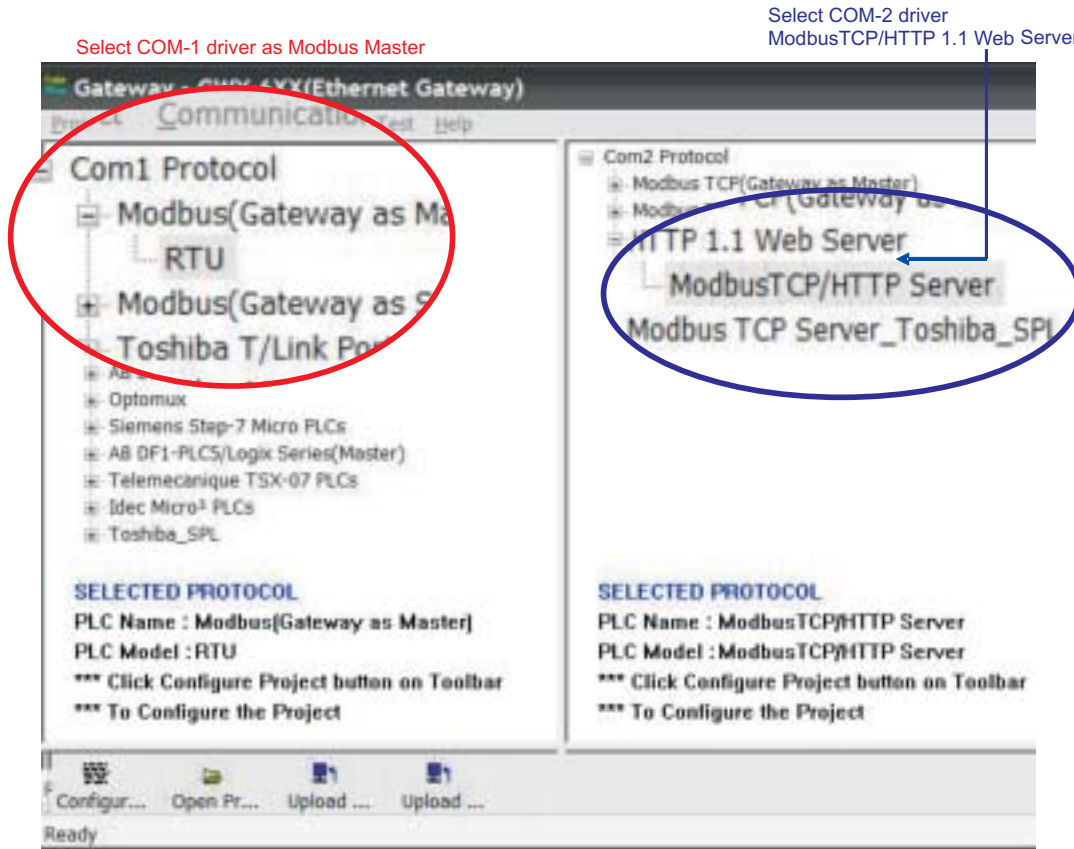
In this chapter. . . .

- ◆ Configuring the Gateway Project
- ◆ Note on Coils (Bit data type)

## Creating Gateway Project

### 2.1 Configuring the Gateway Project

Assuming that the software is running, select GWY-6XX(Ethernet Gateway) product from the list. On choosing the right product, following screen appears: Using this screen the GWY ports can be configured. To use the HTTP server, select the configuration as shown in Screen-1.



Screen-1: Port configuration of the GWY-610



**NOTE:**

The unit cannot be configured with “Slave” drivers at both the ports. For the web server, the COM-1 driver has to be of type “Master”.

The registers can then be mapped for Driver 1 (COM-1), e.g. Modbus Master to the registers of the Web Server. This step is configuration of the Project where a mapping between the registers of the two drivers is done.

As seen in **Screen-2**:

- Eight (8) Input Status (**100001-100007**) of the Modbus masters is mapped to the **C00000-C00007** bit register of the Web server.
- Holding registers **400001** is mapped to **B00000** of the web server (the lower BYTE of the Holding register gets mapped to the BYTE).
- Holding registers **400002** is mapped to **W00000** (Word: 2 Bytes) of the web server.
- Holding registers **400003-400004** are mapped to **D00000** (Double Word: 4 Bytes) of the web server. The word mapping is always UPPER word followed by the LOWER word. In future version, the user can select the WORD ordering for the Double and Float data types.
- Holding registers **400005-400006** are mapped to **F00000** (Float: 4 Bytes) of the web server. The word mapping is the same as Double word.
- Holding registers **400001-400006** are mapped to **400001-400006** of the ModbusTCP.



Block No.	# Words/Bits	Slave Port	Slave Address	Target PLC	Target ID	Target Address	Comment
1	00008	ModbusTCP/HTTP Server	C00000	Modbus(Gateway as Master)	1	100001	
2	00001	ModbusTCP/HTTP Server	B00000	Modbus(Gateway as Master)	1	400001	
3	00001	ModbusTCP/HTTP Server	W00000	Modbus(Gateway as Master)	1	400002	
4	00001	ModbusTCP/HTTP Server	D00000	Modbus(Gateway as Master)	1	400003	
5	00002	ModbusTCP/HTTP Server	F00000	Modbus(Gateway as Master)	1	400005	
6	00001	ModbusTCP/HTTP Server	400001	Modbus(Gateway as Master)	1	400001	

IDB FOR COM1	Node Ad...	Starting A...	Data Type	#Words/...	Scaling F...	Skip For # C...	Skip on Com...	Fail V...
1		100001	DiscreteBit	1	1	0	Yes	63535
1		400001	Word	1	1	0	Yes	63535

Screen-2: Sample project (register mapping with Web server register)

Blocks of the Web Server and the ModbusTCP server can be intermixed; there are NO RULES on how to intermix the Web Server and the ModbusTCP blocks.

There are five different types of registers in the Web server:

1. Word type (W00000 – W00049)
2. Double Word type (D00000-D00049)
3. Float type (F0000-F00049)
4. Byte type (B00000-B00049)
5. Bit type (C00000-C00047)

There seldom is “Byte” type register, but is used in HTTP server as an added feature. Currently there are a limited number of registers supported in this evaluation version; this limit may change in the later version(s).

Currently, a total of TWO HUNDRED (200) registers ONLY can be used for monitoring purposes. This limit will however be extended in future version; we advise our customers to check you website for latest updates and news.

Thus, a project can be created by mapping various registers of the master driver to the registers of the Web server. This mapping implies that the registers of the “Master” driver can be monitored on the web server.



**NOTE:**

For types “Double” and “Float”, the “#Words” filed must always be TWO (2) as marked by RED ellipse in Screen-2.

## 2.2 Note on coils (Bit data type)

There are some limitations on how the bit data types of the Web server are mapped; it is imperative that the user follow them for correct values to be reproduced for the web server and hence on the Internet browser:

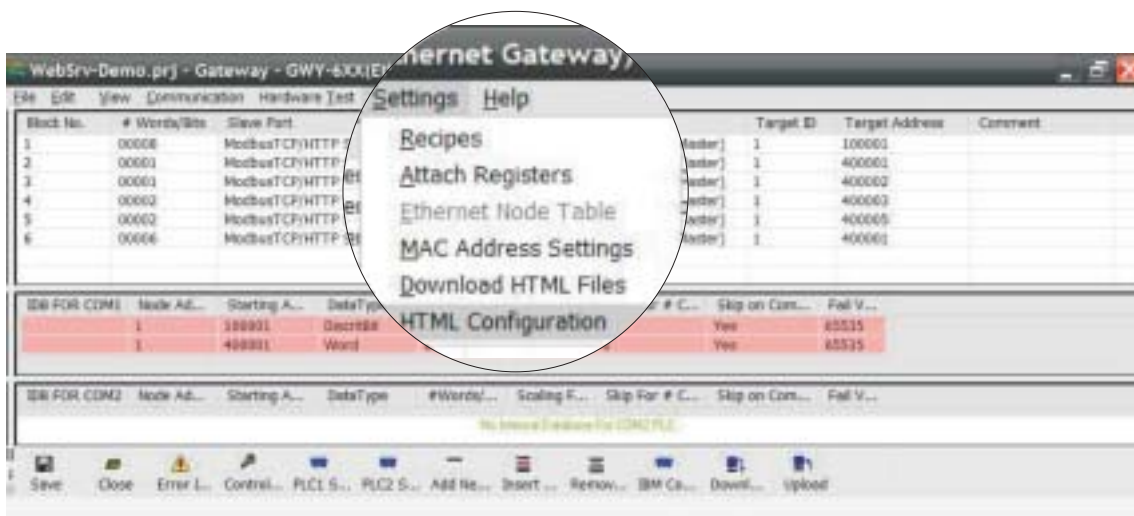
- The **#Words** field (as shown in **Screen-2**) can be either ONE or EIGHT. Any value other than 1 OR 8 would cause garbage values to be reported to the web server.
- If the **#Words** value is 8, then the web server register (Cxxxxx) must be boundary aligned to 8, i.e it's address should be divisible by eight. E.g., C00000, C00008, C00016, etc are valid values. If the Web server's bit register is not boundary aligned, the values produced by the web server will be incorrect (garbage values). However, if the **#Words** field has a value of **ONE**, then the boundary alignment rule **DOES NOT** apply; any bit register of the web server can be mapped directly.

Once a project is ready, we can move on to configure the HTML pages where we embed the web server tags into the screens. It is recommended that the project must be saved first before moving on to configure the HTML pages.



The user **MUST** take care that the **Web server tags** that have been created in the Gateway project must be used in HTML configuration in order to view that particular tag in the Internet browser window.

To initiate the HTML configuration utility, select the "HTML Configuration" option from the "Settings" menu, as show in **Screen-3**.



Screen-3: Initiating the HTML configuration utility

When the HTML configuration utility is initiated from the Software, a new window opens, as shown in **Screen-4a**. This is a HTML configuration utility thread where in you can configure the HTML pages for the web server. A default screen appears as shown in **Screen-4b**.

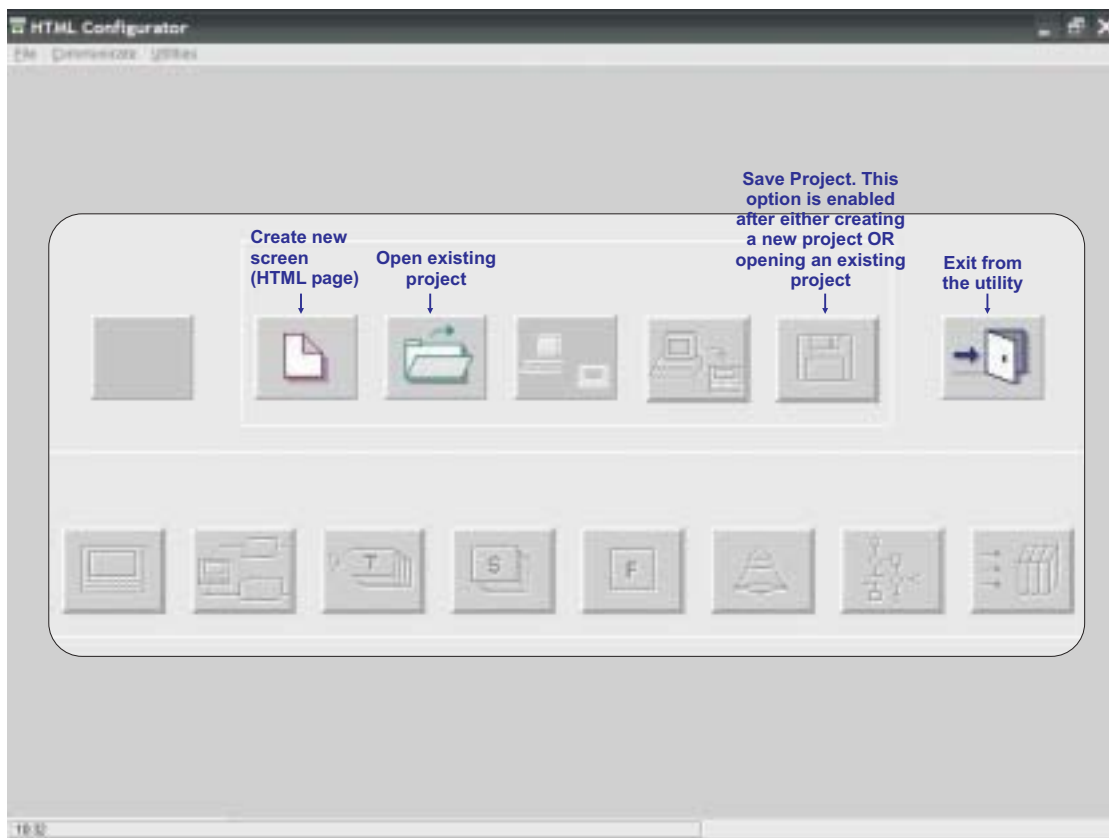
## **CONFIGURATION AND CREATION OF HTML PAGES**

In this chapter. . . .

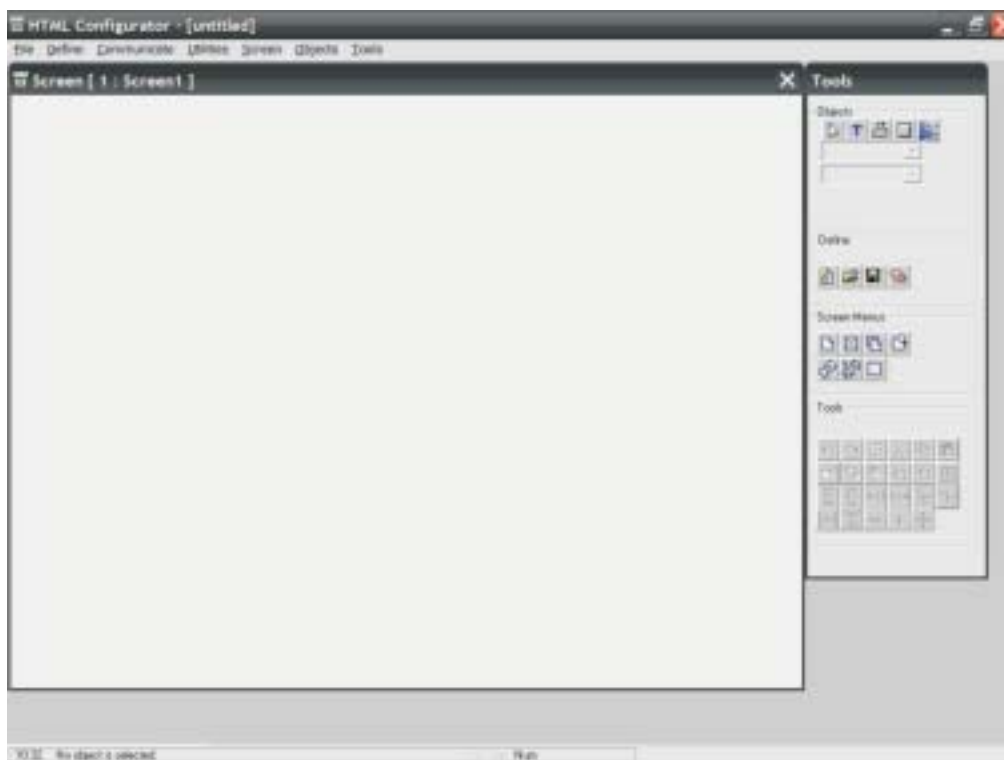
- ◆ Brief Description
- ◆ Adding Labels
- ◆ Adding Tags
- ◆ Embedding dynamic information
- ◆ Adding Bitmaps
- ◆ Adding Buttons
- ◆ Other Features

## Configuration and creation of HTML pages

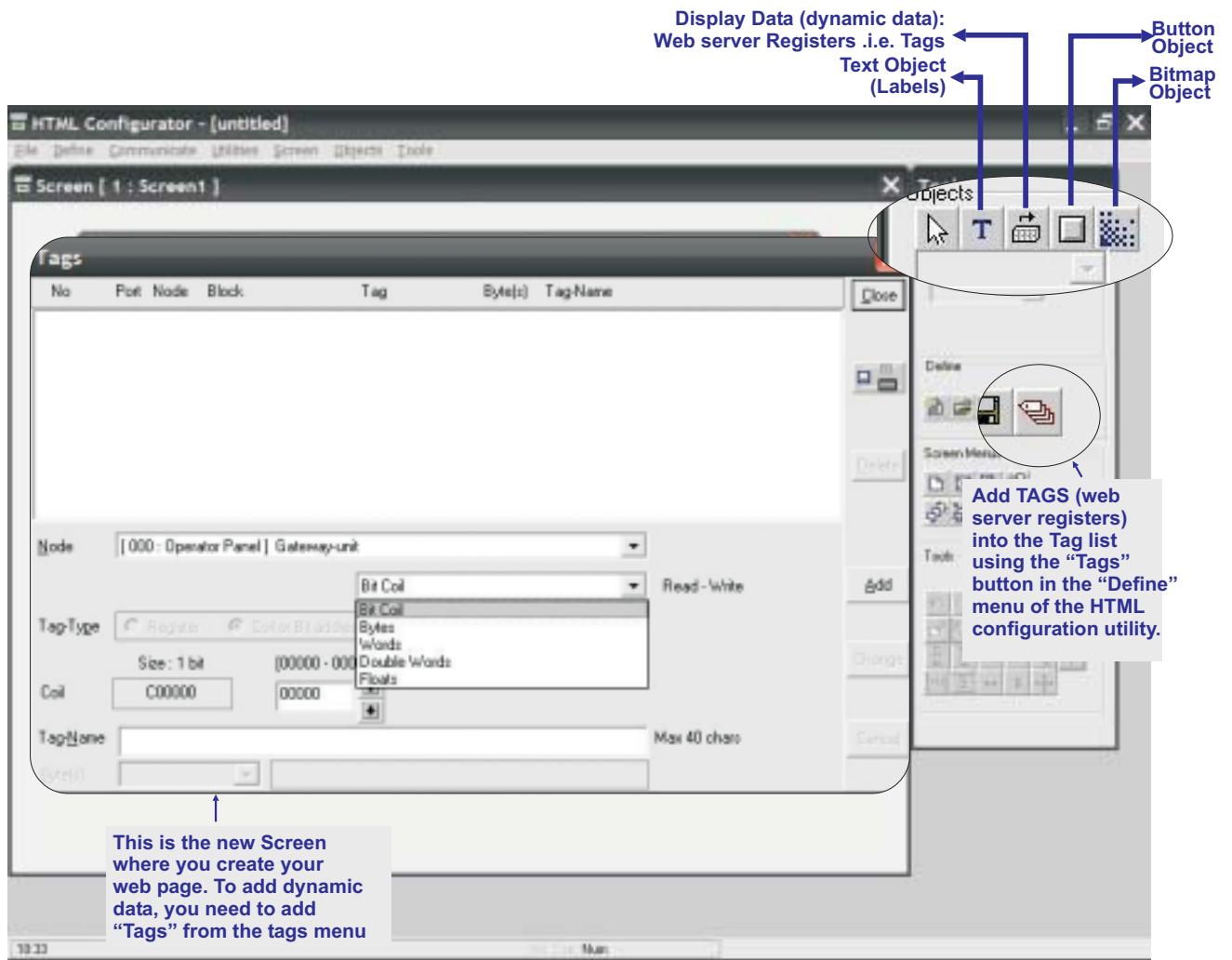
Using this utility, you can start configuring the web pages (Screens), embed dynamic and static information on the pages, etc. The following screen appears when you run an instance of the “HTML configuration” from the Gateway setup software as explained in the earlier section.



Screen-4a: HTML configuration utility



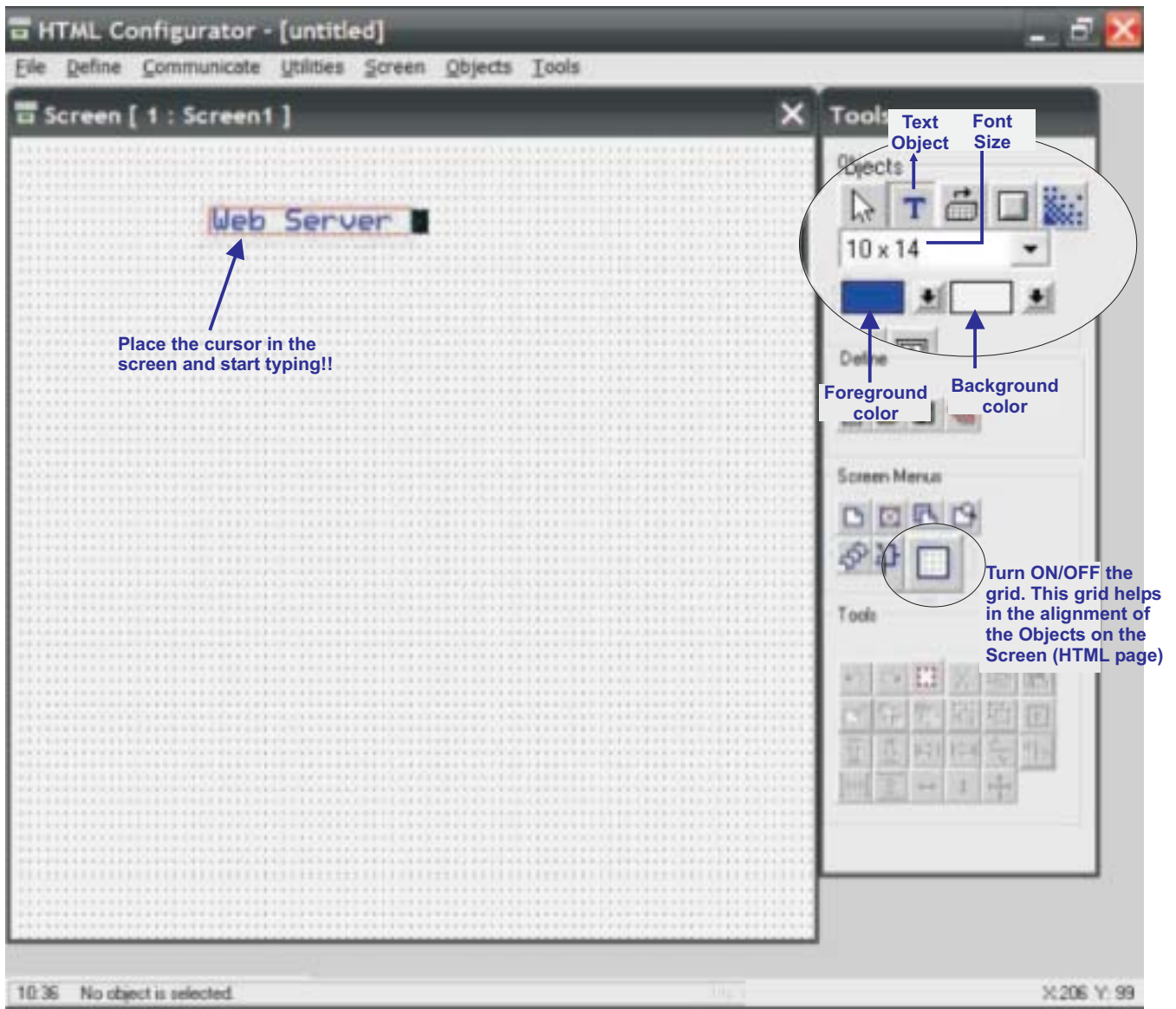
Screen-4b: Default screen



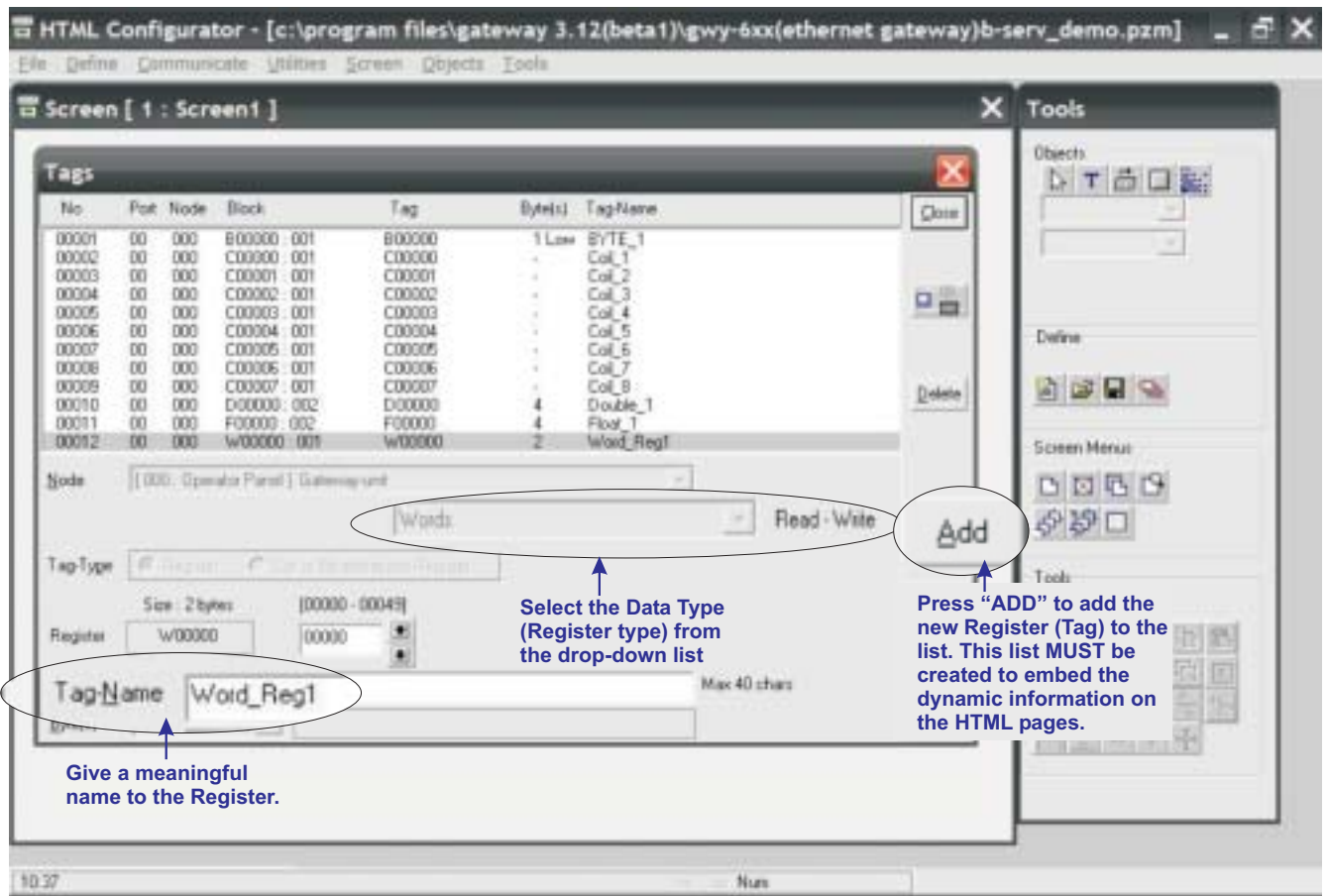
Screen-5: New Screen and Tag(s) addition

### 3.1 Adding Labels

Using the “Text” object from the “Objects” wizard, text can be embedded into the HTML page. The screen grid can be turned ON/OFF from the “Screen menu” as marked in Screen-7. The background/foreground colours, and font size for the text can be altered as illustrated in Screen-7 on the next page.



Screen-6: Adding Labels (text)



Screen-7: Web server Tag addition

### 3.2 Adding Tags

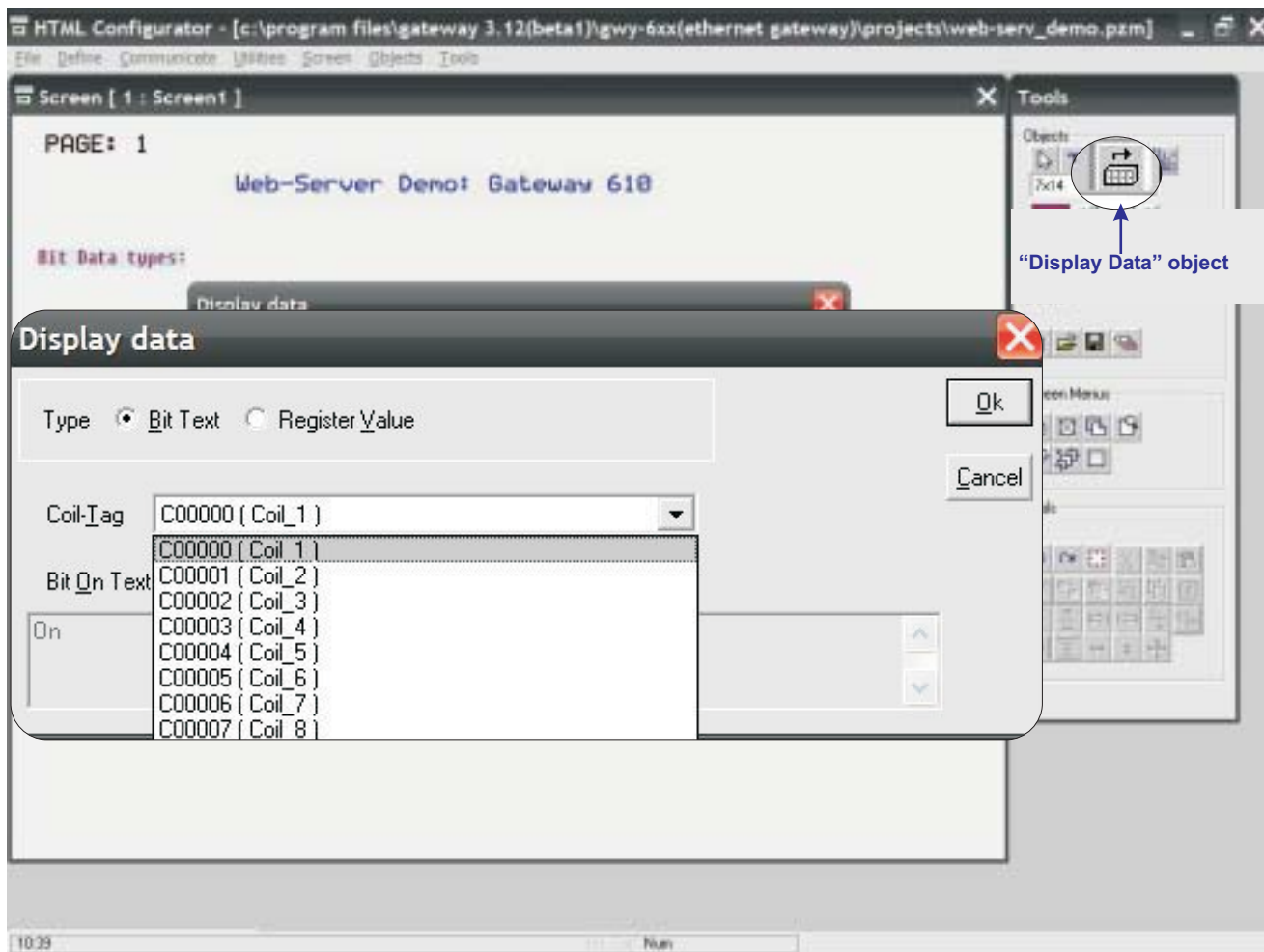
To add Tags (the web server registers), use the “Tags” button in the “Define” menu on the right hand side (Refer to **Screen-7**). As shown in **Screen-5** there are the same five types of tags as defined in the Gateway Software. So referring to our Gateway project (**Screen-3**), if we want **W00000** tag to be Web-enabled, we need to add the same Web server tag into the HTML configuration utility; we have added the **W00000** tag into the tag list and named it “Word\_Reg1”. This “Word\_Reg1” is just a simple name given to the Tag to give a meaning to the register; e.g “Oil Level” can also be used to give a more meaningful and elaborated information about that particular register. To web-enable the Web server registers into the HTML page, their respective TAGS MUST be created in the HTML configuration utility. The onus is on the user to ensure that tags are added. However in the future version, the Gateway project will export the Web server register used into the project to the HTML conversion utility so that the user does not have to go through the pain of adding TAG for each and every Web server Register.

### 3.3 Embedding dynamic information

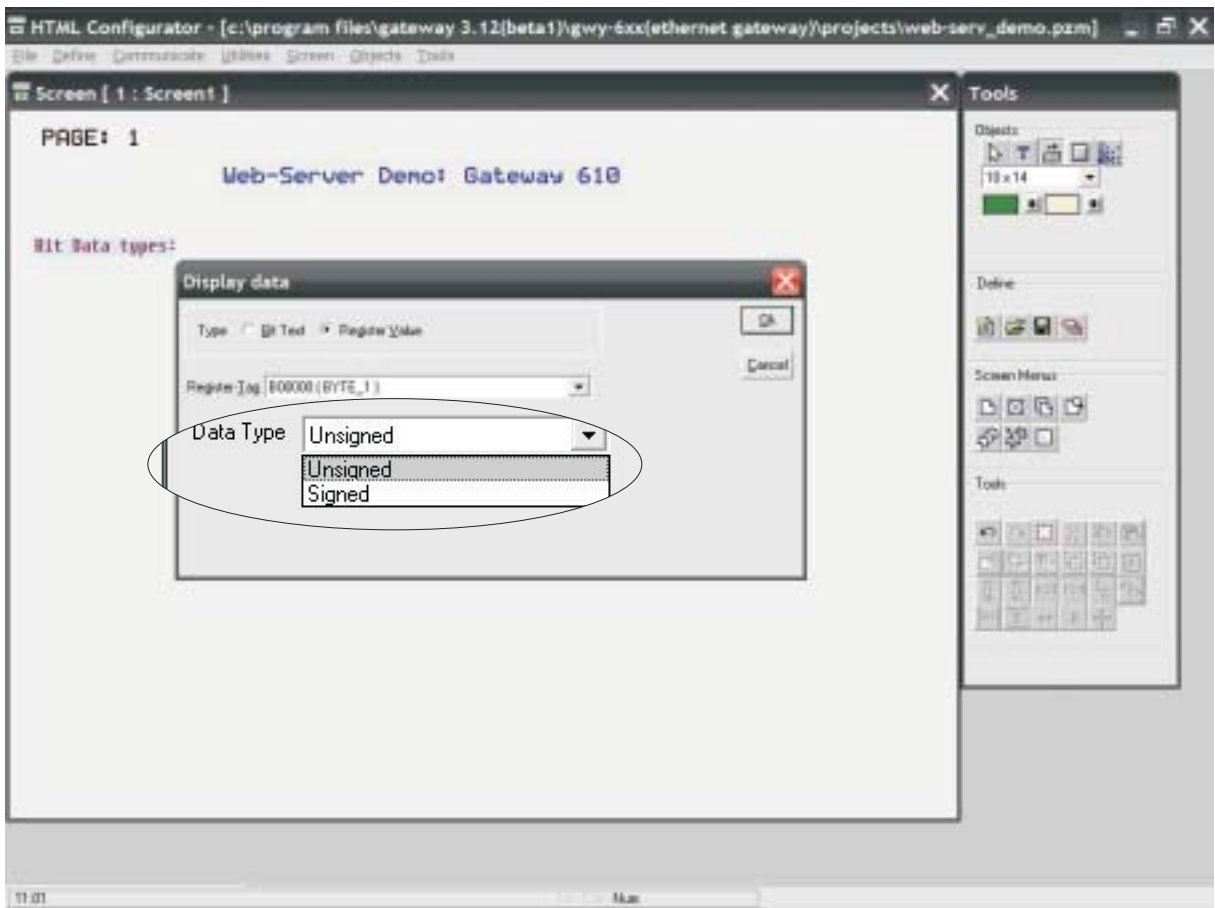
For monitoring the dynamic data (tags) the tags have to be embedded into the HTML page. To do so, select the “Display data” object and place it anywhere inside the “Screen” section. A small window opens as seen in **Screen-8a**. This window lists all the TAGs that we added; select the TAG we want to embed and press “OK”.

For Word, Byte and Double Word data types, we can also select whether the data type for the TAG is to be displayed

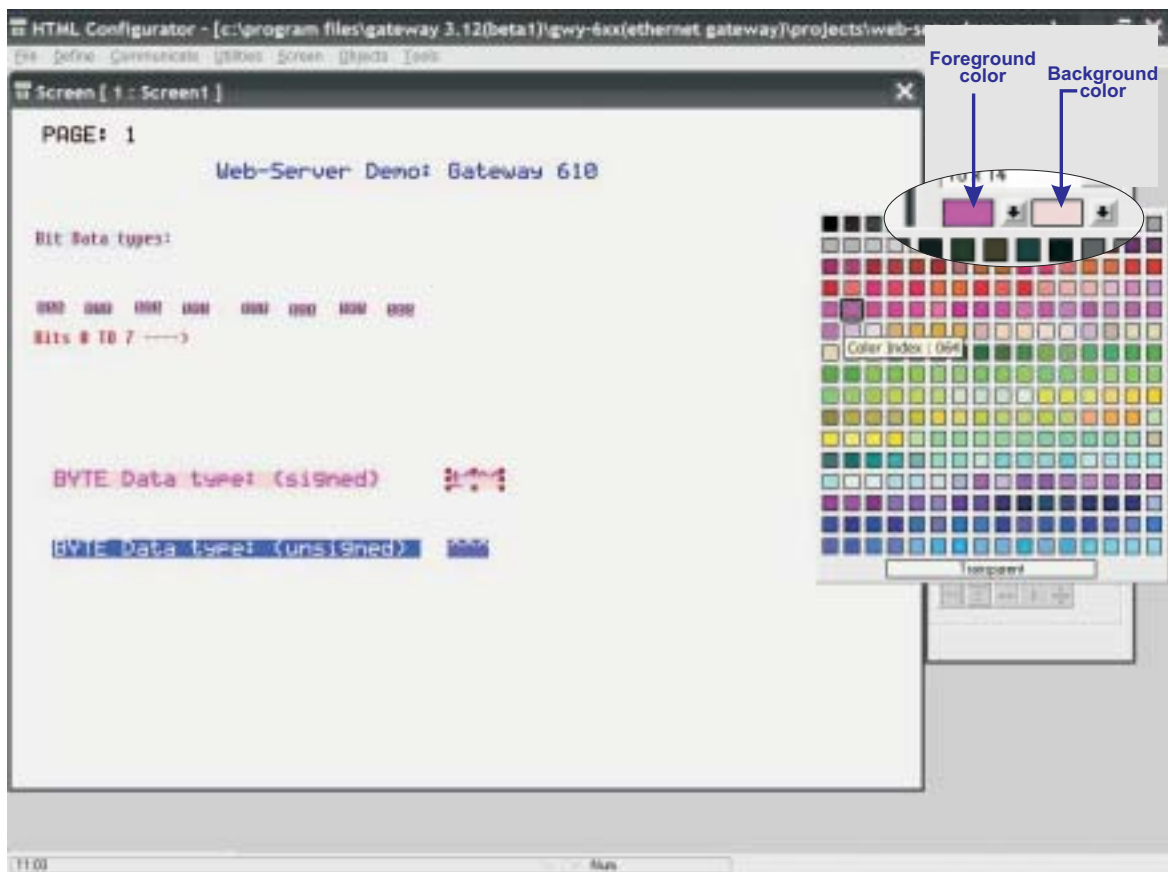
as a “signed” OR “unsigned” type. In this example we have added the **C00000** tag into the web page (refer to Screen 8a,8b). We can also choose the foreground and background colour in which we want to display this dynamic data. This way other TAGs can also be embedded into the HTML page (Screen).



Screen-8a: Embedding Dynamic data into HTML page(s)



Screen-8b: Embedding Dynamic data into HTML page(s): Signed/unsigned

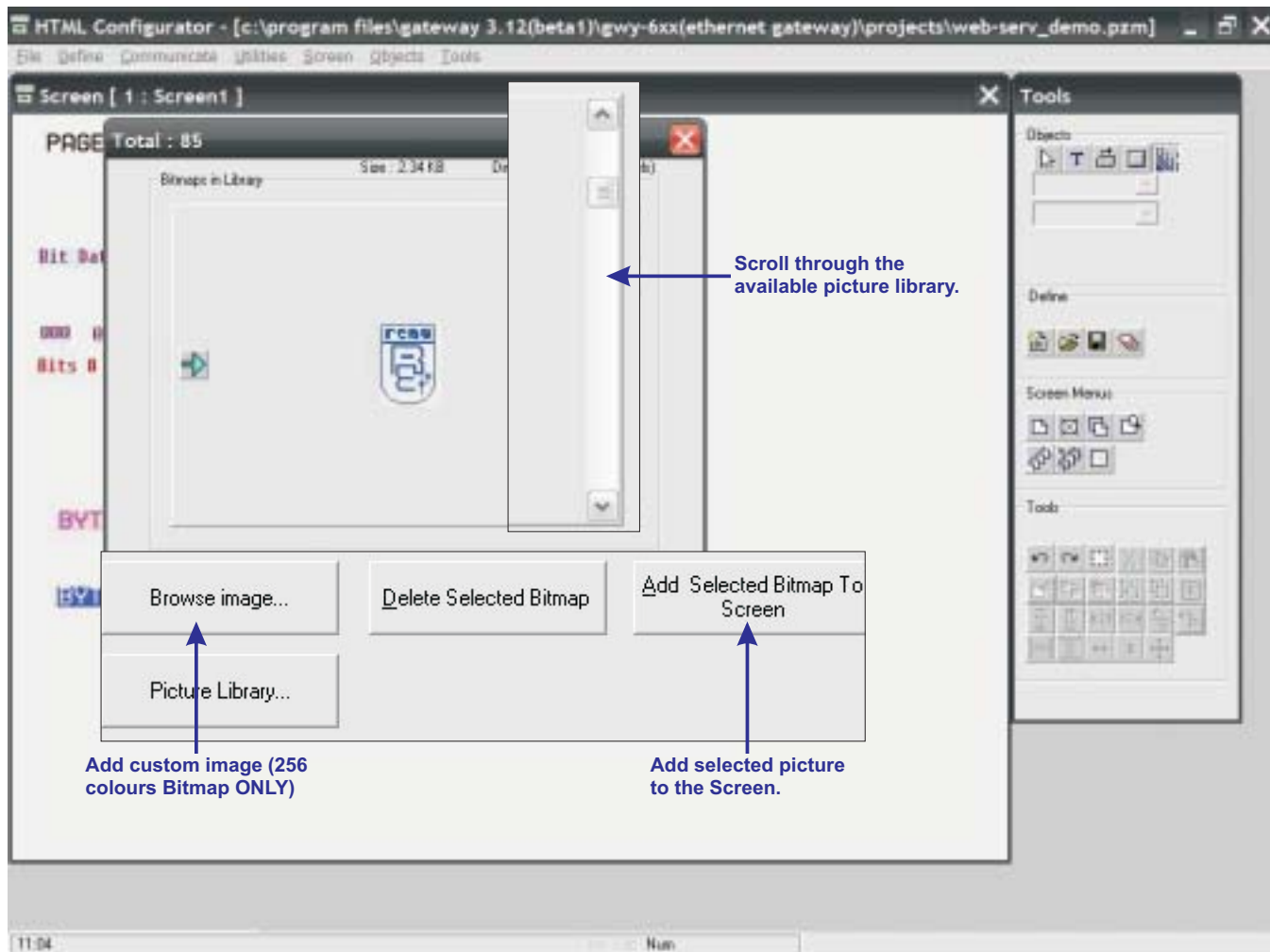


Screen-9: Changing foreground/background colour of Dynamic Data

### 3.4 Adding Bitmaps

Using the “Bitmap” object, we can place images into the HTML page. Click on the “Bitmap” object and place the object anywhere into the “Screen”. A small window pops up as shown in Screen-10. You can select a bitmap either from the library or a custom bitmap (256 colours). Company logo, plant diagram, controller picture, etc. can be embedded as bitmaps into the web page; this feature helps in adding an elaborate information of what is being monitored.

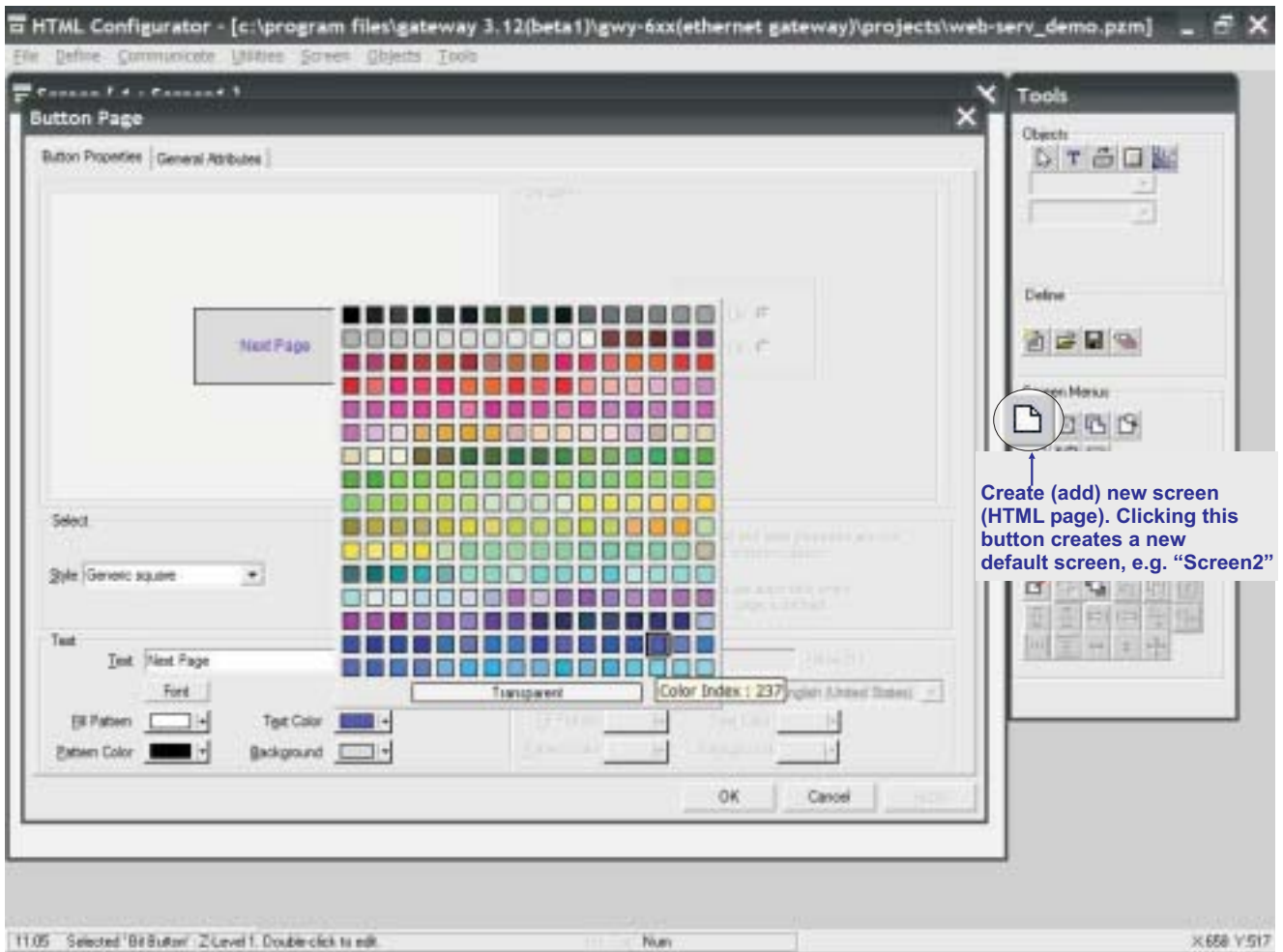
Once the bitmap is added on the screen, it can then be placed anywhere in the screen by selecting the picture and moving it around in the screen.



Screen-10: Adding Bitmaps (images)

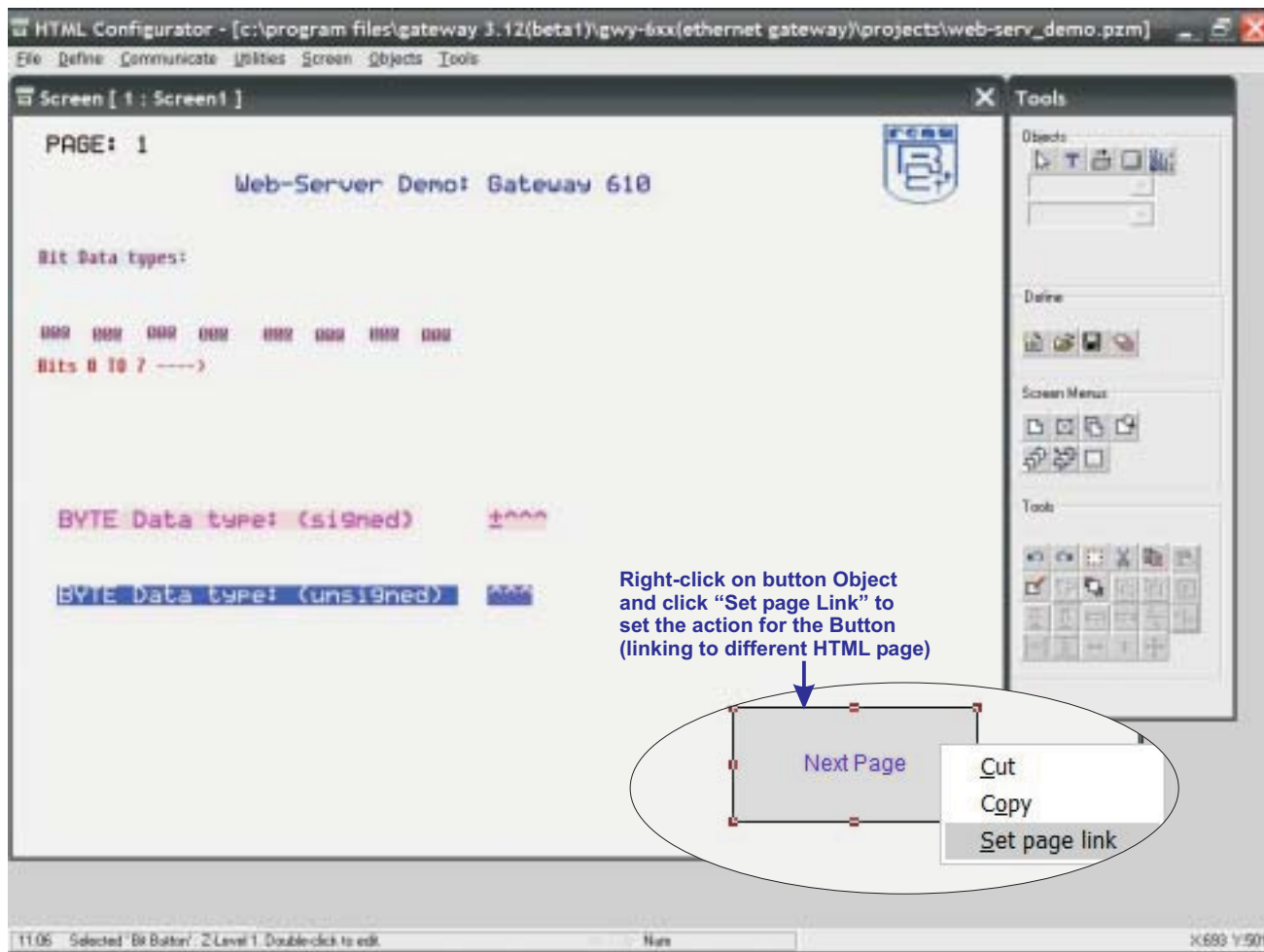
### 3.5 Adding Buttons (Navigation to other HTML pages)

Buttons are used as Navigation tool to navigate between different screens (HTML pages). Please follow **Screen-11a** to **Screen-11e** for illustration. In order for the linking to work, one must ensure that that the new screen exists (HTML page). To create a new HTML page, just click on the “New Screen” button in the “Screens Menu” (“New Screen” button is marked in **Screen-11a**)



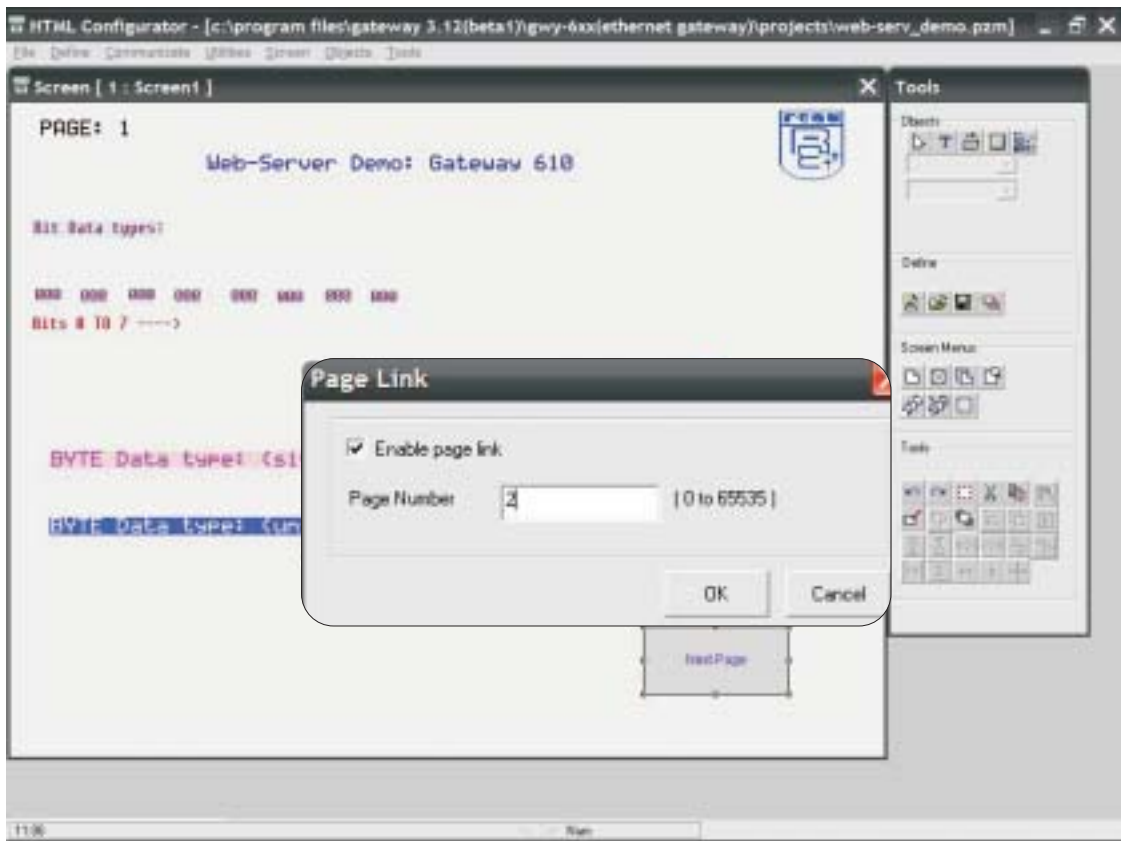
Screen-11a: Adding Buttons (Creating Button)

Screen-11a: Appears when the “Button” object is clicked. In this window the properties of the Button can be set: Text inside the Button; colour, etc.



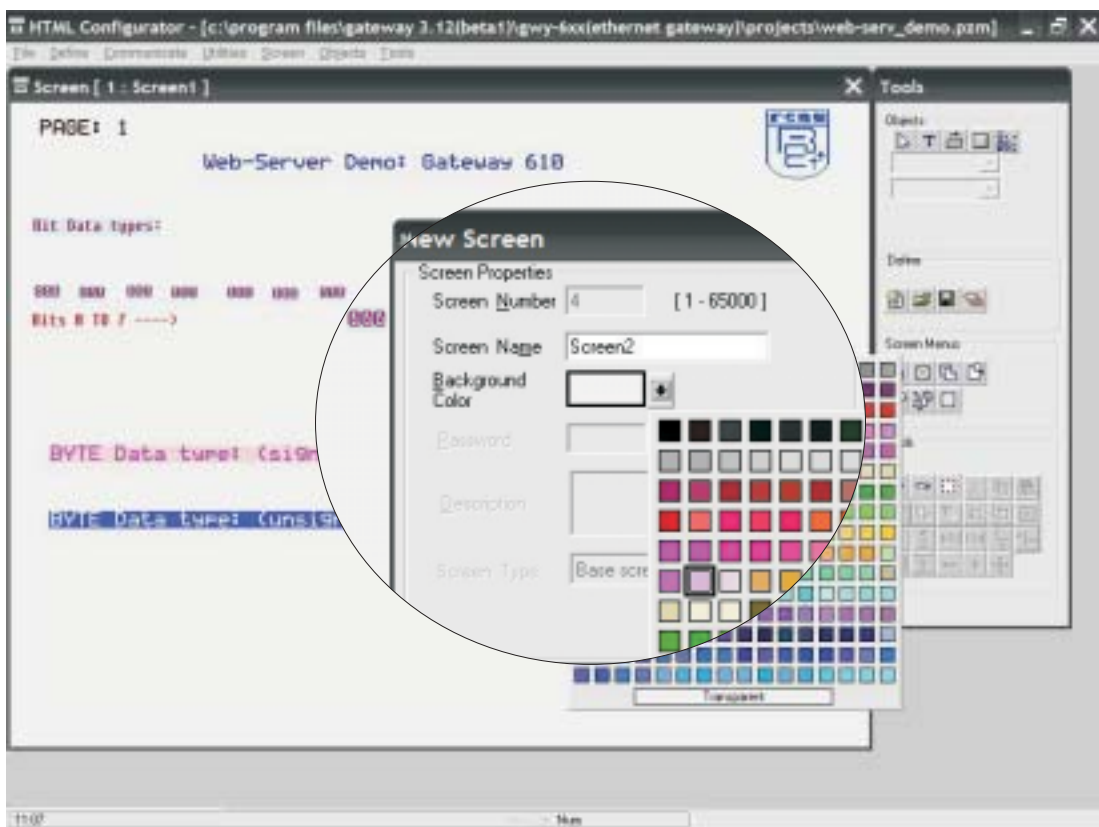
Screen-11b: Editing Action property to Buttons (Adding Link)

Screen-11b: When the properties of the Button are set and the button is placed in the Screen, the "Page link" property can be set by right-click on the newly created bit button. Please refer to Screen-11b.



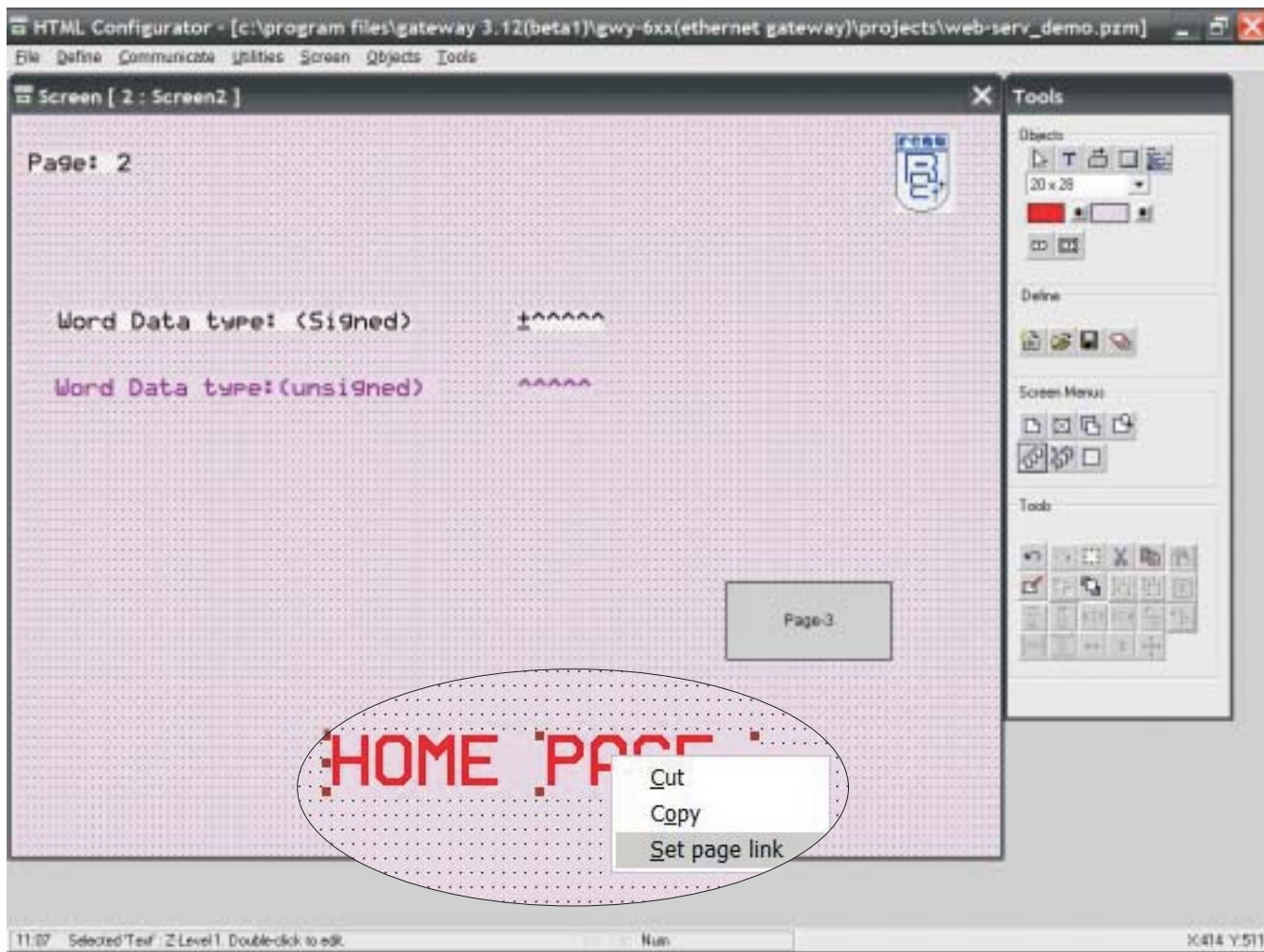
Screen-11c: Linking Screen 2 (On-click action set to “goto Screen 2”)

Screen-11c: this screen pops up when “Set Page Link” option is clicked. The page number that has to be linked to his button must be entered. One must ensure that this is a valid number.



Screen-11d: Creating new Screen (Screen2)

Screen-11d: Create a new Screen. A button action is set on Screen-1 to go to this new screen. As explained so far, other tags can be embedded into these new screens; screens can be linked together using Buttons OR **Text links**

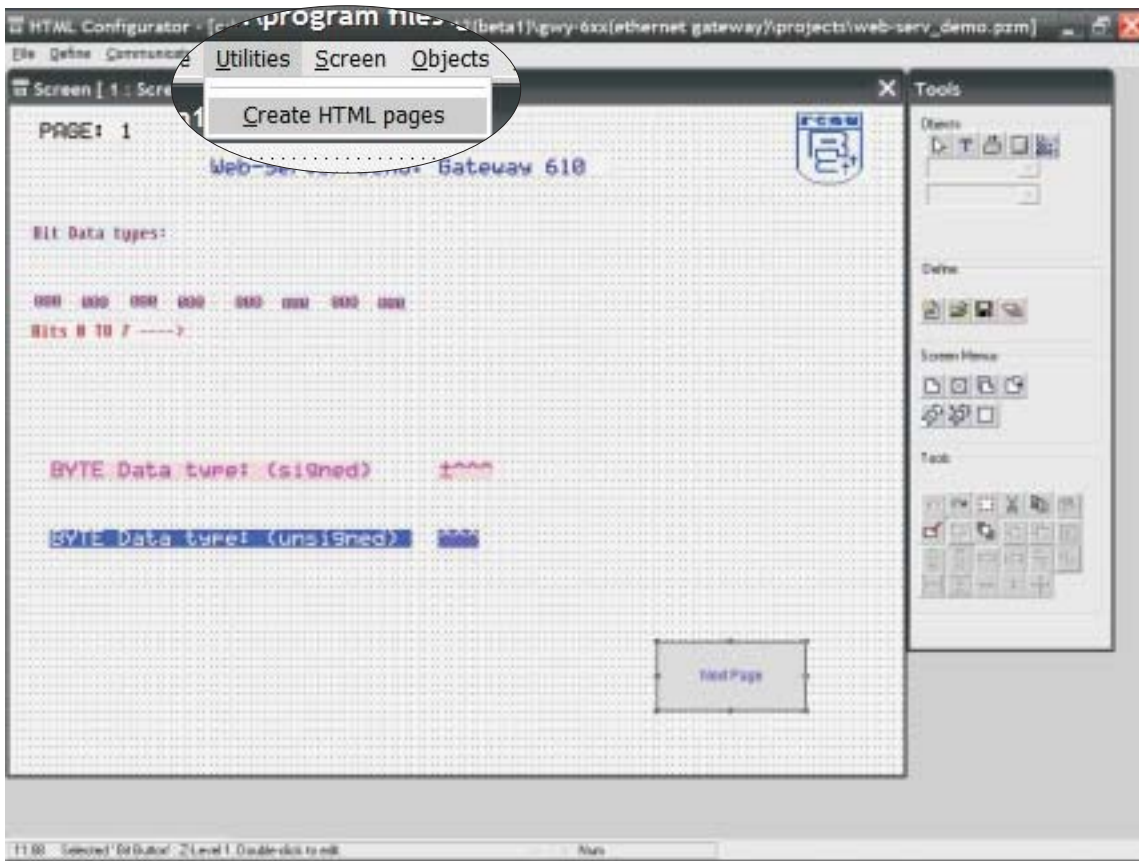


Screen-11e: Setting Page-Link property of “Text” object.

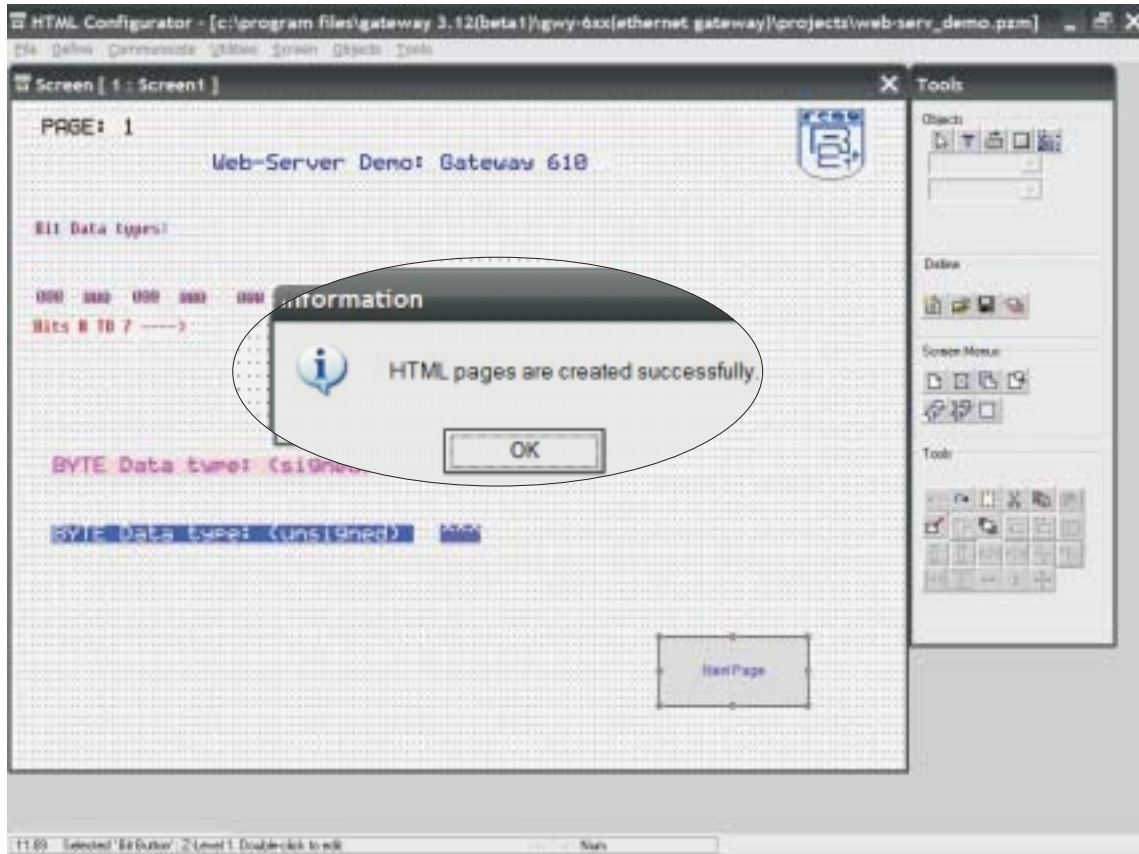
Screen-11e: Similar to Button, the Page link property can be set to a “Text” object. Just create a text object, and right-click to set this property. Please refer to Screen-11e for illustrations.

Once the HTML page(s) are configured (all required tags, images, text labels, etc. are embedded into the web pages), the last step is to create the HTML pages. To generate the HTML pages, select the “Create HTML pages” options from the “Utilities” menu as shown in **Screen-12a**. On successful creation of the HTML pages, a message pops up (**Screen-12b**).

The HTML files are now ready and the HTML conversion utility can be closed. However before exiting from the HTML conversion utility it is recommended to save the project as the HTML files are deleted when a new project is created. So by saving the project one can save the efforts of creating the Screens again; he can just open the saved project and directly use “Create HTML pages” and the pages are ready.



Screen-12a: Creating HTML pages



Screen-12b: Successful conversion of HTML files.

### 3.6 Other Features of the HTML utility

- A copy-paste feature is also provided to copy and paste multiple/single object(s) on a screen.
- An entire screen can be duplicated from the “Screens menu”

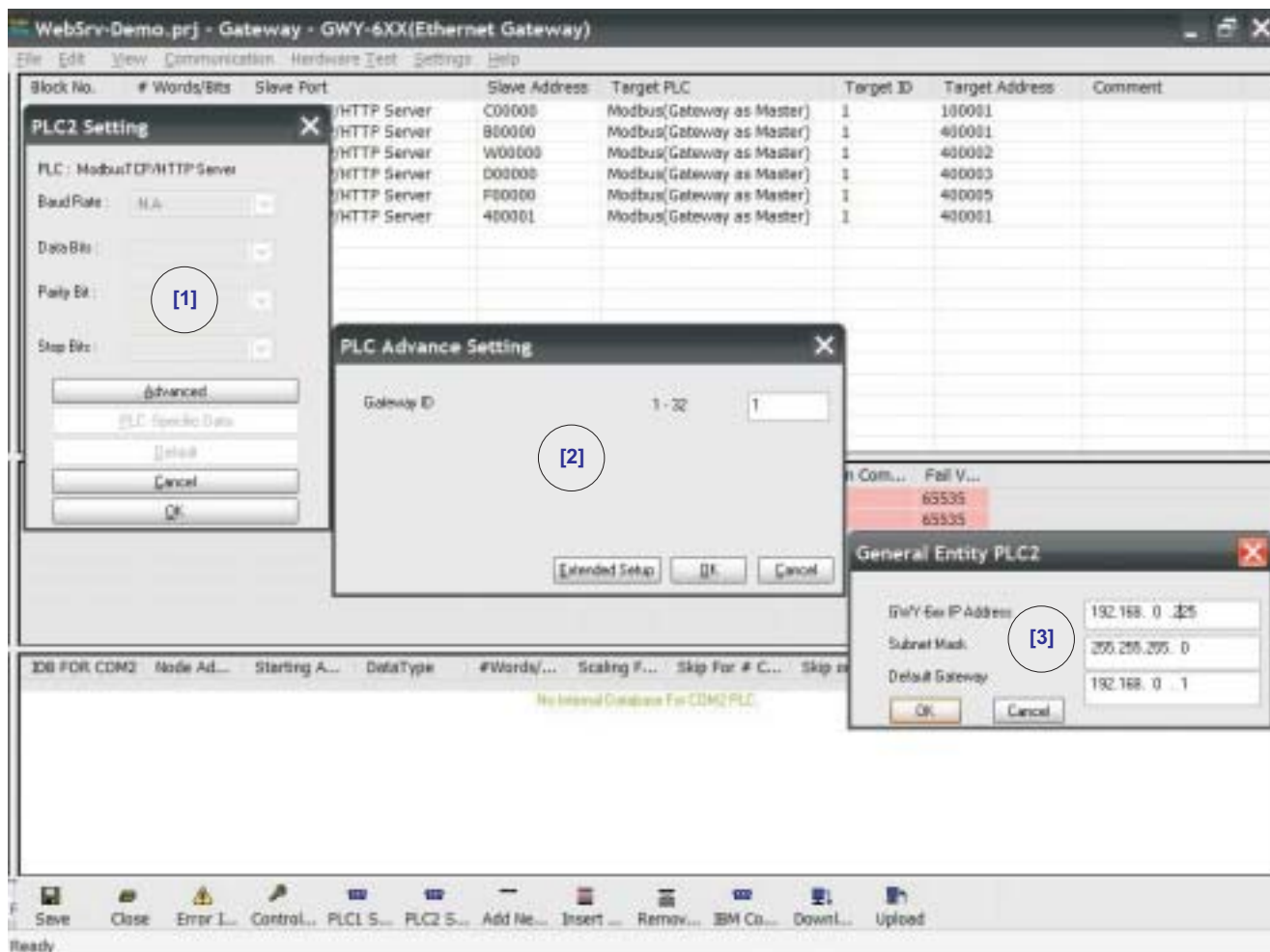
## **CONFIGURING IP**

In this chapter. . . .

- ◆ Configuring IP

## Configuring IP

Once the HTML pages are created successfully, and the user returns back to the Gateway software, the first step is to ensure that the IP of the GWY unit has to be configured. This can be done using “PLC2 Settings” button. A small window pops up (marked [1] in Screen-12) in this window, select “Advance” which in turns opens another window (marked as [2] in Screen-12). Again in this window select “Extended Setup” which opens another window (marked [3]). Here the device IP, Subnet mask, and Default gateway can be configured. Please consult your system/network administrator before assigning the IP to the unit.



Screen-13: IP configuration of the GWY unit

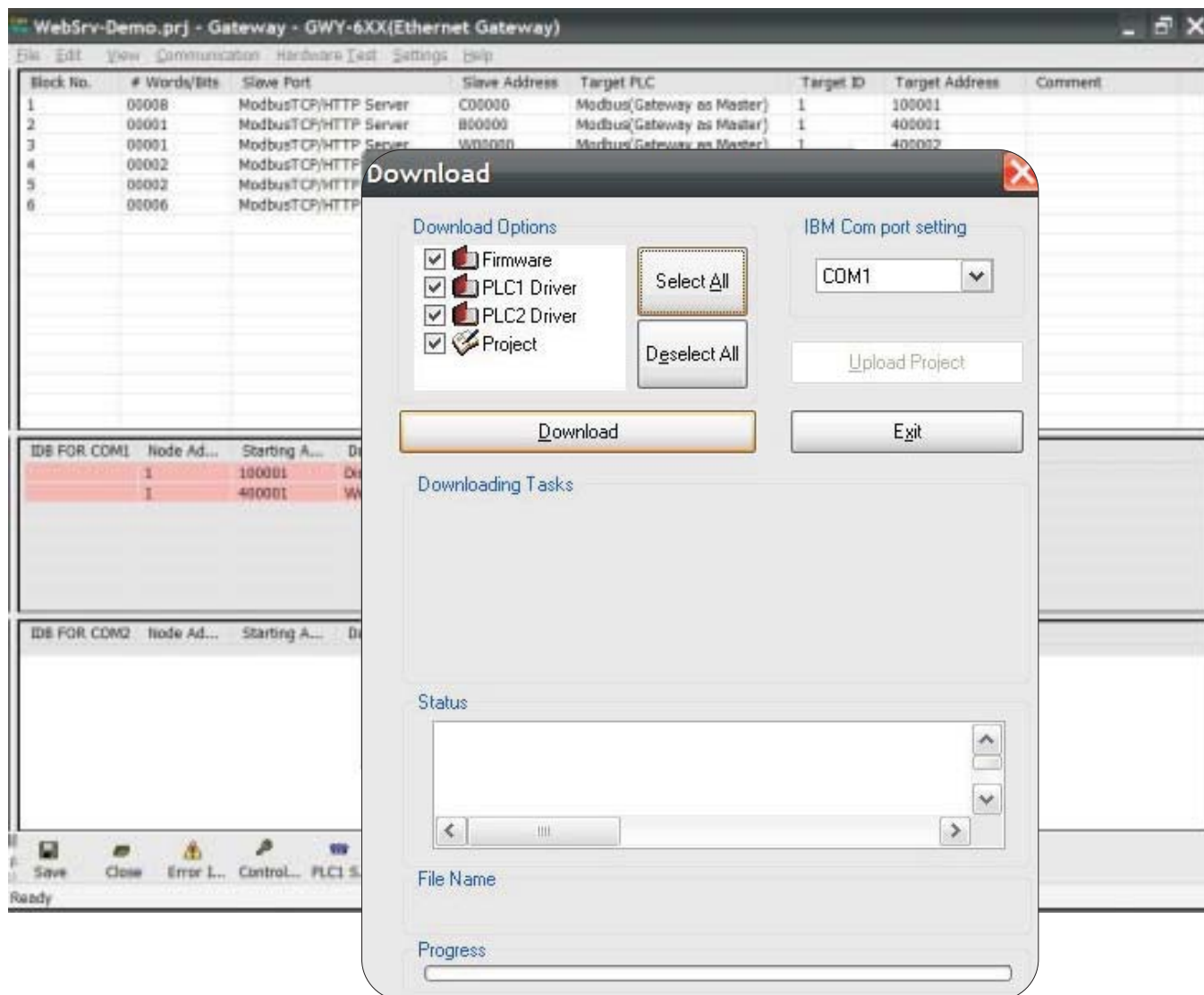
## **DOWNLOADING DRIVER (S), FIRMWARE**

In this chapter. . . .

- ◆ Downloading Driver (s), Firmware

### Downloading Driver (s), Firmware

To download the Project and other drivers, and firmware, select “download” and use “Select All” to download. (Illustrated in Screen-13). However for the download to work, ensure that IBM cable is connected from your PC’s serial port to the GWY unit’s serial port. Assuming the power cable is connected, turn OFF the unit and turn it ON again, and within 10seconds from the restart download the drivers and project to the gateway unit.



Screen-14: Download device drivers, firmware, etc.

## **DOWNLOADING HTML FILES**

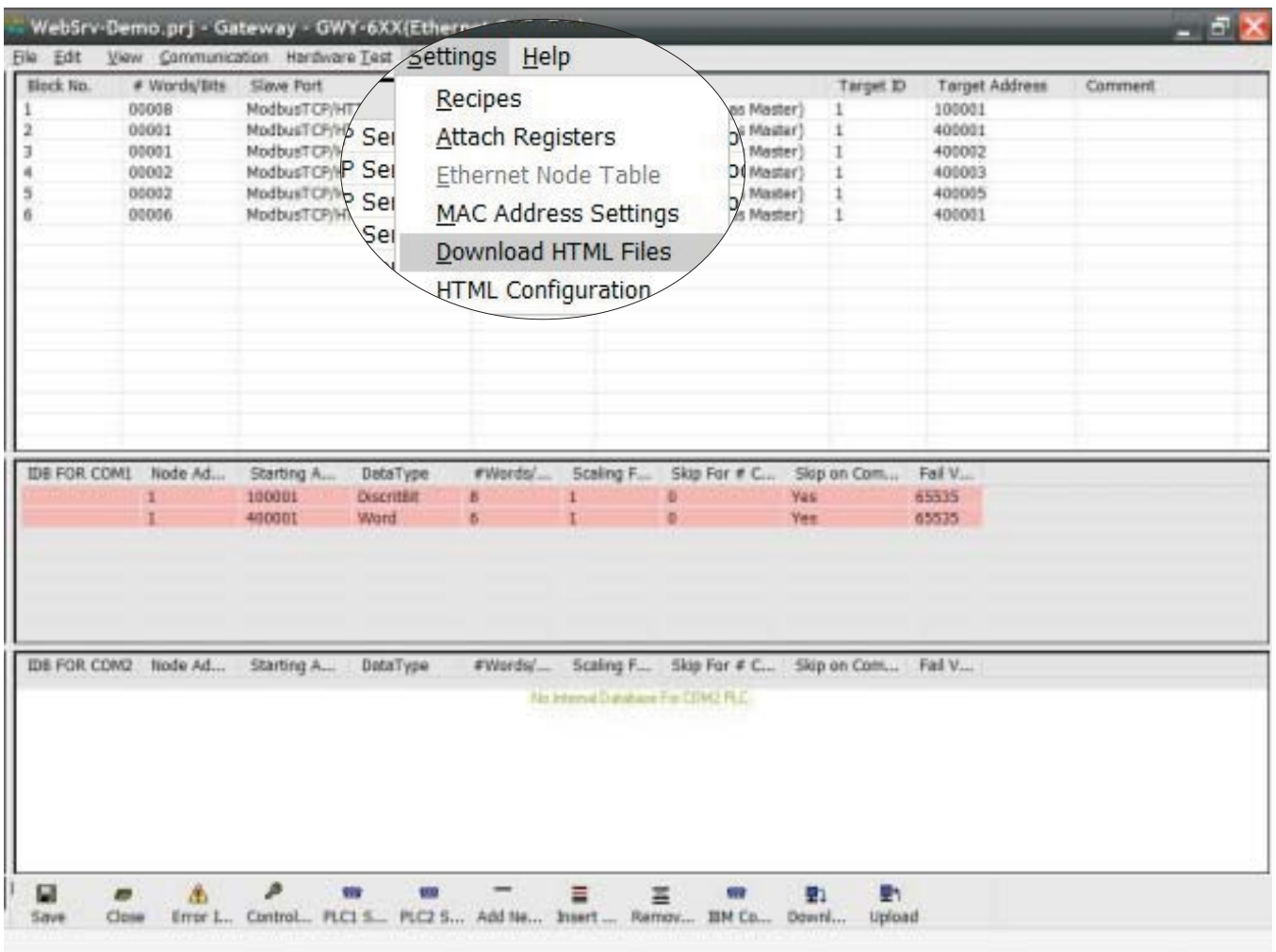
In this chapter. . . .

- ◆ Downloading HTML Files

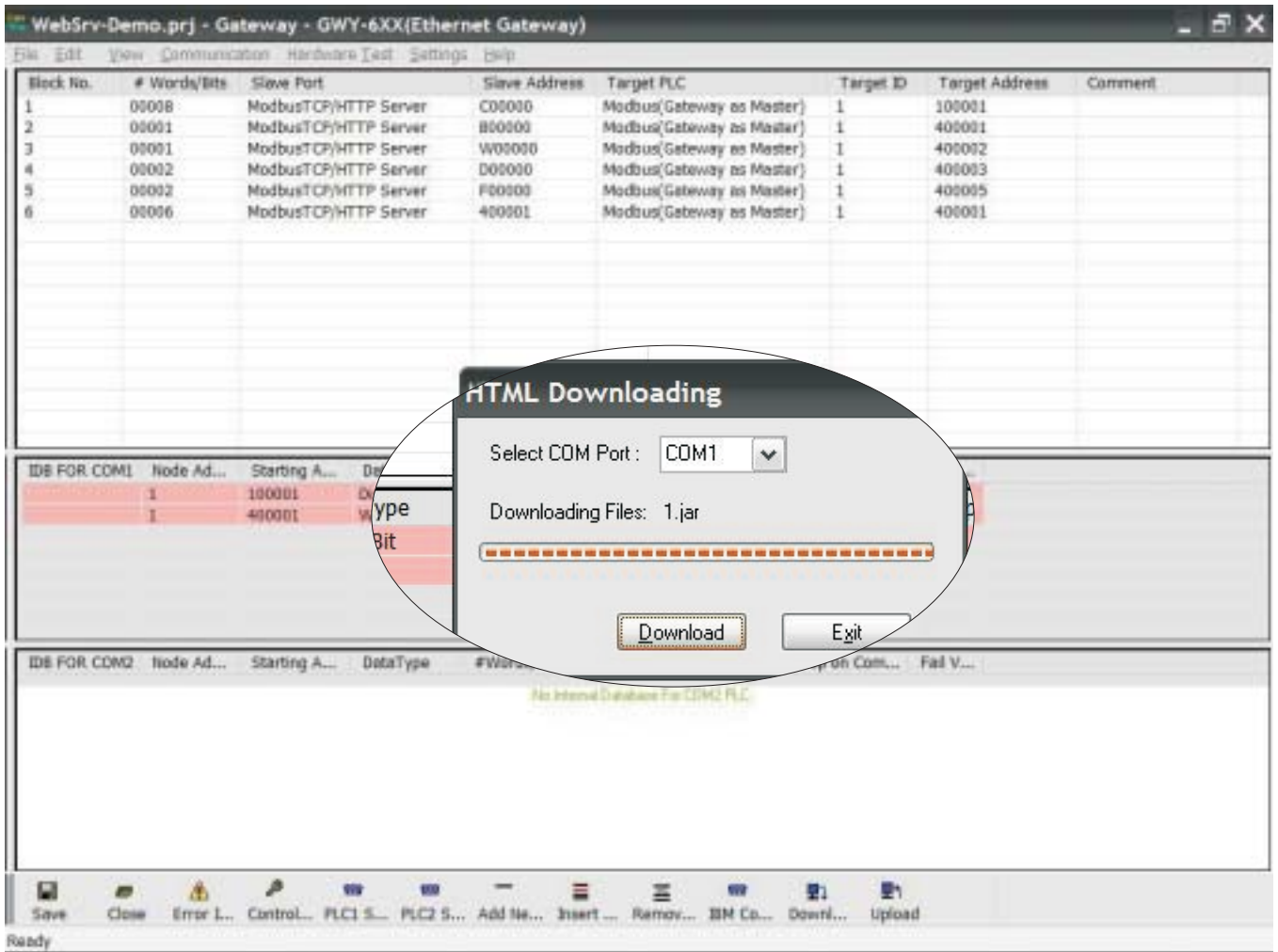
### Downloading HTML Files

To download the HTML files created earlier by the HTML configuration utility, click on the “Download HTML files” option from the “Settings” menu. However, again the unit needs a power cycle (restart) before the HTML pages can be downloaded. Please refer to Screen-15a to Screen-15c. Once the download is complete, a “Download complete” message pops up (Screen-15c).

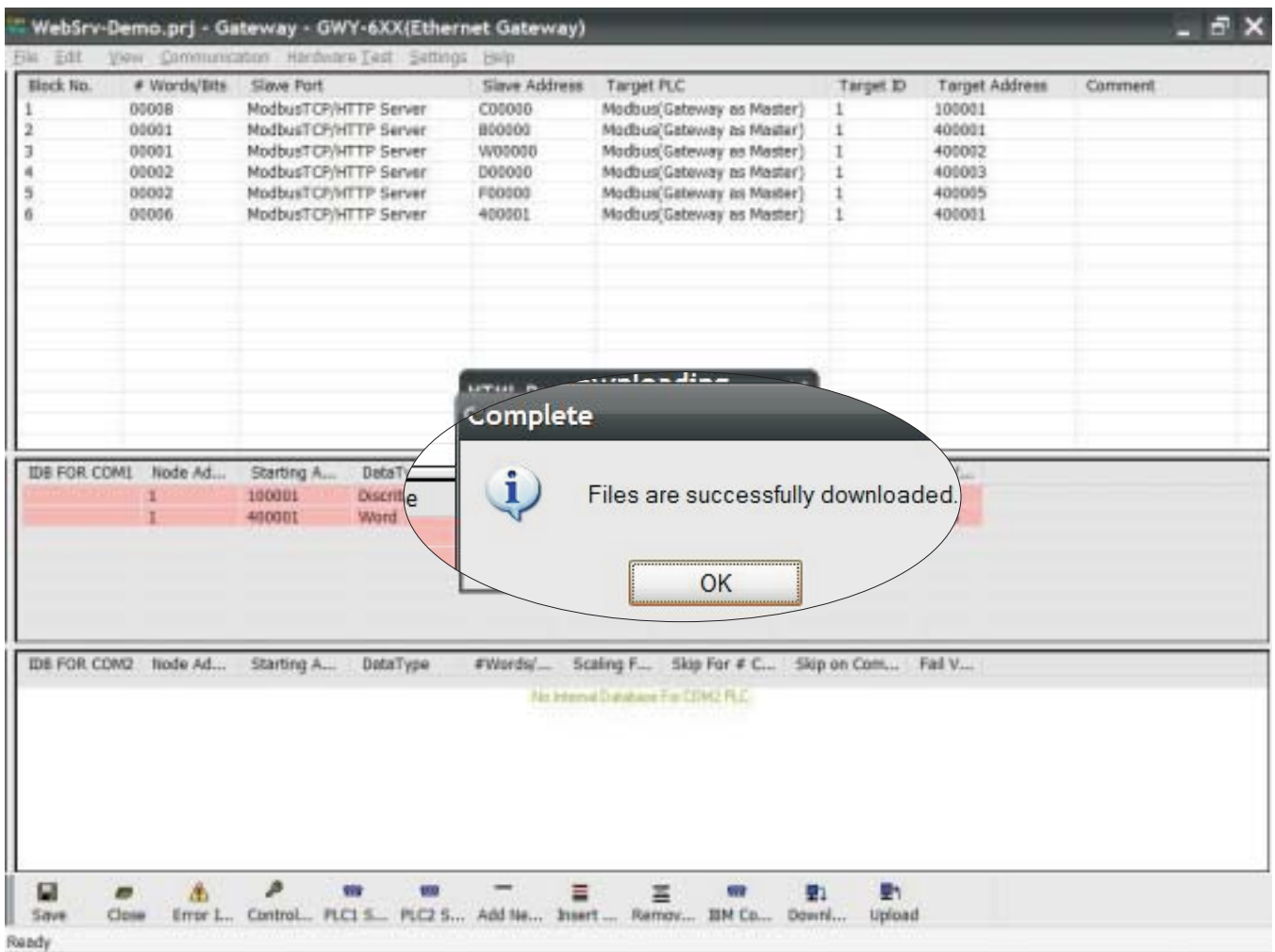
You now have the Web server ready to work!! Just type in the IP of GWY unit into the Internet Explorer and first page you will see will be the FIRST screen that was configured using the HTML utility. (Please ensure that the Internet Browser is Java- Enabled)



Screen-15a: Downloading HTML pages (menu)



Screen-15b: Downloading HTML pages in process



Screen-15c: Downloading HTML pages complete

To download the HTML files created earlier by the HTML configuration utility, click on the “Download HTML files” option from the “Settings” menu. However, again the unit needs a power cycle (restart) before the HTML pages can be downloaded. Please refer to Screen-14a to Screen-14c. Once the download is complete, a “Download complete” message pops up (Screen-14c).



**NOTE:**

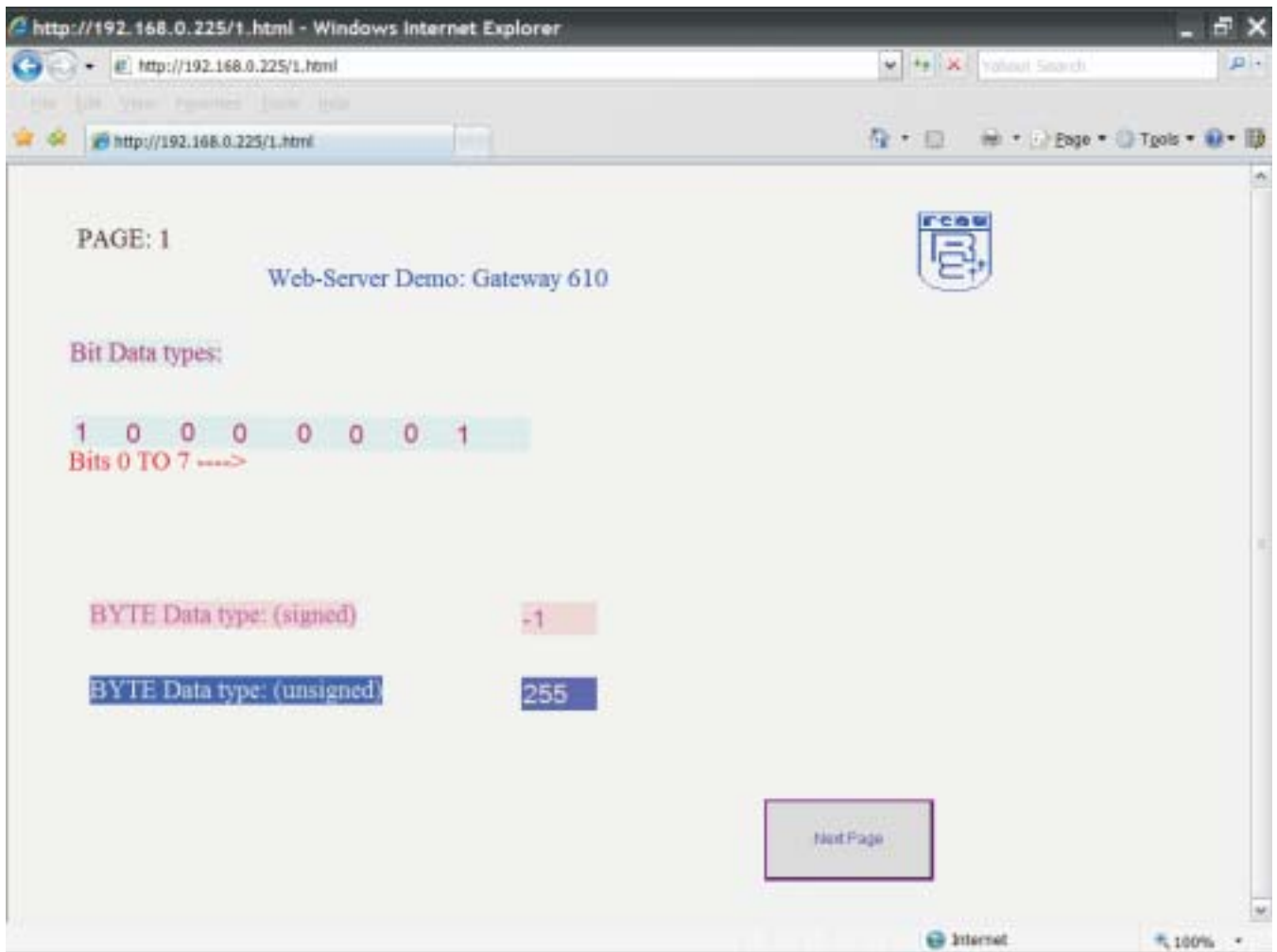
Please note that BEFORE DOWNLOADING the HTML files, Drivers, Firmware, etc., the Gateway unit must be POWER-CYCLE, i.e., you must RESTART the unit before any download/upload activity.



For better performance, keep the “Background Communication” **ENABLED** using “PLC2”, “Advance” settings.

Once the Web Server is configured and the pages downloaded, just type in the IP address assigned to the GWY unit into Internet Explorer, and your web server is up and running (refer to Screen-16).





Screen-16: Internet Explorer (web server up and running Screen-15c: Downloading HTML pages complete)

## LIMITATIONS

In this chapter. . . .

- ◆ Limitations

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## Limitations

The current version is a “Limited-functionality” version; following limitations apply in the current release:

1. There is no support to change the WORD order of Float/Double data types.
2. Scanning frequency of the Java Applet fixed to 4 seconds
3. A MAXIMUM of 200 (Two hundred) different registers can be embedded into the web pages.
4. Maximum of 5 Modbus-TCP clients and Maximum 6 HTTP clients can operate simultaneously.
5. Floating point resolution is fixed to scientific notation.
6. Image resolution for Bitmaps: 265 colours.
7. Font of Text object is the “default” font of the Internet Browser.
8. The user has to keep record of the HTML project he had created.
9. Maximum File size of the web page(s) (HTML, images, etc.) permitted is 64000 BYTES.
10. A maximum of **576KBytes** of space is available for Web pages.
11. The HTML pages cannot be uploaded from the Gateway unit.
12. Once the HTML pages are created, it is RECOMMENDED that the user save the HTML project for future use. This is because new, subsequent HTML projects overwrite/delete the old HTML files. Therefore, if the user wishes to download the pages again, he needs to identify and open the HTML project he/she had created for the Gateway project, and then use the “Create HTML pages” option from the “Utilities” menu of the HTML utility.

### **ENHANCEMENTS PLANNED**

In this chapter. . . .

- ◆ Enhancements Planned

### Enhancements Planned

Following are some of the enhancements that are planned for future versions:

1. Select the WORD (Upper-Lower OR Lower-Upper) order for Float and Double word data types.
2. Customizable Float data type representation: decimal places, etc.
3. Scanning frequency of the Applet to refresh the dynamic data can be selected in multiples of 1 second.
4. Font selection of the Text in the HTML pages.
5. Blocks defined for the Web Sever in the Gateway software to be exported directly into the HTML conversion utility so that the onus of creating all these tags again in the HTML utility is removed.
6. HTML project and the Gateway Project will have a direct association with each other; the user does not have to remember which project (HTML) was used for the Gateway project for the Web server. When the HTML configuration utility is fired from the Gateway software, the HTML project associated with the current Project will be automatically loaded. This is valid ONLY when the project was saved previously.
7. Insert decimal point at a particular location in **Byte**, **Word** data types.

## **RECOMMENDED SETTINGS FOR IMPROVED PERFORMANCE**

In this chapter. . . .

- ◆ Recommended settings for improved performance

### Recommended settings for Improved performance

Following settings are recommended to extract better performance from the HTTP and the Modbus-TCP server:

1. Enabling the Background Communication through the **PLC2, Advance Settings** improves the performance of the Modbus-TCP server, reducing the Modbus-TCP frame loss to as close as 0.0%.
2. While selecting the Scanning interval of the Modbus-TCP clients, the network traffic, and network topology **MUST** be taken into consideration. Our recommended, minimum scanning interval is 200msec; any value below this will directly affect the system performance.
3. It is recommended **NOT** to keep the Internet Browser window running (connected) to the GWY-610 web server running if not in use; this keeps the GWY unit busy processing unnecessary requests.

