

# Interfacing between PT2 and FCT with CODESYS

## Application note

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## 1. Introduction

The purpose of this document is to provide the useful information for the development of the applications that need the sharing of variables between an user interface of PT2xxx type and a controller with CODESYS. For more complete information related to the panels or to the controller, refer to the documents that are available in the <http://www.cmz.it> website or address to CMZ SISTEMI ELETTRONICI S.r.l..

## 2. In general

### 2.1. Components and software

This document refers to a panel of the PT2xxx series and to an FCTxxx controller with CODESYS. The communication between these devices happens through the Ethernet port by using a native protocol of the controller development environment.



#### Important

What is reported in this document refers to the software version:

- CODESYS V3.5 SP14 Patch 3 development environment, for the controller.
- Panel Master Designer version 2.1.9.84 development environment, for the HMI.
- The FCTxxx controller has the SP 11 firmware rev 6.

### 2.2. Method for the variables sharing

Here follows the setting to be done in the development environment of the controller and of the panel.

In the *Section 3, “CODESYS developing environment”* it is described the procedure to obtain a file of xml type, that allows to export the data type that are defined and the variables list to be exposed in the panel (“Symbol Configuration” object and “Generate code” command).

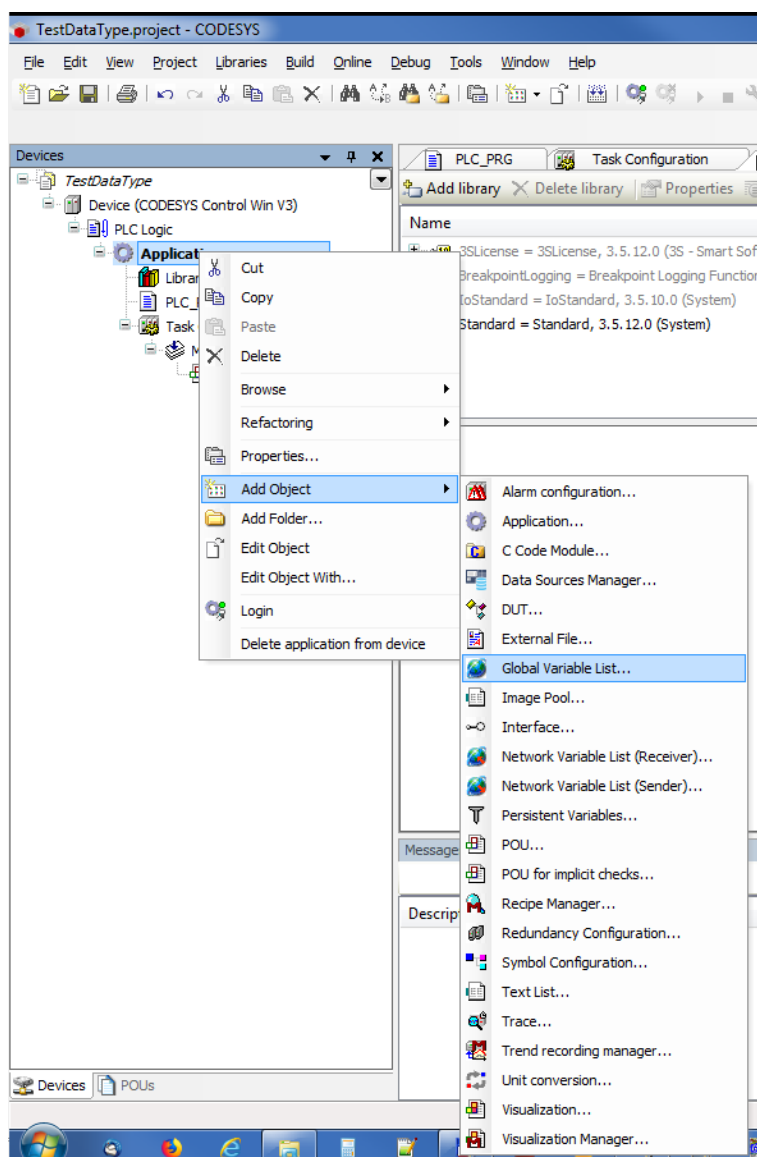
In the *Section 4, “HMI developing environment”* it is described the procedure to define the properties of the CODESYS link and to import the data types and the variables that are reported in the xml file created in the development environment of the controller (“Import Data Type” and “Preview/Import Tags...” command).

### 3. CODESYS developing environment

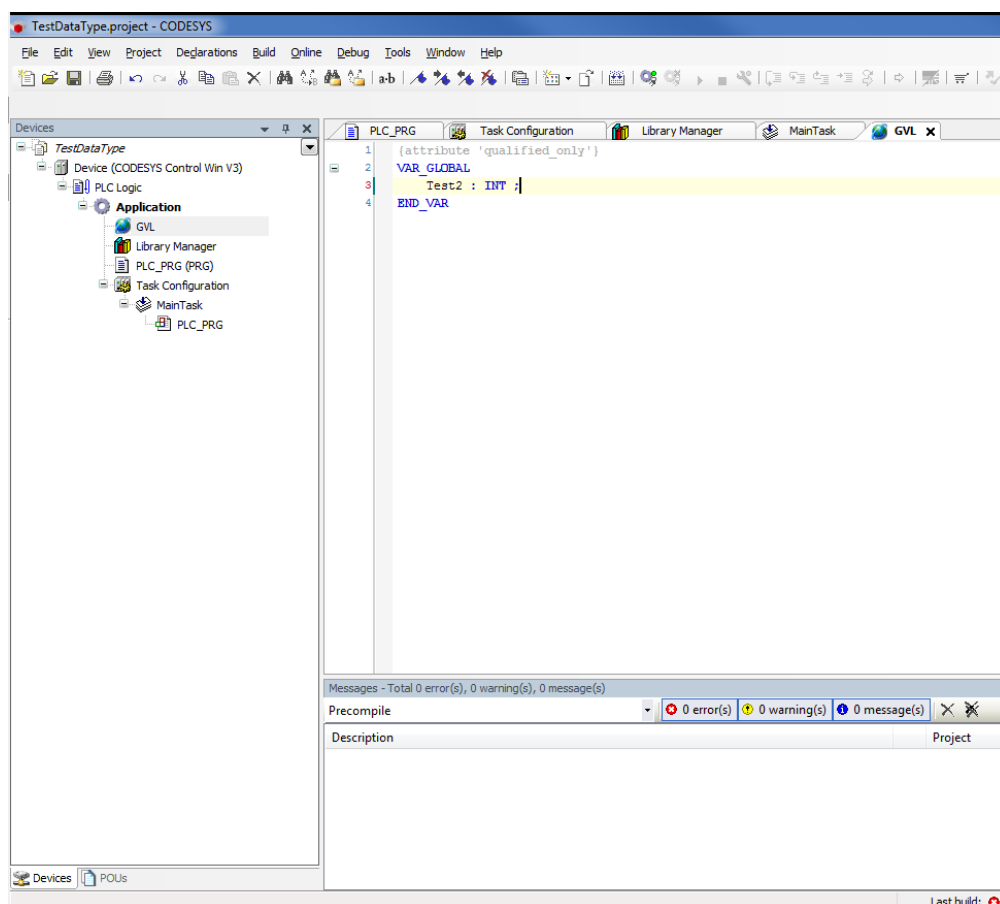
In the controller with CODESYS the variables, that are present in the application software, have to be exposed "by name" towards the panel. In this way the parallel development of the applications in the controller and in the panel and the successive updates of the softwares are easier.

#### 3.1. Variables definition

In order to insert the global variables is necessary to add the "Global Variable List ..." resource. In the project tree, by clicking the right button of the mouse on "Application", select "Add Objects" and then "Global Variable List ...".



Then write the variables in the GVL resource.



## Attributes

In the variables declaration it is possible to insert the "attributes" that allow to export the variables in the symbols table with the property of access set on "write only" or "read only".

Here follows an example:

```
{attribute 'symbol' := 'readwrite'}
PROGRAM PLC_PRG
VAR
  A : INT;
  B : INT;
{attribute 'symbol' := 'none'}
  C : INT;
{attribute 'symbol' := 'read'}
  D : INT;
END_VAR
```

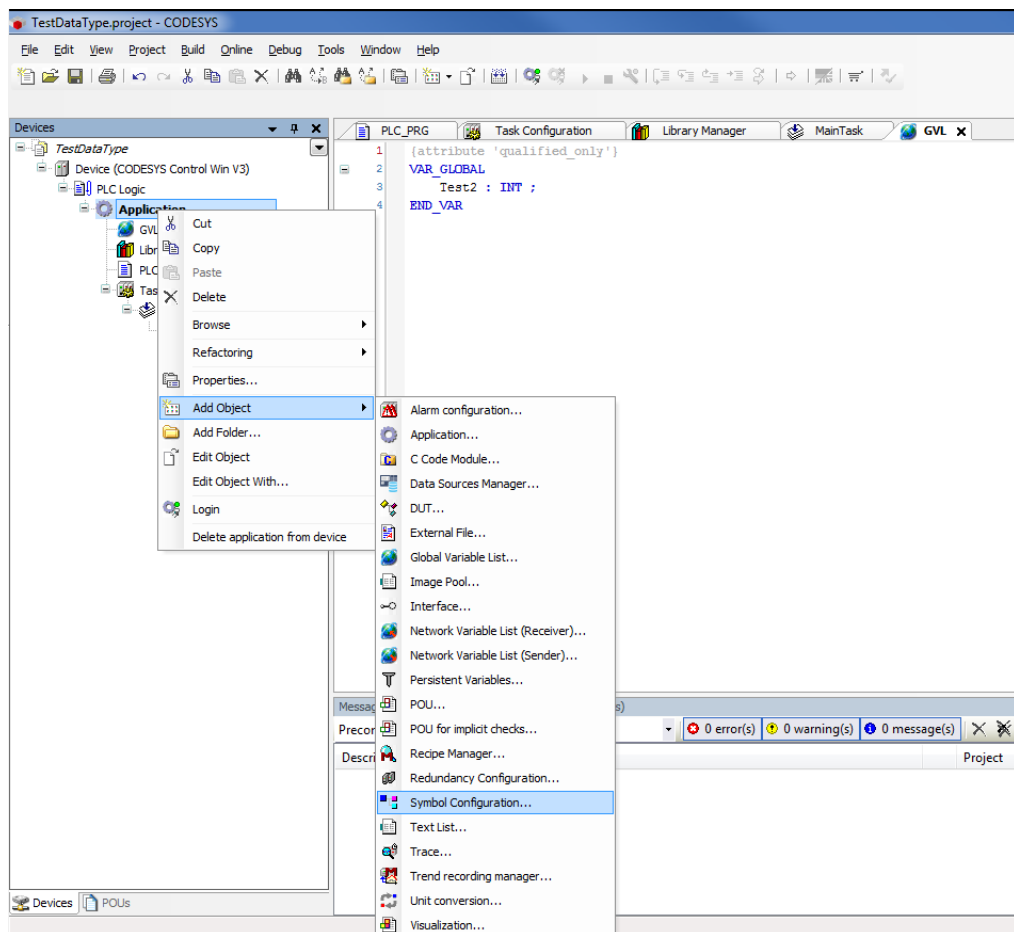
**Note**

For further information refer to “Attribute symbol” in “CODESYS Help” (<http://help.codesys.com/>).

### 3.2. Export of the data type and the variables

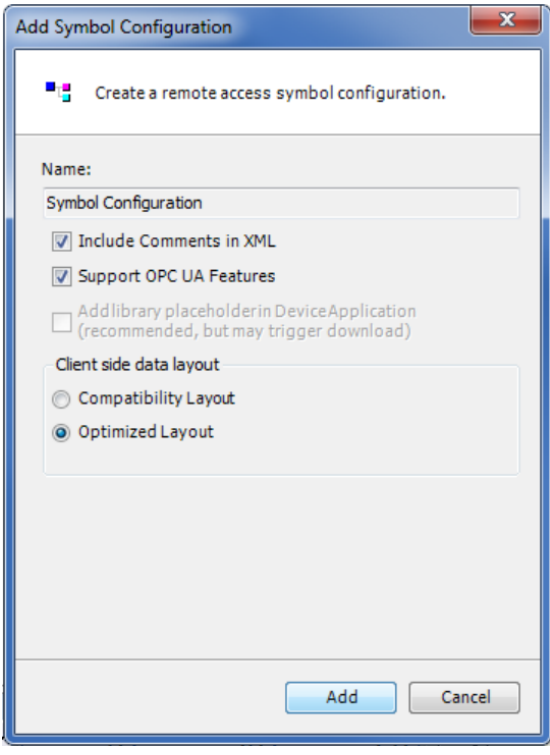
To export the variables towards the panel it is necessary to proceed as follows.

1. Add the “Symbol Configuration ...” resource  
 In the project tree, by clicking the right button of the mouse on “Application”, select “Add Objects” and then “Symbol Configuration ...”.



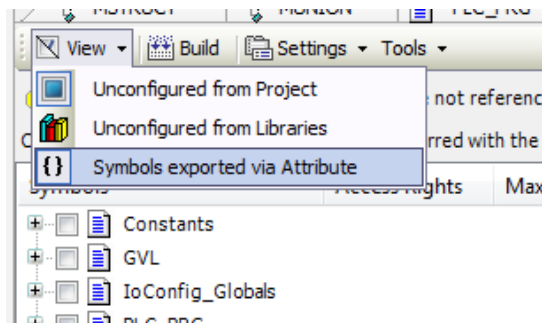
The following settings are recommended:

- Include the export of the comments that are present in the variables definition, by checking “Include comments in XML”.
- Enable “Support OPC UA Features”, only if used.
- As “Client side data layout” leave “Optimized Layout” enabled.
- Press the “Add” button.

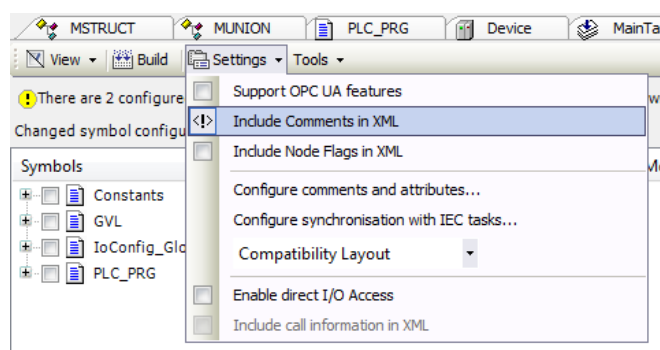


The comments and the attribute that characterize the reading and the writing of the variables can be exported in the xml file even by making the following settings.

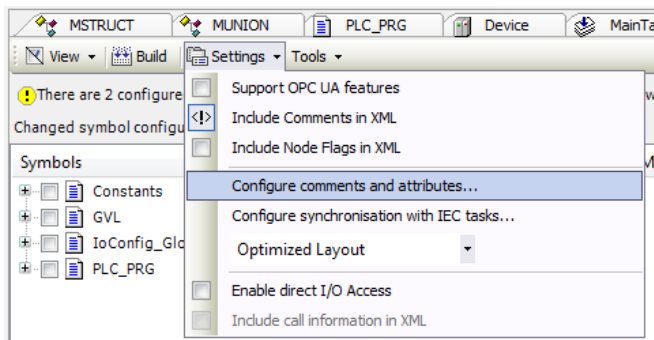
- From the “View” tab of the “Symbol Configuration” object, enable “Unconfigured from Project” and “Symbols exported via Attribute”.



- From the “Settings” tab of the “Symbol Configuration” object, enable “Include Comments in XML”.

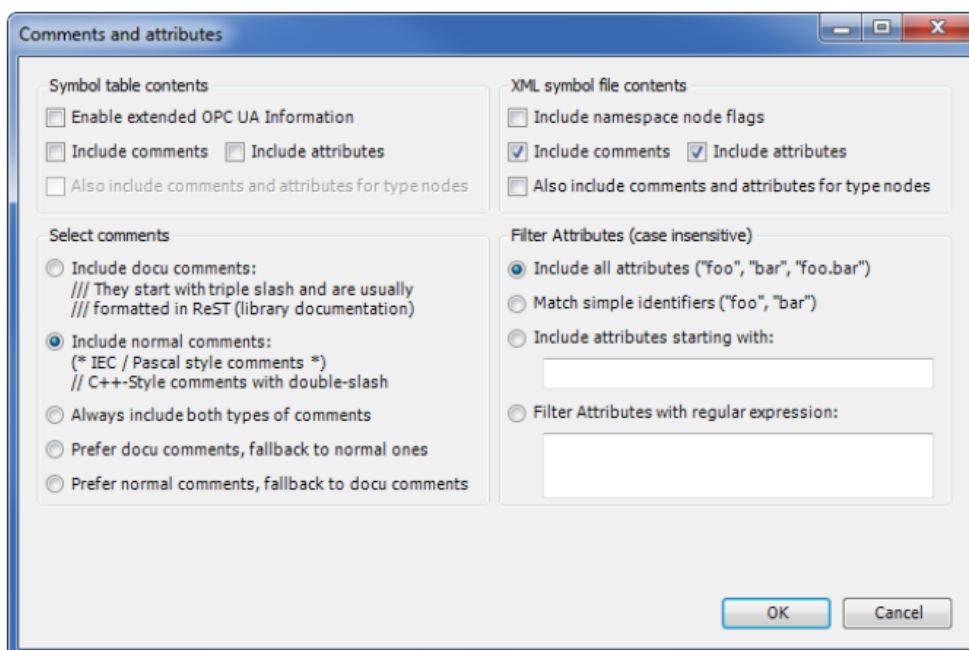


- From the “Settings” tab of the “Symbol Configuration” object, select “Configure comments and attributes ...”



Then, from the pop-up window:

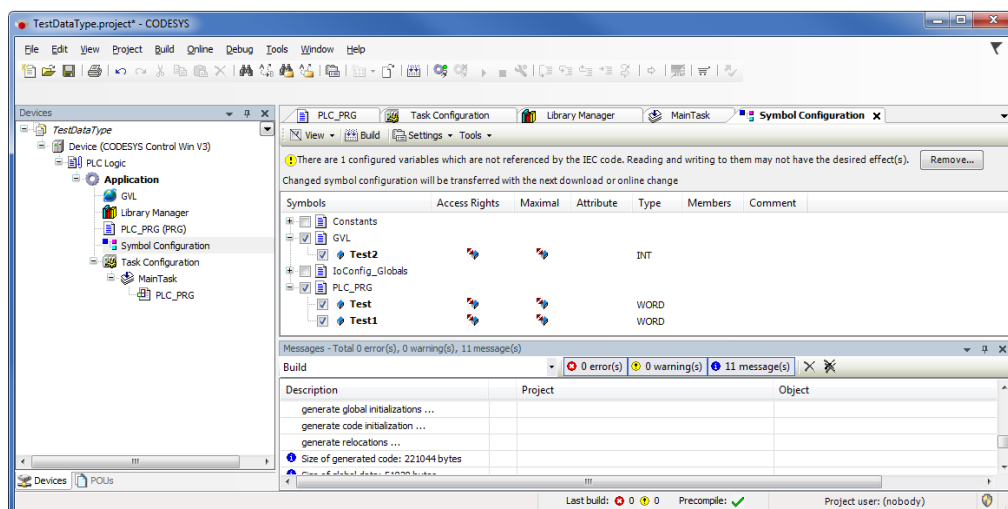
- in the “Select Comments” section enable “Include normal comments”
- in the “XML symbol contents” section enable “Include comments” and “Include attributes”
- in the “Filter Attributes” section leave “Include all attributes” enabled.



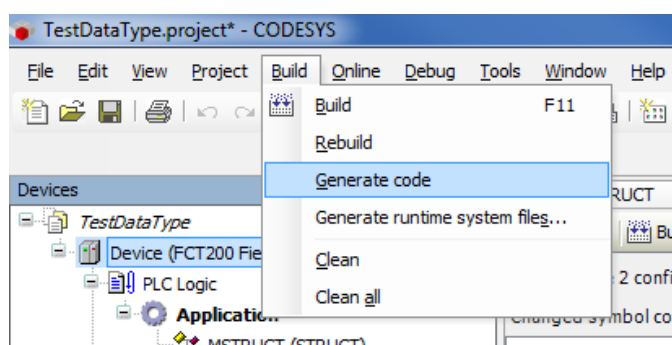
### Note

For further details please refer to “CODESYS Help” (<https://help.codesys.com/>).

2. Select the single variable to be exposed.  
Open the “Symbol Configuration” and check the variables that have to be used in the panel.



3. From the “Build” menu select “Generate code”.



In the project directory a file of \*.XML type is created, structured as in the following example:

```

1  <?xml version="1.0" encoding="utf-8"?>
2  <Symbolconfiguration xmlns="http://www.3s-software.com/schemas/Symbolconfiguration.xsd">
3  <Header>
4  <Version>3.5.11.0</Version>
5  <SymbolConfigObject version="3.5.12.10" runtimeid="3.5.12.10" libversion="3.5.11.0" compiler="3.5.12.10" lmn="3.5.12.10" profile="CODESYS V3.5 SP12 Patch 1+" settings="SupportOPCUA, Xml11">
6  <ProjectInfo name="TestDataType" devicename="Device" appname="Application" />
7  </Header>
8  <TypeList>
9  <TypeSimple name="T_INT" size="2" swpsize="2" typeclass="Int" icname="INT" />
10 <TypeSimple name="T_UINT" size="2" swpsize="2" typeclass="UInt" icname="UINT" />
11 <TypeSimple name="T_WORD" size="2" swpsize="2" typeclass="Word" icname="WORD" />
12 <TypeUserDef name="T_VERSION" size="8" nativesize="8" typeclass="UserDef" pouclass="STRUCTURE" icname="VERSION">
13 <UserDefElement icname="uiMajor" type="T_UINT" byteoffset="0" vartype="VAR" />
14 <UserDefElement icname="uiMinor" type="T_UINT" byteoffset="2" vartype="VAR" />
15 <UserDefElement icname="uiServicePack" type="T_UINT" byteoffset="4" vartype="VAR" />
16 <UserDefElement icname="uiPatch" type="T_UINT" byteoffset="6" vartype="VAR" />
17 </TypeUserDef>
18 </TypeList>
19 <NodeList>
20 <Node name="Application">
21 <Node name="Constants">
22 <Node name="CompilerVersion" type="T_VERSION" access="Read">
23 <Comment> Does the target support multiple cores?</Comment>
24 </Node>
25 <Node name="RuntimeVersion" type="T_VERSION" access="Read">
26 <Comment> Does the target support multiple cores?</Comment>
27 </Node>
28 </Node>
29 <Node name="GVL">
30 <Node name="Test2" type="T_INT" access="ReadWrite" />
31 </Node>
32 <Node name="PLC_PRG">
33 <Node name="Test" type="T_WORD" access="ReadWrite" />
34 </Node>
35 </NodeList>
36 </Symbolconfiguration>

```

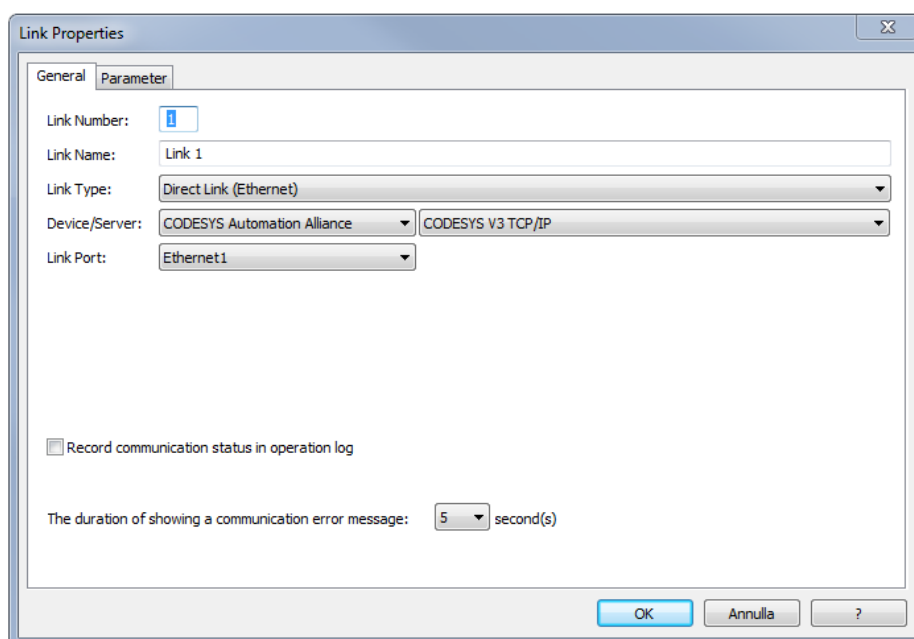


## 4. HMI developing environment

### 4.1. Link definition

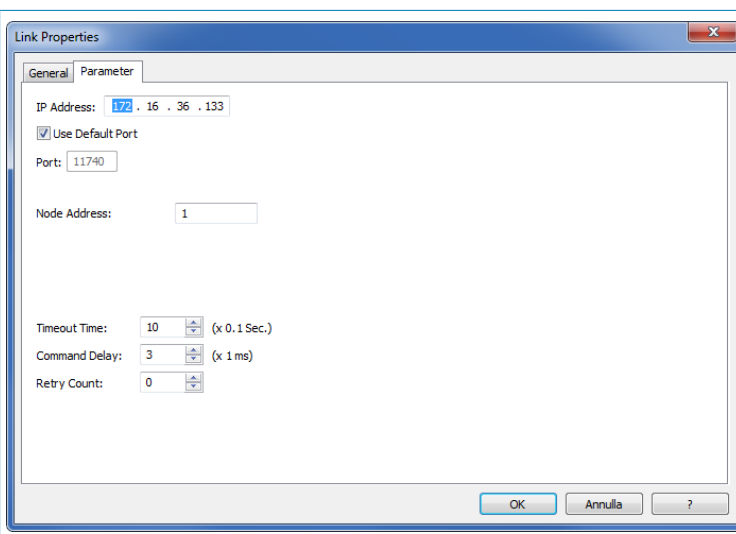
In the HMI the link with the controller with CODESYS is defined by setting in the “Link properties”:

- “Link type” with “Direct Link(Ethernet)”.
- “Device/Server” with “CODESYS Automation Alliance” - “CODESYS V3 TCP/IP”.
- “Link Port” with “Ethernet1”.



Then, by selecting the "Parameter" window:

- Set the "IP Address" and leave the "Use Default Port".
- It is recommended to set a Command Delay of 20ms to limit the resources required to the controller that are necessary for the communication management.
- Set the Timeout Time to 200, that means 20 seconds. In this way, if necessary, the controller can free the stack of the TCP port before to open another one. If the time would not be sufficient, then it would continue to reserve further dynamic memory.



## 4.2. Supported data type

The HMI manages the following simple data type: BOOL, BIT, BYTE, WORD, DWORD, LWORD, SINT, INT, DINT, LINT, USINT, UINT, UDINT, ULINT, REAL, LREAL, STRING(x), WSTRING(x).

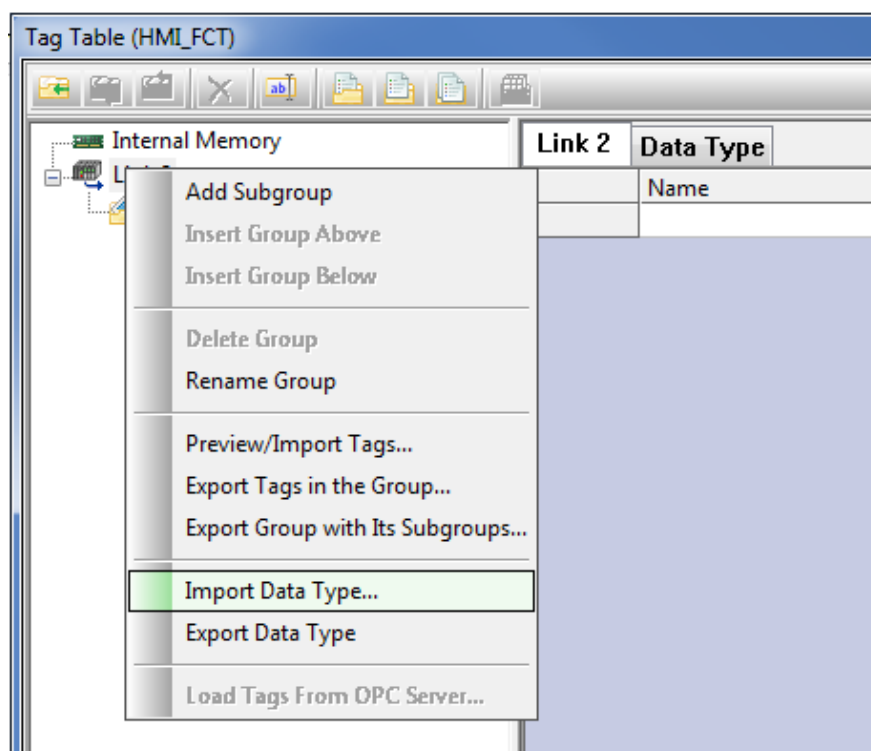
The structured data type that can be used are ENUM, UNION, ARRAY e STRUCT.

## 4.3. Import of the data type and of the variables

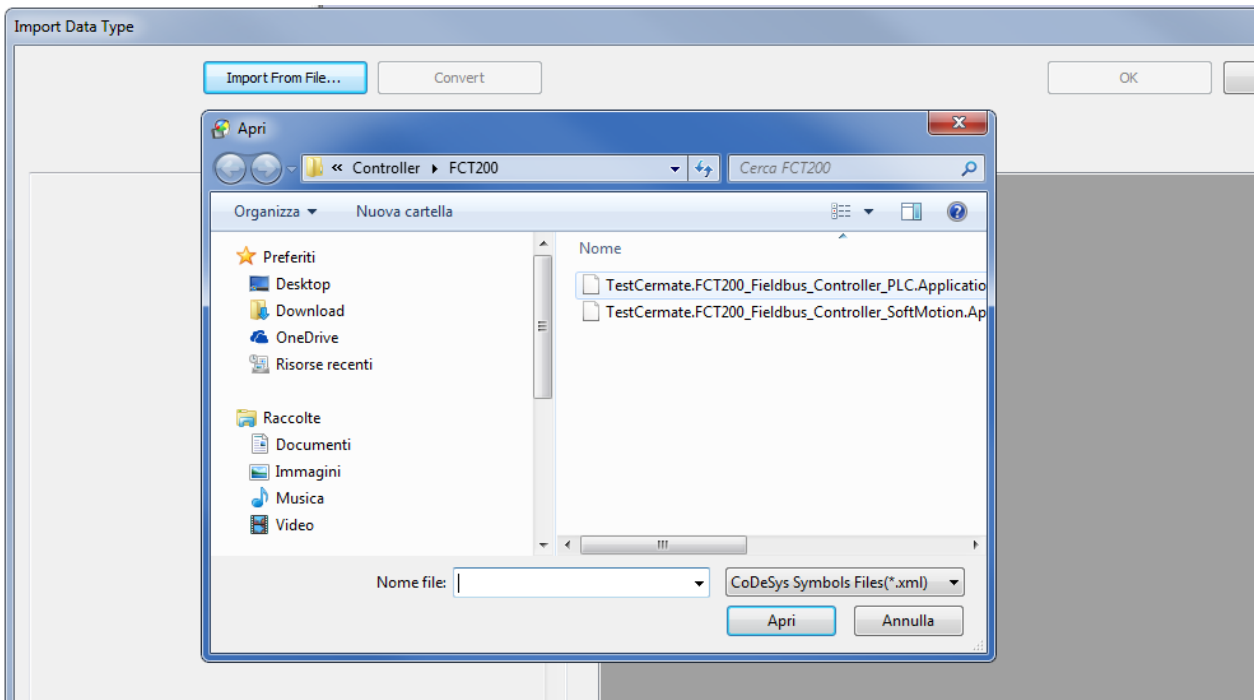
To import the controller variables in the PMDesigner environment, it is necessary to double click on the project tree in the “Tags” resource. From here it is possible to access to a page that has 2 nodes on the left:

- “Internal Memory” with the variables of the panel internal memory.
- “Link” with the interface variables towards the controller.

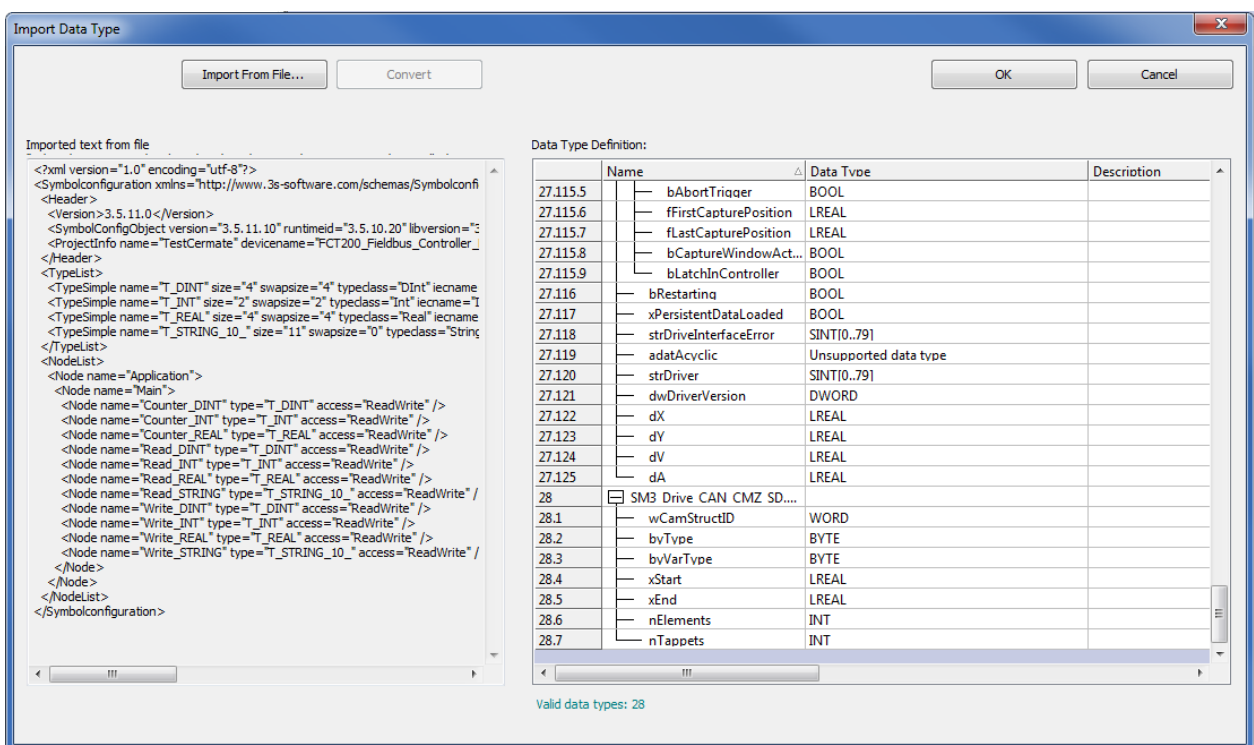
From the “Link” node, by clicking the right button of the mouse, select “Preview/Import Tags ...”.



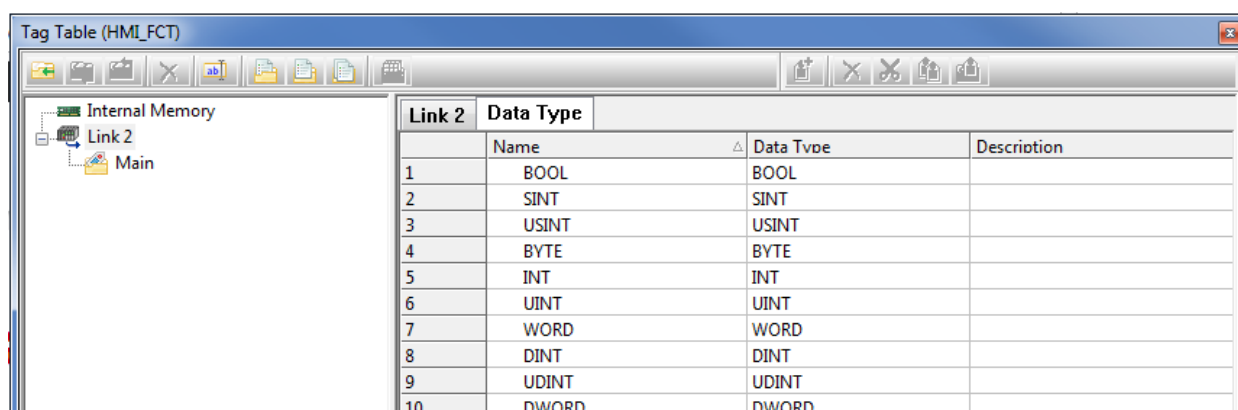
From the “Import Data Type” window select the file \*.xml



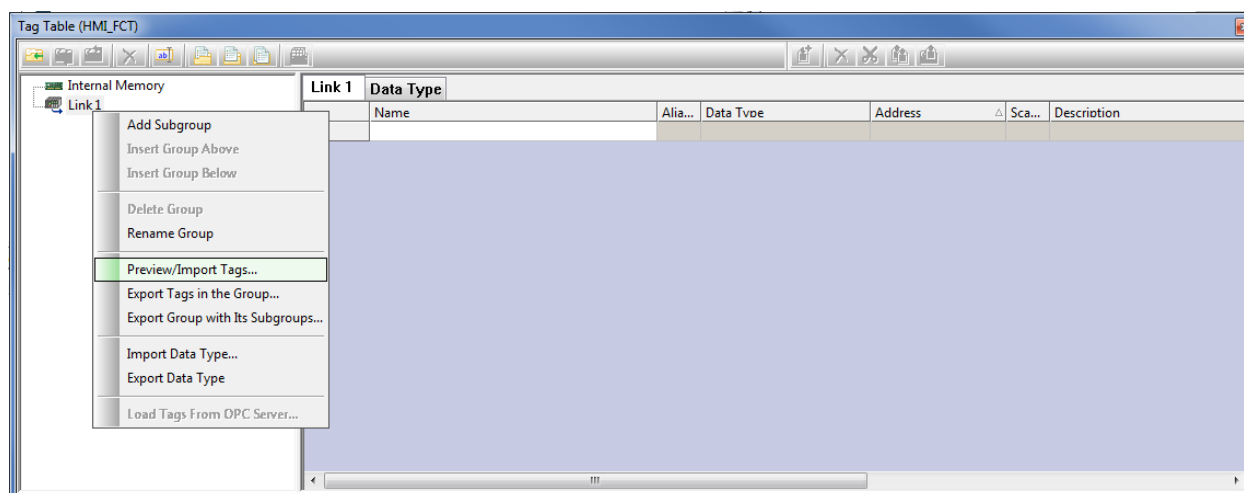
Then, from the “Import Data Type” window press the “Convert” button and, if there is no error, the “OK” button.



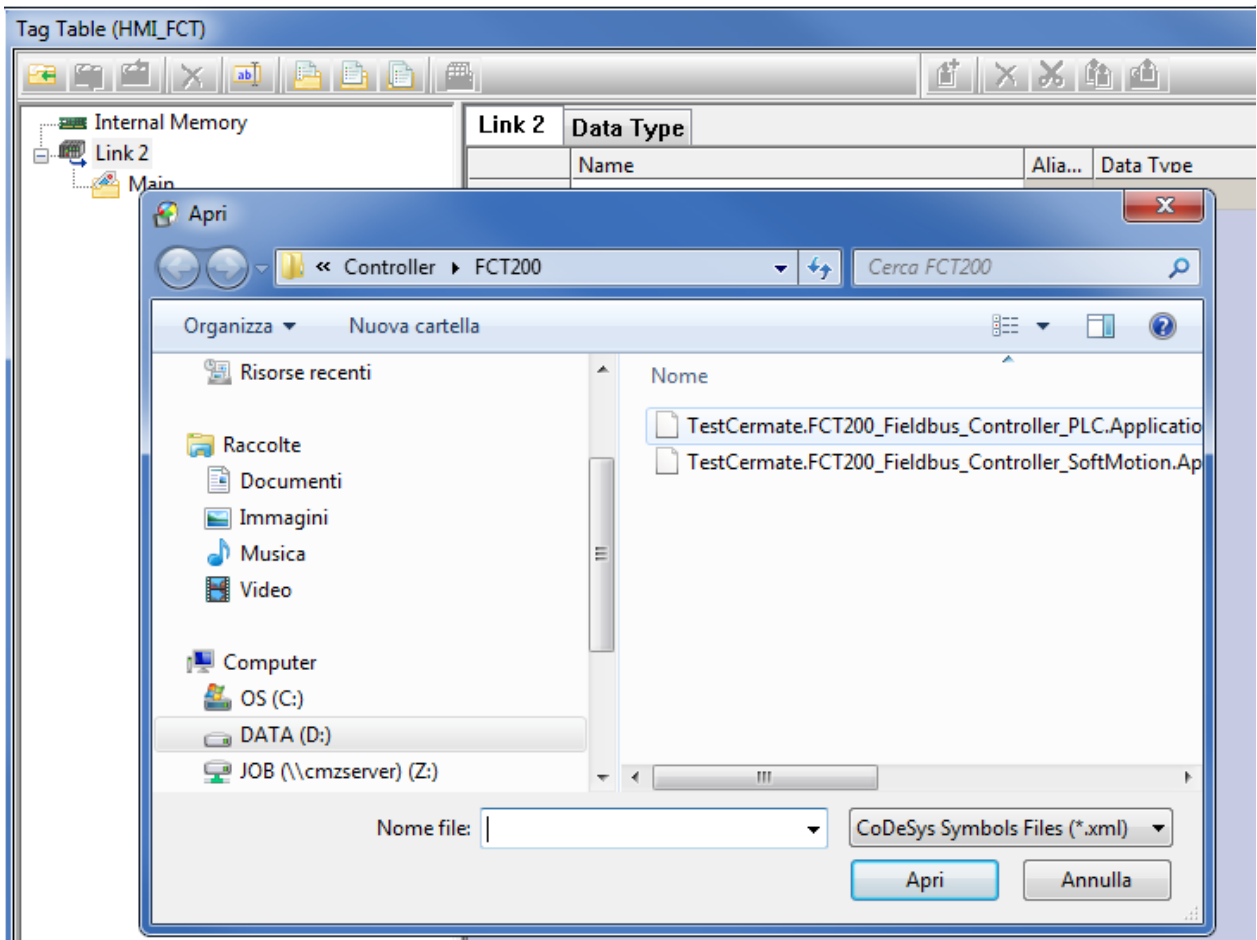
Now on the “Link” node there is even a table named “Data Type”, with the data type that can be used in the variables that are exchanged with the controller.



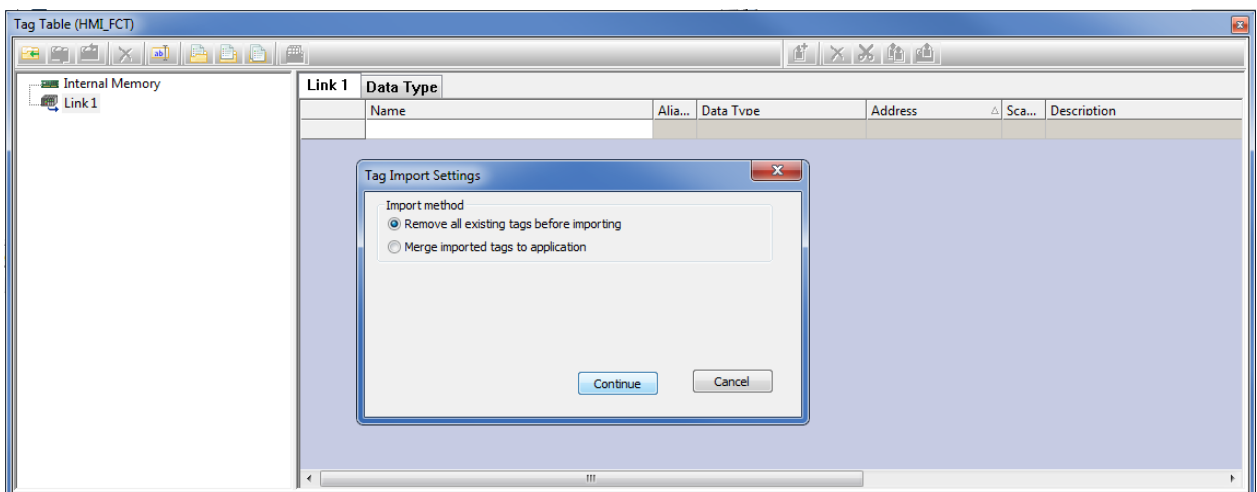
From the “Link” node, by clicking the right button of the mouse, select “Preview/Import Tags ...”.



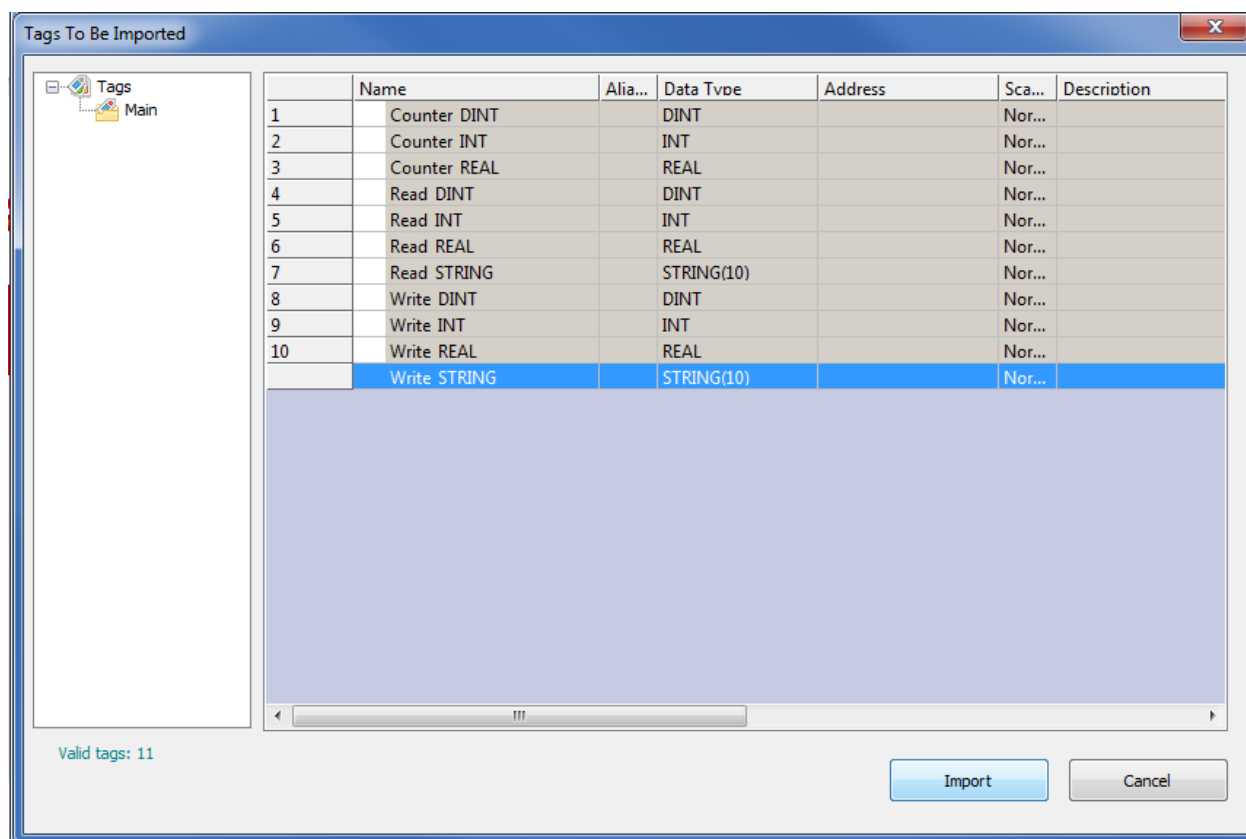
Select the file \*.xml



Then press “Continue” leaving the “Remove all existing tags before importing” option.



At last in the “Tags To Be Imported” window, press the “Import” button.



### Note


The introduction of a new controller variable to be exposed in the HMI needs first the export of the "Symbol configuration" from the CODESYS environment and then to use of the "Preview/Import Tags ..." command from the Panel Master Designer environment.

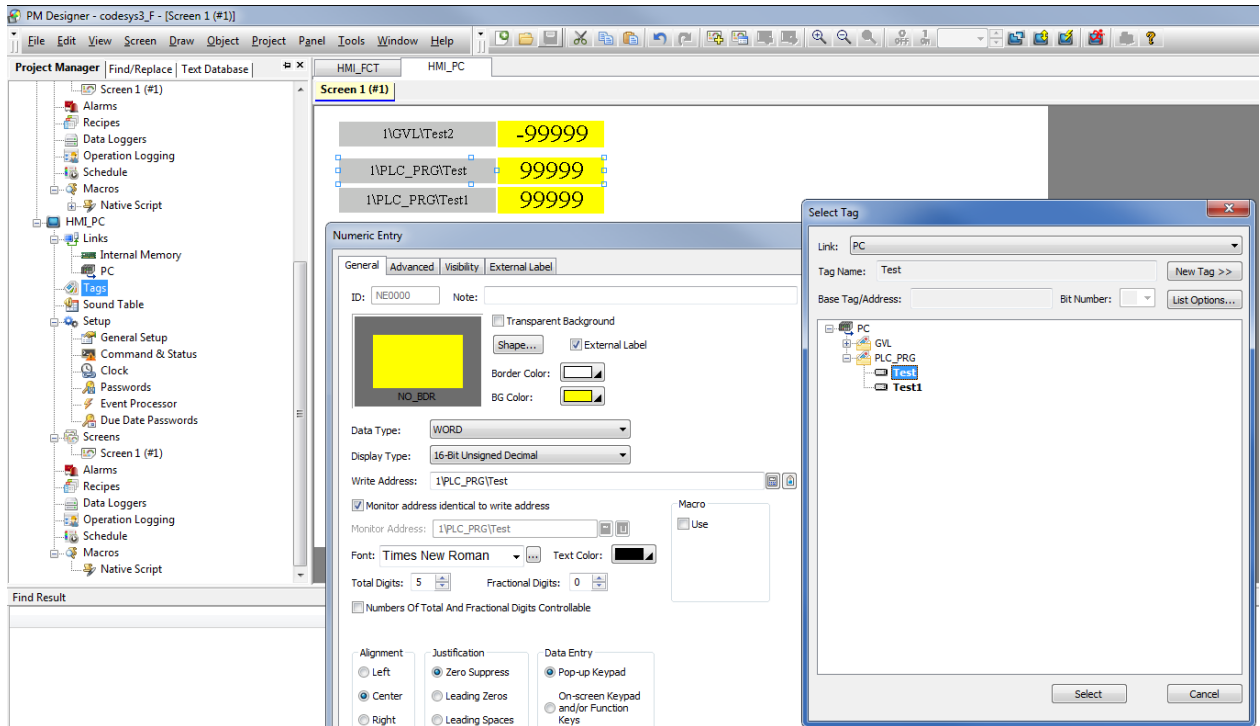



### Note

If in the controller new data type are introduced, for variables that have to be exposed in the HMI, it is always necessary to execute "Import Data Type" before to import the tags.

## 4.4. Use of the variables in the objects and in the macros

After the import it will be possible, for every object of the page, to indicate the address in the "Address" field, by pressing the button  and by selecting the correct variable from the "Select Tag" box.



In the same way, during the macro writing, the selection of the variable happens by pressing the same button  and by selecting the correct variable from the “Select Tag” box.

