

Quick Start Mect Suite Starter Kit



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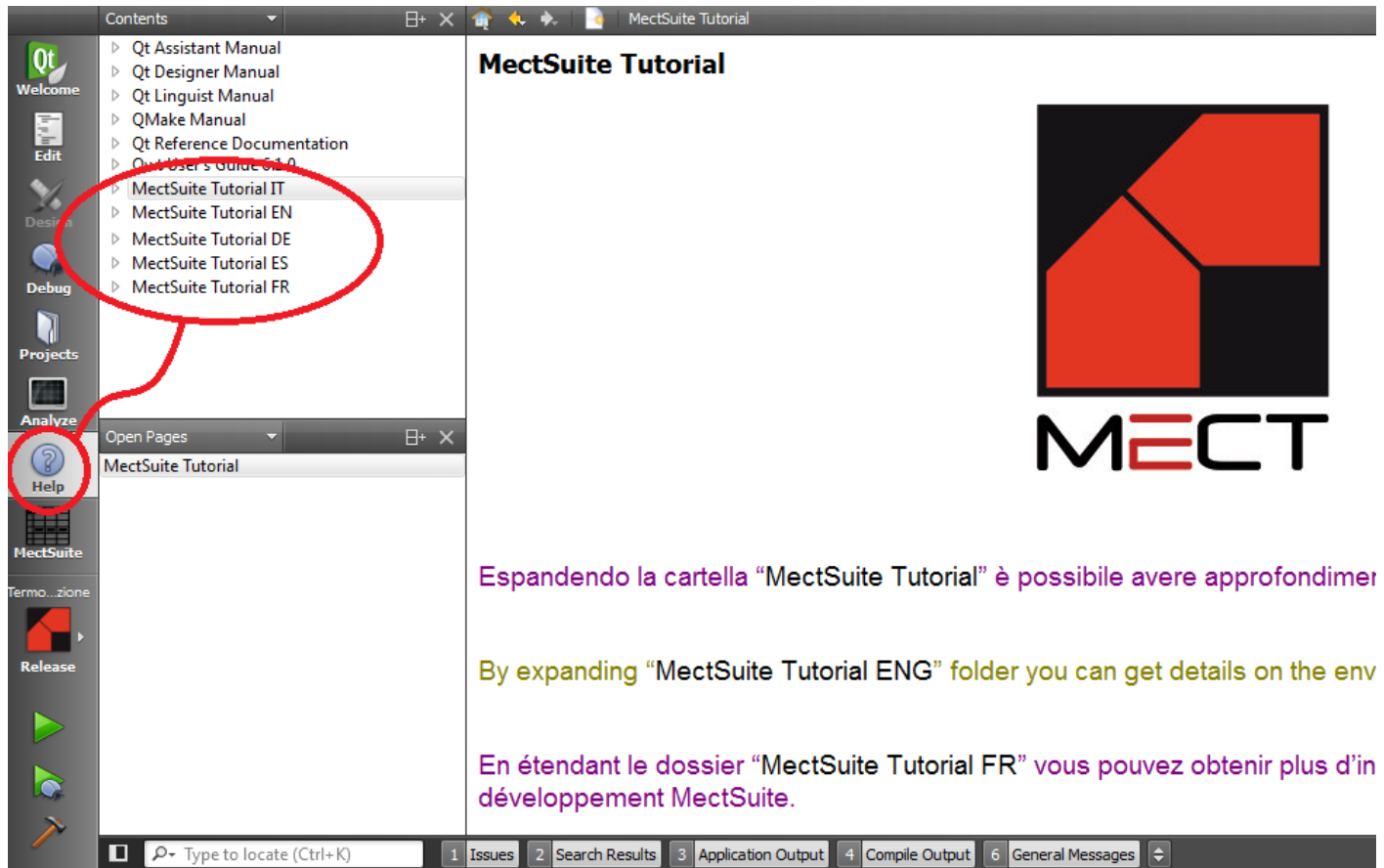
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1 BEGINNING STEPS

WARNING: read the “MectSuite Tutorial EN” for further details.



1.1 UPDATE

Before upgrade read the “changelog.txt” file on Mect web site in “DOWNLOAD Mect Suite” area.

Update for device:

- **img_sysupdate-3.x.x-ProductName.ext2 and sysupdate_img_3.x.x.sh:**
 - **By USB:** copy files “img_sysupdate-3.x.x-ProductName.ext2” and “sysupdate_img_3.x.x.sh” on an USB key and restart the device with USB key inserted. For example, with TPAC1007_04_AC device:
 - **img_sysupdate-3.x.x-TPAC1007_04_AC.ext2**
 - **sysupdate_img_3.x.x.sh**
- The update of 3.x version takes about 1.30 minutes. Then switch off device, remove the USB pen drive and restart it. For TPAC1007 and TP1043 models use the micro-USB (type A) → USB adapter.

1.2 PLUG IN THE KIT

Connect the TPAC1007 to the STK Board by the enclosed flat cable.
Plug the STK to the mains.

1.3 LET'S PLAY!



The preloaded applications on the TPAC1007 let you already play: the graphics reports the analog and digital interfaces status, moreover the 4 buttons in the upper left corner actuate the 4 board relays. In the following we'll show the easy steps for recreating and modifying the applications.

1.3.1 LAN connection between PC and TPAC

You program the panel applications on PC / Laptop by using the QtCreator and ATCMcontrol software. The connection from the PC to the TP/TPAC is by LAN (Ethernet).

➤ Physical connection (Ethernet):

In the Starter Kit you find the LAN cable for directly connecting the PC and the TPAC1007.

In case of Wi-Fi connection you need to use an Ethernet/Wi-Fi Switch/Router (with the purchase of Wi-Fi stick at Mect) and configure the network from MENU (press button TPAC1007_04) → OPTIONS → NETWORK_CFG → “Wi-Fi” tab.

➤ Logic connection (IP configuration):

The default IP configuration (Internet Protocol) is:

- addr **192.168.5.211** mask 255.255.255.0

The PC needs a coherent configuration in order to be able to connect to the TPAC, for instance:

- addr 192.168.5.100 mask 255.255.255.0

Please follow the PC operating system instructions for configuring the network settings.

➤ Validation connection (ping):

For validating the connection please start the “Command Prompt” and write:

- **ping 192.168.5.211**

Press “return” and check for the correct answers.

```

C:\Users\Utente>ping 192.168.5.211

Esecuzione di Ping 192.168.5.211 con 32 byte di dati:
Risposta da 192.168.5.211: byte=32 durata=1ms TTL=64
Risposta da 192.168.5.211: byte=32 durata<1ms TTL=64
Risposta da 192.168.5.211: byte=32 durata<1ms TTL=64
Risposta da 192.168.5.211: byte=32 durata<1ms TTL=64

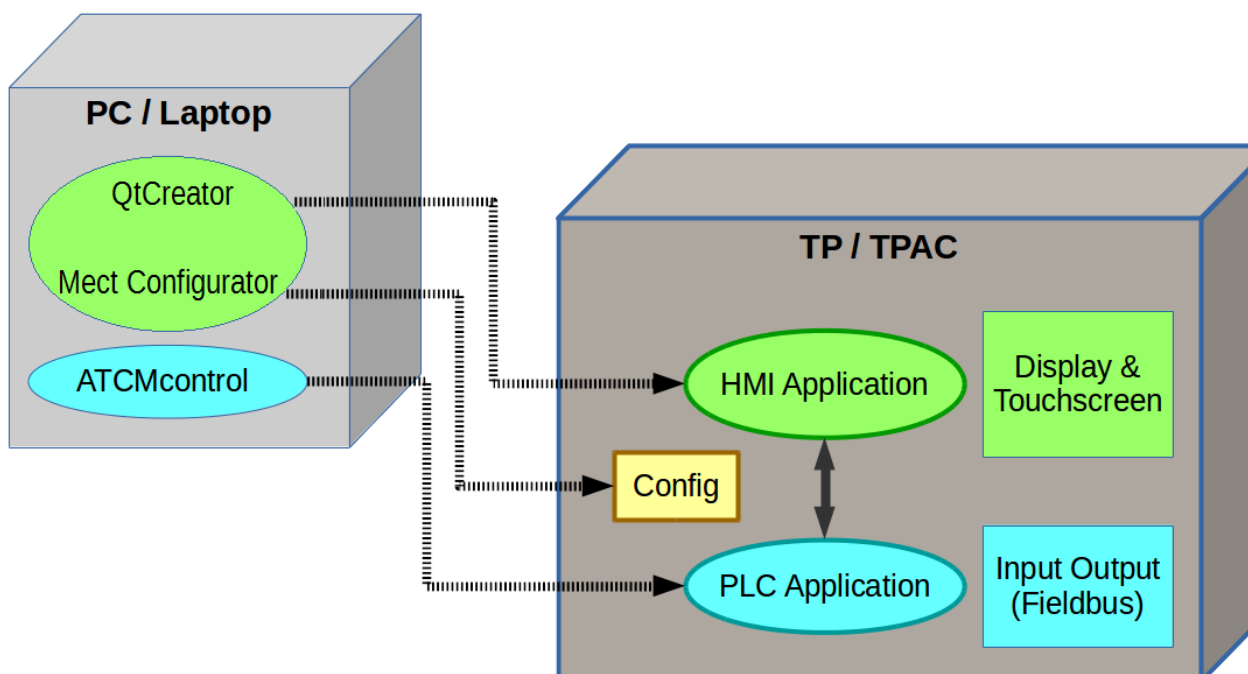
Statistiche Ping per 192.168.5.211:
    Pacchetti: Trasmessi = 4, Ricevuti = 4,
    Persi = 0 (0% persi),
    Tempo approssimativo percorsi andata/ritorno in millisecondi:
        Minimo = 0ms, Massimo = 1ms, Medio = 0ms

C:\Users\Utente>

```

2 MECT SUITE SOFTWARE

The software in each Mect MPX28 board based TP and TPAC panels is structured as follow.



On the TP/TPAC panel two main applications are running and they communicate with each other through a variable table called “Crosstable”:

- **HMI Application:** it is the graphic application that manages display and touchscreen
- **PLC Application:** it is the PLC application (IEC-61131-3) that manages input and output of the many fieldbuses (Modbus RTU, Modbus TCP, CANopen,)

Thanks to high integration it is possible to program a graphic interface without being a programmer. Nevertheless the system is open and it is possible, if necessary, to create complex applications.

When using the Starter Kit and the local TPAC1007 inputs/outputs, everything is already configured and you only need to use QtCreator for creating the graphic interface.

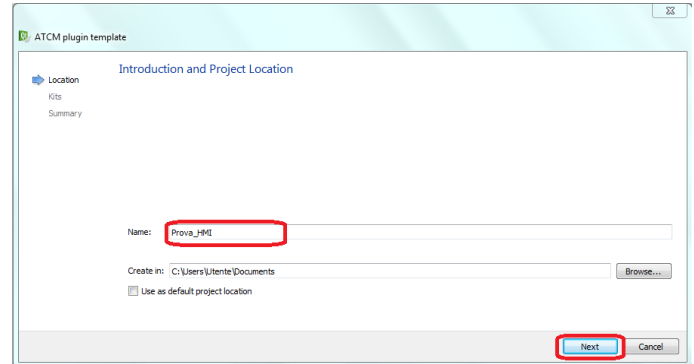
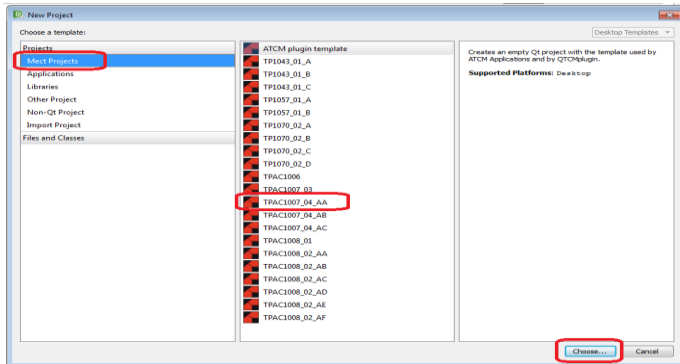
2.1 GRAPHIC APPLICATION CREATION (HMI)

You use **QtCreator** for creating the graphic application (HMI = Human to Machine Interface).

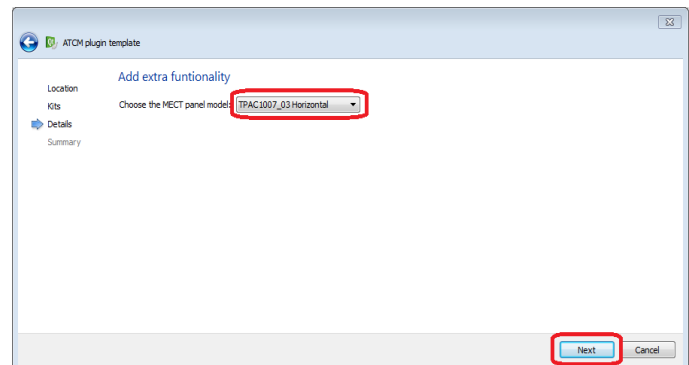
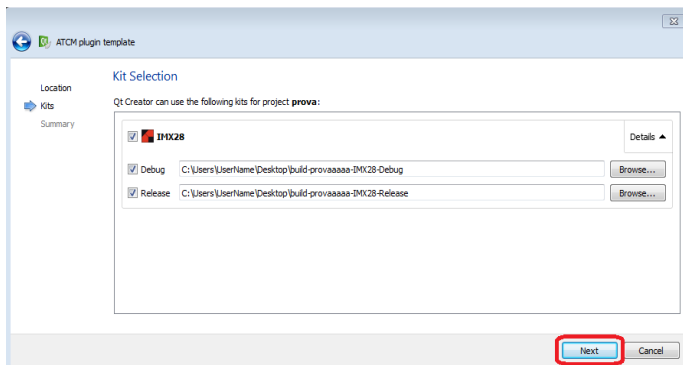
2.1.1 New project

Open **Qt Creator** and follow the easy steps:

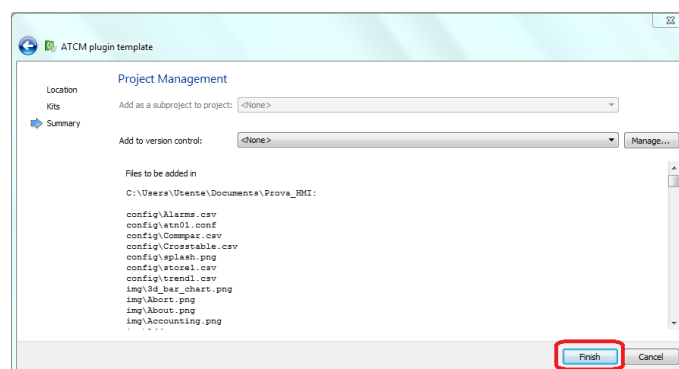
1. From the menu open *File* → *New File or Project*.
2. Then choose *"Mect Projects"* and click *"Choose"*.



3. Insert the project name, **without blanks and special characters**, except for the underscore ' _ '.
4. **Warning:** also the path of the project folder must not contain.
5. Select *"Next"* at the *"kit selection"*
6. Select product orientation.



7. At *"Project Management"* dialog box click *"Finish"*.



2.1.2 “Splash screen” change

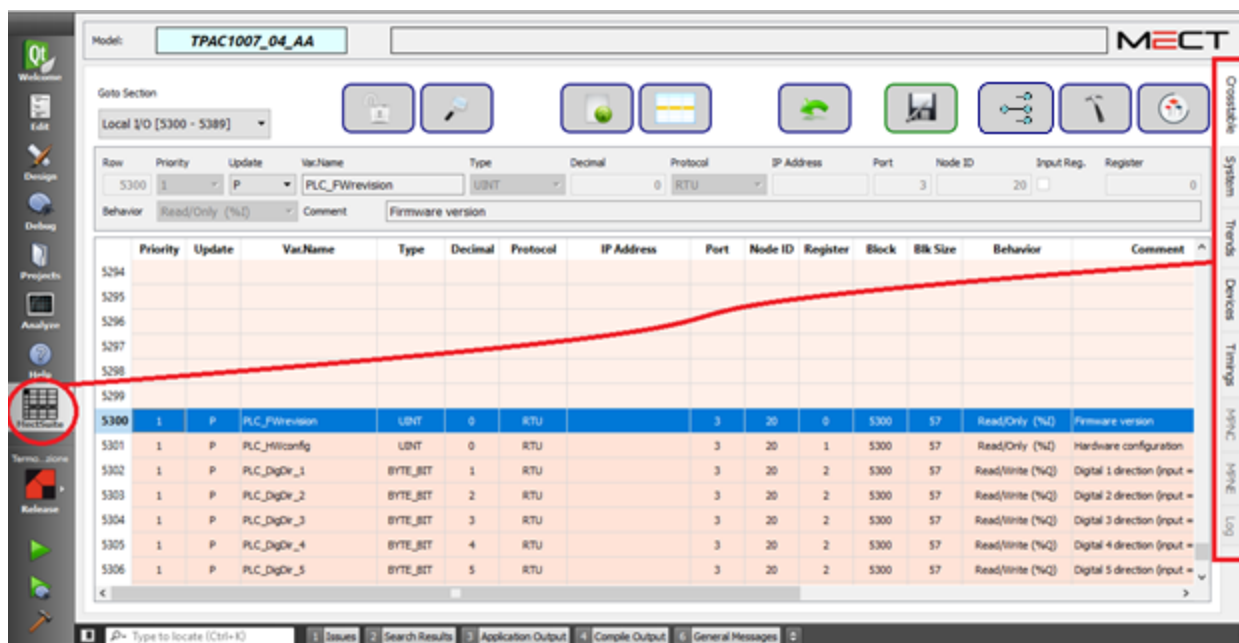
To customize the splash screen overwrite the “splash.png” file in the “config” folder of the project. Splash image must be in the png format, of the same screen resolution of the used product:

- TPAC1007/TP1043 => 480x272;
- TPAC1008/TP1070 => 800x480.

2.1.3 Variables – Device management

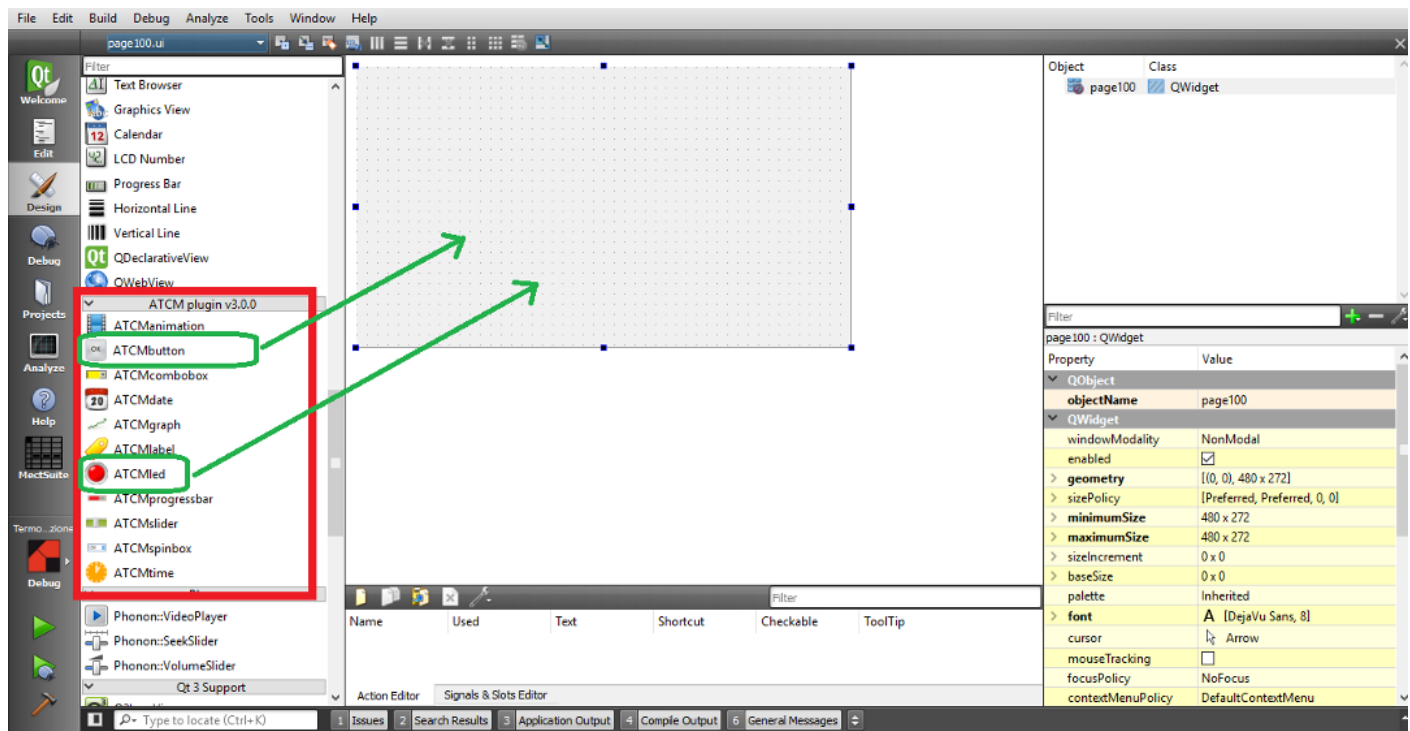
It is possible to modify some of the project settings:

1. **Crosstable Editor** → creation and management of the **variables**;
2. **System Editor** → preliminary setup of the operator panel and setup of communication parameters;
3. **Trends Editor** → configuration of stored variables to show graphics in the time domain.
4. **Devices Editor** → the window provides a topological view of the variables used in the Crosstable;
5. **Timing Editor** → gives a general idea about the time necessary to allow a correct exchange of values between variables with RTU protocol.
6. **MPNC Editor** → configuration of remote I/O nodes of the MPNC family.
7. **MPNE Editor** → configuration of remote I/O nodes of the MPNE family.
8. **Log** → gives a general idea about the stored variables



2.1.4 Adding contents to the page

For adding contents to the pages you only need to drag and drop the graphic elements and then change the properties in the coloured boxes on the right corner.



You can create the application without writing C++ code, the characteristic feature of the Mect Suite is the ATCM plugin.

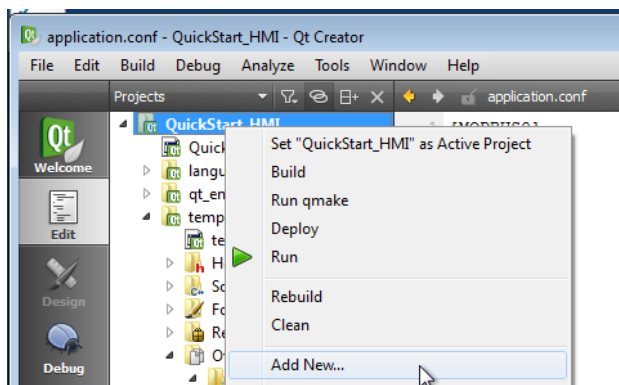
The PLC interaction happens by associating the graphic elements to the Crosstable variables (i.e. inputs, outputs and PLC variables).

For instance if you use an “ATCMbutton” (instead of a Qt “Push Button”) and you associate it to the fourth digital output (PLC_DigOut_4), then when you press the button the PLC drives the output.

The ATCM plugin contains many graphic elements: **ATCManimation, ATCMbutton, ATCMcombox, ATCMdate, ATCMgraph, ATCMlabel, ATCMled, ATCMprogressbar, ATCMslider, ATCMspinbox, ATCMtime.**

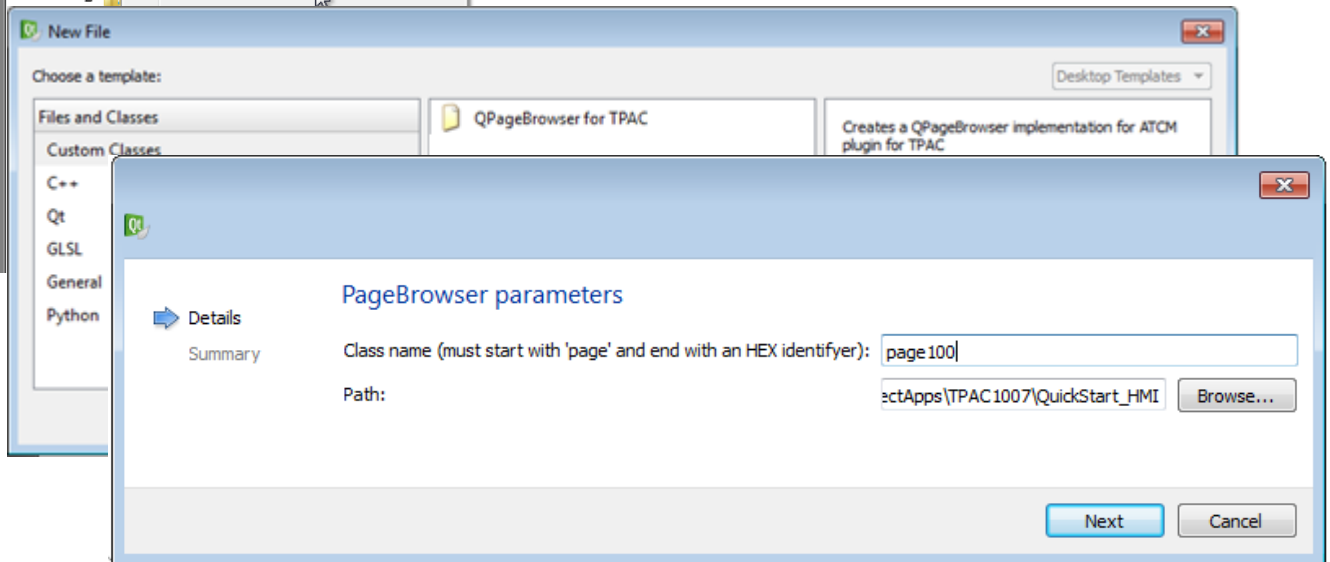
You obviously can use the standard Qt graphic elements (and write the C++ code as necessary).

2.1.5 Add a new page



Choose [Edit] and from the project popup click on **Add New..**

Press “Choose” button and insert the name page.

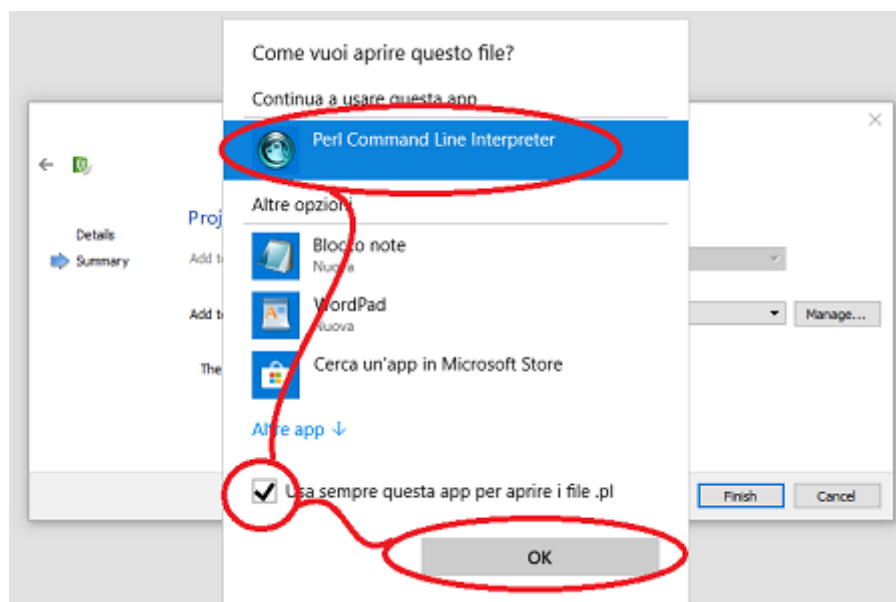


The page name must start with 'page' and end with an HEX identifier (i.e. use only the characters in “0123456789abcdef”).

Use unique names, for example: page200, page300. From the menu page is possible to go directly to page100, page200, page300 and page400.

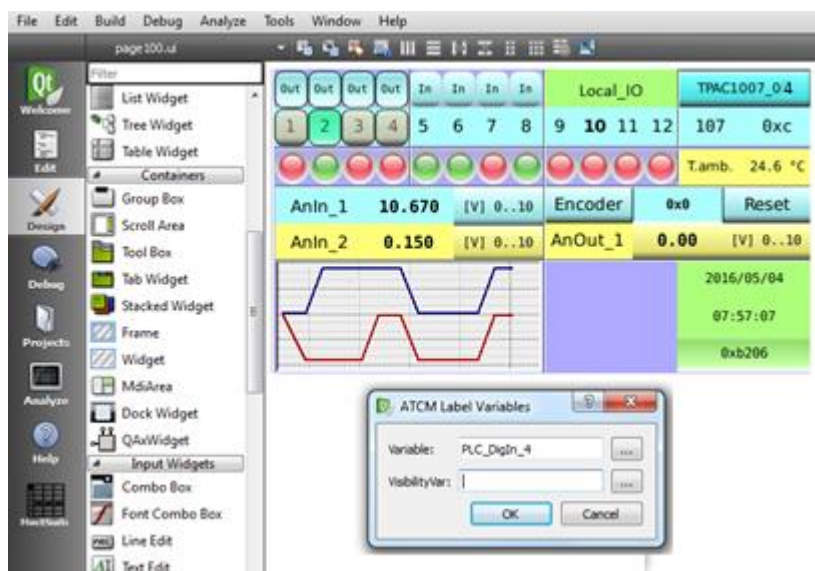
You can open the page just created by double-clicking on the corresponding file.ui under Edit → “Forms”.

Warning: Win10 might bring up this window. Always use the app: Perl Command Line Interpreter. Start from the beginning to create the page.



2.1.6 Associating variables to graphic elements

For associating the Crosstable variables to the graphic elements you must double click on the element itself and select the desired variable (click on "...").



The **preloaded local variables** for the TPAC are:

Variable	Meaning	TPAC1007_03	TPAC1007_04_AA	TPAC1007_04_AB	TPAC1007_04_AC	TPAC1007_04_AD	TPAC1007_04_AE
PLC_DigIn_..	digital input	12	12	9	12	12	8
PLC_DigOut_..	digital output	8	8	8	8	8	8
PLC_DigDir_..	digital direction	8 *	8 *	8 *	8 *	8 *	8 *
PLC_AnIn_..	analog input	2	2	5	2	3	-
PLC_AnOut_..	analog output	1	4	4	1	2	-
PLC_AnInConf_..	analog input configuration	2 **	2 **	5 **	2 **	3 **	-
PLC_AnOutConf_.	analog output configuration	1 ***	4 ***	4 ***	1 ***	2***	-
PLC_Tamb	cold junction compensation	1	1	1	1	1	-
PLC_Encoder	encoder reading/writing value	1	1	-	1	1	-
PLC_StatusReg	I/O board status	-	1	1	1	1	-
PLC_ControlWord	reserved	-	-	-	-	-	-
PLC_EncoderReset	encoder / counter reset	1	1	-	1	1	-
PLC_EncoderStart	encoder / counter enable	1 ****	1 ****	-	1 ****	1 ****	-

PLC_time	seconds since boot (reset each 24h)	1	1	1	1	1	1
PLC_timeMin	10 seconds window start	1	1	1	1	1	1
PLC_timeMax	10 seconds window stop	1	1	1	1	1	1
PLC_FWrevision	firmware version	1	1	1	1	1	1
PLC_HWconfig	hardware configuration	1	1	1	1	1	1
PLC_Heartbeat	I/O board function check	1	1	1	1	1	1
PLC_AnIn...Filter	analog input average	-	2	5	2	3	-
PLC_timeWin	graph display window	1	1	1	1	1	1
PLC_Version	PLC version	1	1	1	1	1	1
PLC_EngineStatus	PLC status	1	1	1	1	1	1
PLC_ResetValues	diagnostic variables reset	1	1	1	1	1	1
PLC_Capture	time between 2 input edges	-	1	-	1	1	-
PLC_buzzerOn	buzzer sound (enable = 1 / disable = 0)	1	1	1	1	1	1
PLC_PLC_Version	PLC version	1	1	1	1	1	1
PLC_HMI_Version	HMI version	1	1	1	1	1	1
PLC_Year	currently year	1	1	1	1	1	1
PLC_Month	currently month	1	1	1	1	1	1
PLC_Day	currently day	1	1	1	1	1	1
PLC_Hours	currently hour	1	1	1	1	1	1
PLC_Minutes	currently minutes	1	1	1	1	1	1
PLC_Seconds	currently seconds	1	1	1	1	1	1
PLC_UPTIME_s	uptime in seconds	1	1	1	1	1	1
PLC_UPTIME_ms	uptime in centiseconds	1	1	1	1	1	1
PLC_WATCHDOG_GEN	enable Watchdog	1	1	1	1	1	1
PLC_WATCHDOG_ms	reset Watchdog timer	1	1	1	1	1	1

PLC_PRODUCT_ID	product ID (HEX)	1	1	1	1	1	1
PLC_SERIAL_NUMBER	serial number	1	1	1	1	1	1
PLC_HMI_PAGE	HMI page (HEX)	1	1	1	1	1	1
PLC_BEEP_VOLUME	beep volume (when buzzerOn)	1	1	1	1	1	1
PLC_TOUCH_VOLUME	touch volume	1	1	1	1	1	1
PLC_ALARM_VOLUME	alarm volume (when alarm)	1	1	1	1	1	1
PLC_BUZZER	enable dynamic buzzer sound (0x44332211 up=0x11(%) on=0x22(cs) off=0x33(cs) rep=0x44(times))	1	1	1	1	1	1

System variables configuration:

Variable	TPAC1007_03	TPAC1007_04_XY
* PLC_DigDir_1 PLC_DigDir_2 PLC_DigDir_3 PLC_DigDir_4 PLC_DigDir_5 PLC_DigDir_6 PLC_DigDir_7 PLC_DigDir_8	8 I/O configuration: 0 input 1 output Es°: ch3 = output PLC_DigDir_3 := 1;	8 I/O configuration: 0 input 1 output Es°: ch3 = output PLC_DigDir_3 := 1;
** PLC_AnInConf_1 PLC_AnInConf_2 PLC_AnInConf_3 PLC_AnInConf_4	analogue input configuration: 0 not configured 1 current 2 voltage 3 TCJ 4 TCK 5 TCT 6 PT100E 7 PT100R Es°: ch1 = TCT PLC_AnInConf_1 := 5;	analogue input configuration: 0 not configured 1 current 2 voltage 3 TCJ 4 TCK 5 TCT 6 PT100E 7 PT100R 8 TCS 9 TCB 10 TCR Es°: ch1 = TCT PLC_AnInConf_1 := 5;

Variable	TPAC1007_03	TPAC1007_04_XY
*** PLC_AnOutConf_1 PLC_AnOutConf_2 PLC_AnOutConf_3 PLC_AnOutConf_4	analogue output configuration: • 0 not configured • 1 current • 2 voltage Es°: ch1= not configured PLC_AnOutConf_1 := 0;	analogue output configuration: • 0 not configured • 1 current • 2 voltage • PWM Es°: ch1= not configured PLC_AnOutConf_1 := 0;
**** PLC_EncoderStart	encoder enable: • 0 encoder disable • 1 encoder bidirectional enable • 2 counter Es°: Encoder = disable PLC_EncoderStart := 0;	encoder enable: • 0 encoder disable • 1 encoder bidirectional enable • 2 counter Es°: Encoder = enable PLC_EncoderStart := 1;

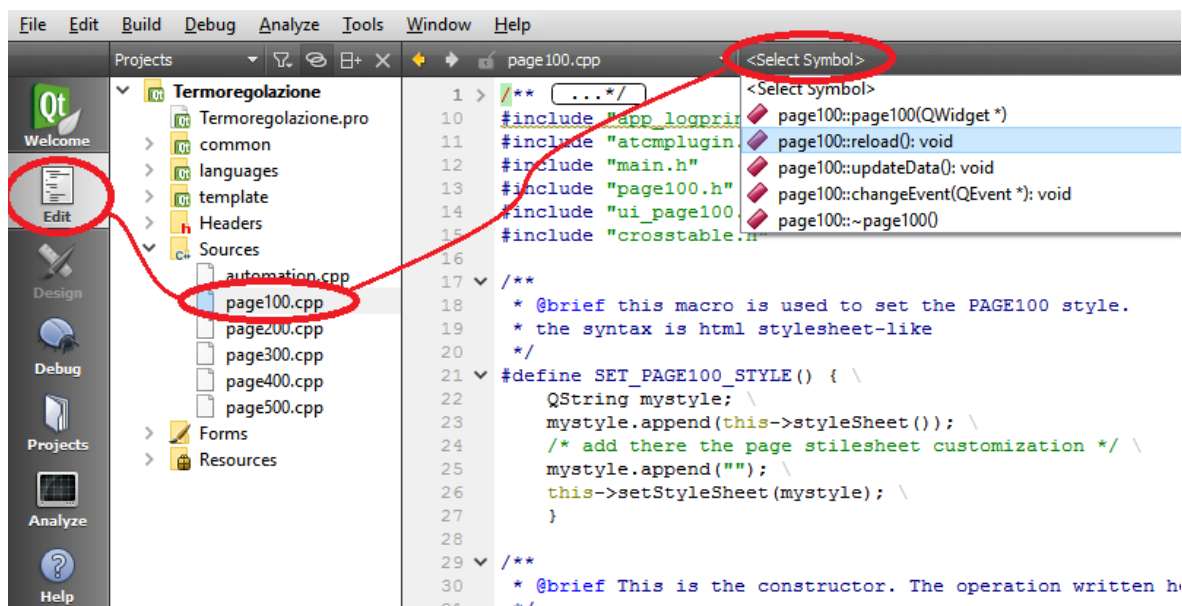
The **PLC_time..** variables are automatically managed and they are helpful for drawing time graphs (the variables are real numbers in seconds and by 10ms steps).

2.1.7 Adding source code

Although it is not necessary to write C++ code, it is possible to do it comunque possibile farlo, for example if you want to manage directly the PLC variables in the HMI application (**Warning:** usually this is done in the PLC application).

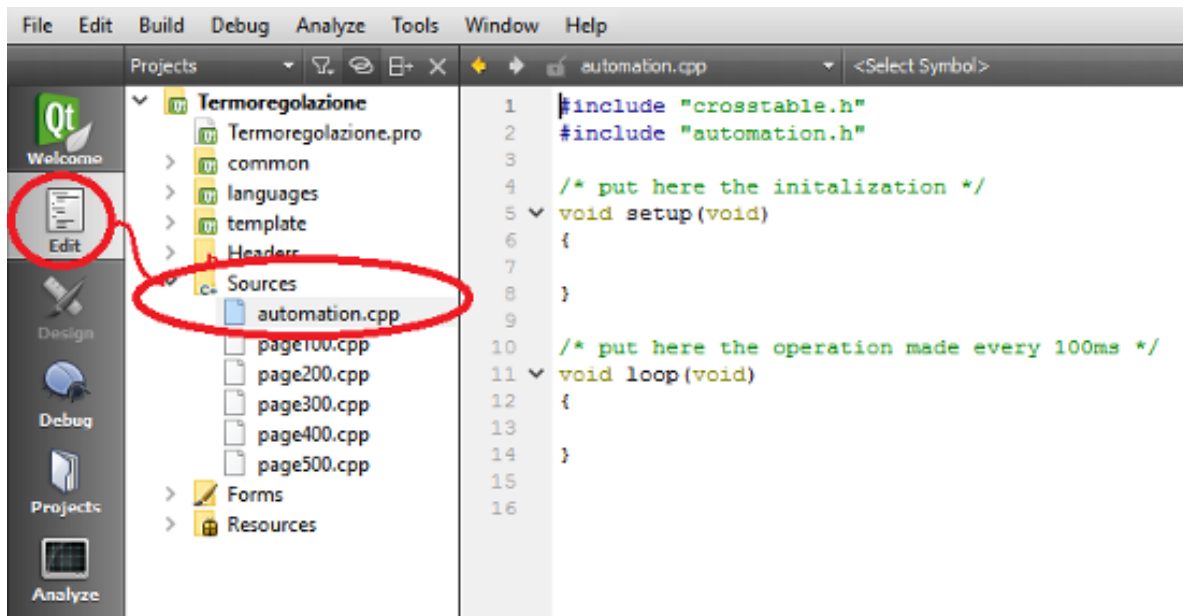
Source code can be linked to each page:

1. in **reload()** method, invoked only when the page is shown on the display;
2. in **updateData()** method, invoked every 500 ms when the page is visible;



Moreover it is possible to write code linked to the application in the file **automation.cpp**:

1. in the **setup()** function, loaded only at the application startup;
2. in the **loop()** function, loaded every 100ms independently of the shown page.



To write a variable in C++ call the function **doWrite_VariableName(value)**, where VariableName is the variable name in the crosstable and value is the value to write. For example to configure as output first digital i/o it is sufficient to write **doWrite_PLC_DigDir_1 (1);**

To assign to the first analogue output the value of the product of first 2 analogue input it is sufficient to write: **doWrite_PLC_AnOut_1(PLC_AnIn_1 * PLC_AnIn_2);**

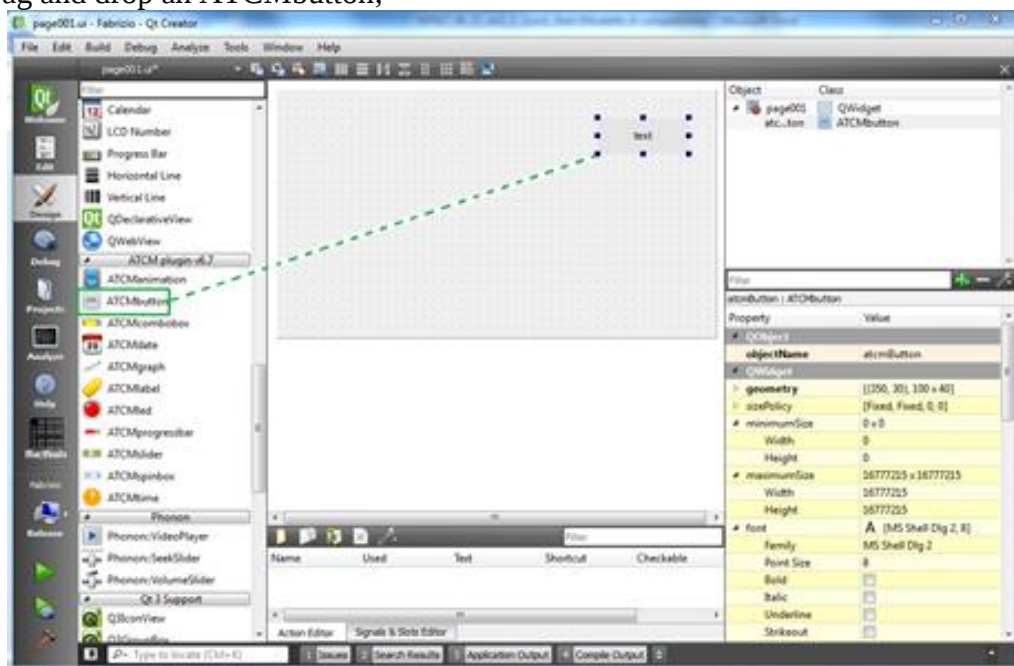
2.1.8 Activating a page change

You can use the **ATCMbutton** as page changers.

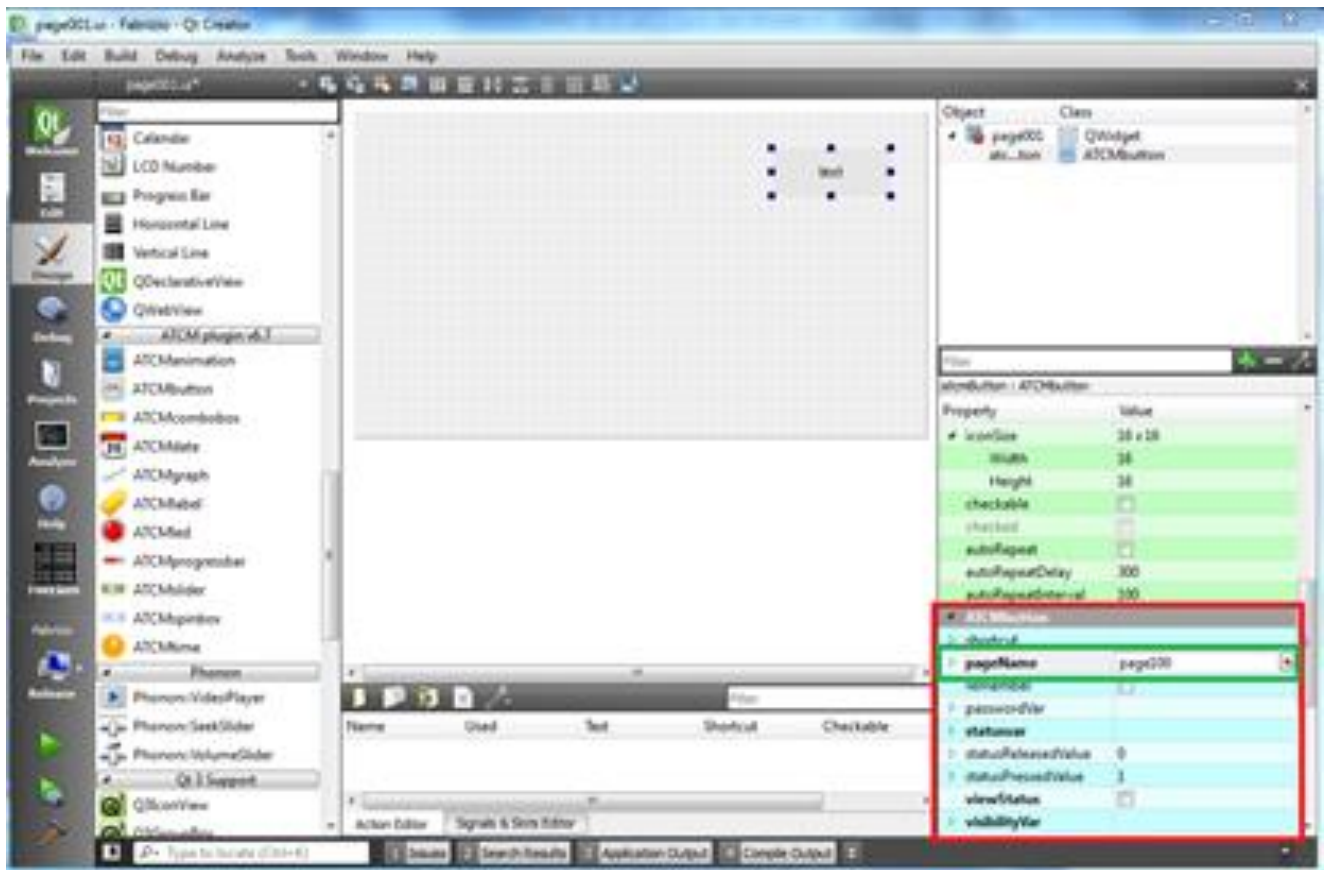
Moreover in the project template some **standard pages** (menu, info, ..) are preloaded.

In page100 the wide "TPAC1007_04" label is an ATCMbutton, that is configured for jumping to the index (menu) of the preloaded pages. You configure it this way:

1. Drag and drop an ATCMbutton;

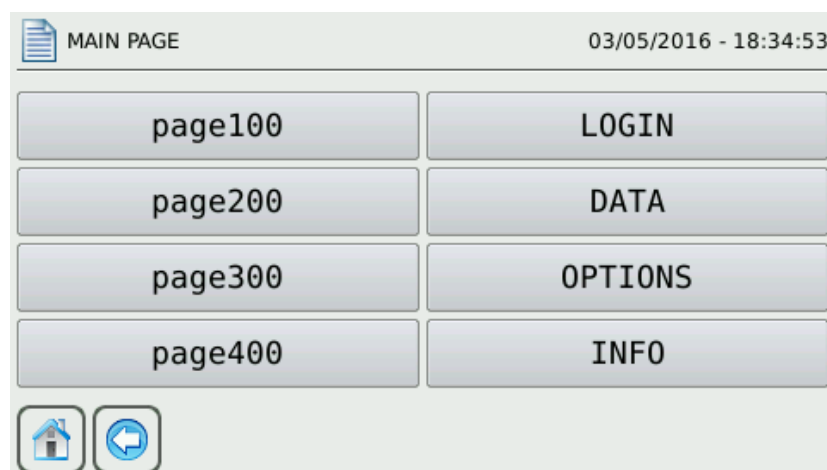


2. Select the button and put the destination page name into the *Property ATCMbutton "pageName"* field, for instance, "page101" or "menu".



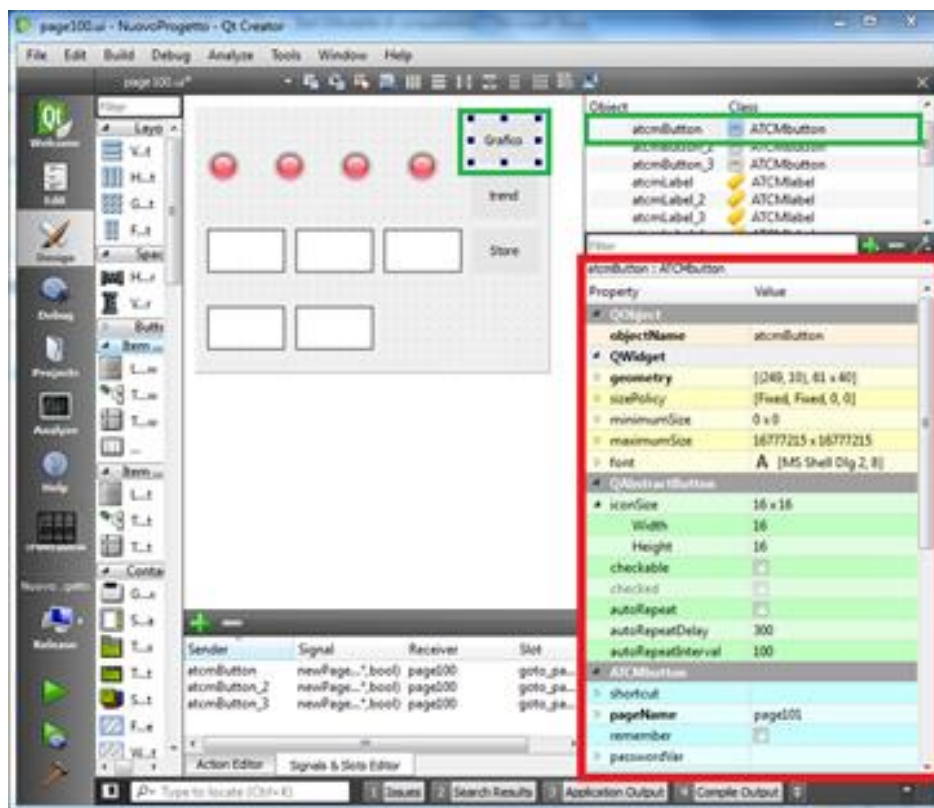
There are some **special page names**:

- “HOME”: jumps to the home page defined in file system.ini;
- “BACK”: jumps back to the last visited page;
- “menu”: jumps to the predefined pages index;
- “trend1”: jumps to the predefined page for graphics variable recording;
- “store”: jumps to the predefined page for tabular variable recording.

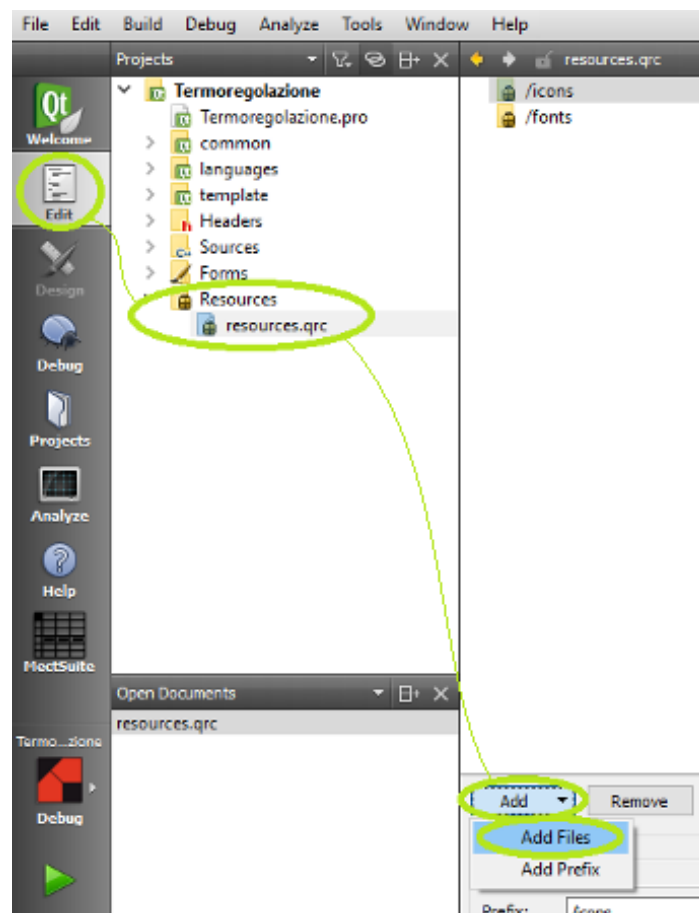


2.1.9 Add icons to buttons

If you wish to add an **icon** to an ATCMButton, click on the button and then select the desired image in the “icon” property.

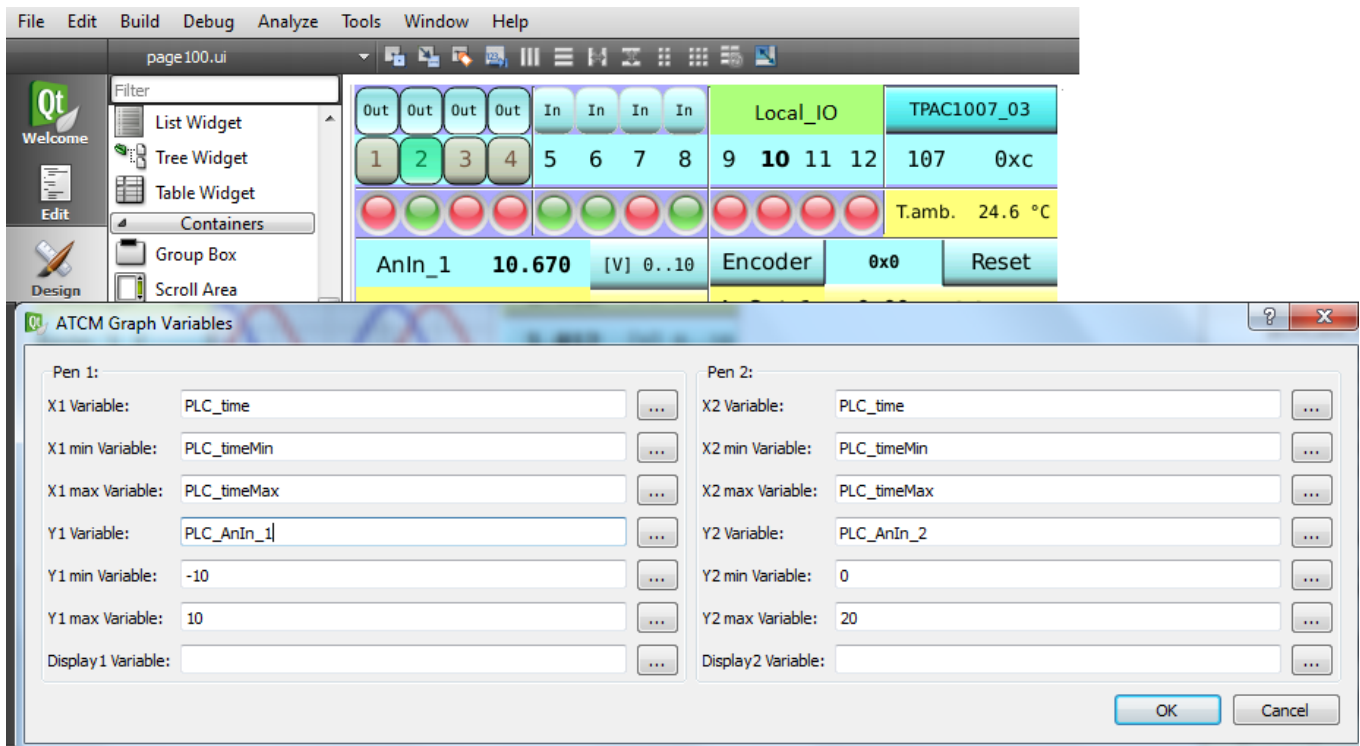


To add a own icon you have to add it to the “resources.qrc” resource (Add File) and save to make effective the addition of icons.



2.1.10 ATCMgraph

You can use “oscilloscope” graphs by dragging **ATCMgraph** into the page and then double clicking on it.



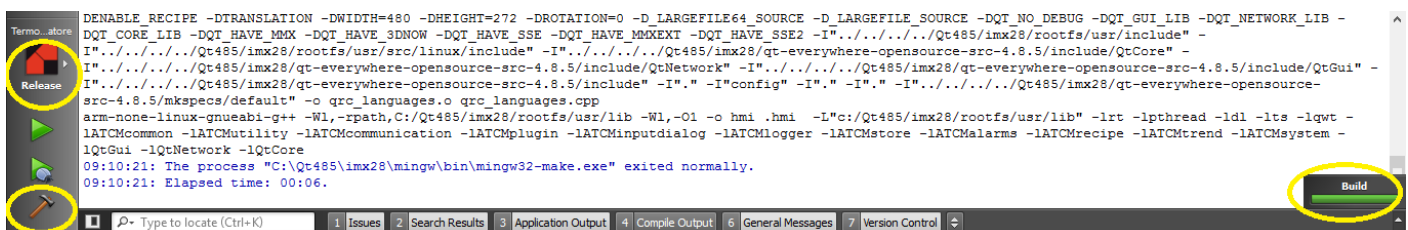
Y1 and Y2 axes: the first 2 analog inputs “PLC_AnI_1” e “PLC_AnI_2” (both are 0-10V and setting the i Ymin and Ymax values we draw them separately).

X1 and X2 axes: we use for both axes the automatically generated PLC timing variables “PLC_time”, “PLC_timeMin” e “PLC_timeMax”, that simply set up a 10 seconds window.

2.1.11 Executable compilation (Build)

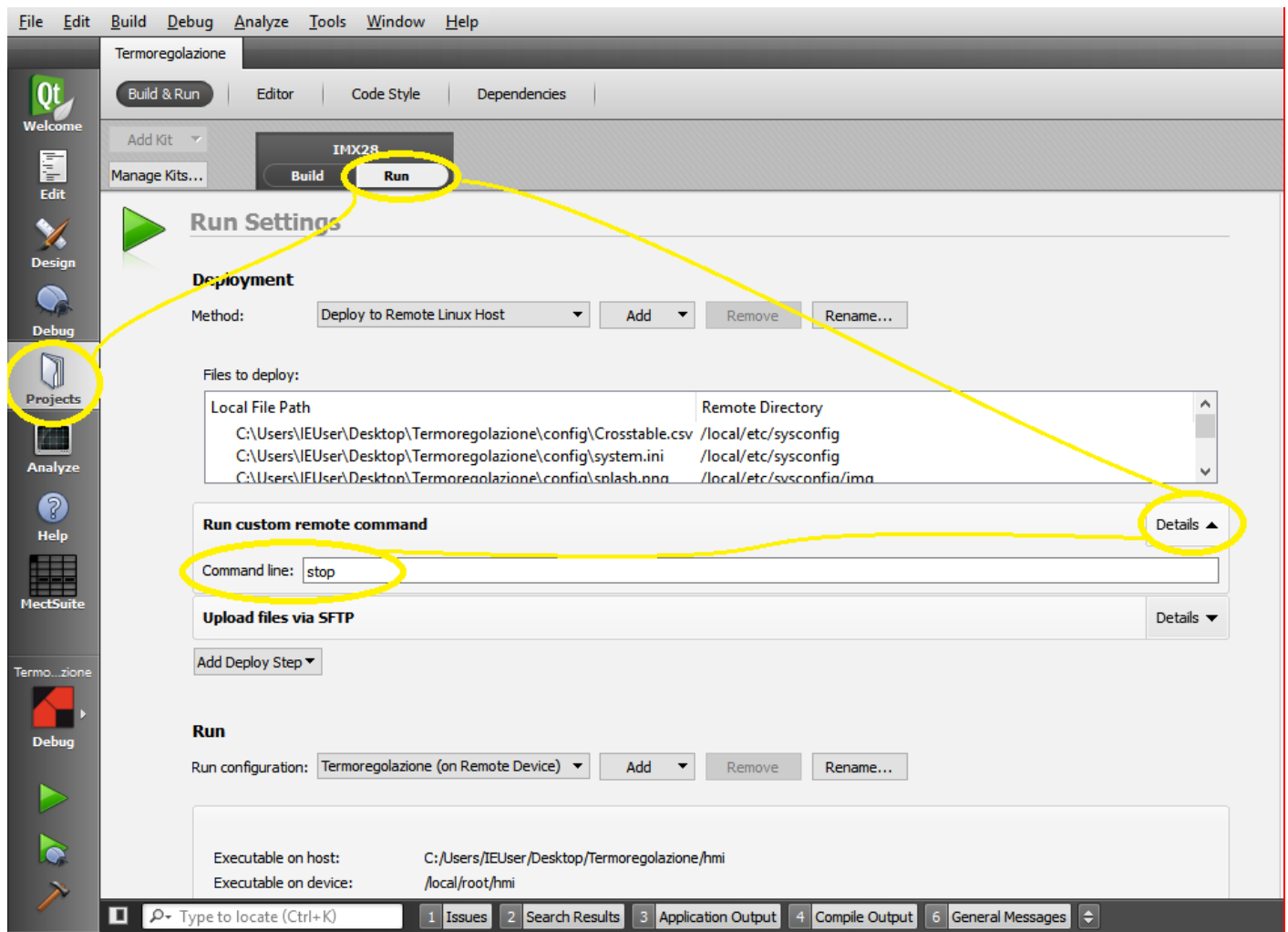
Once the project is done you need to build an executable file for the panel architecture and then upload it to the panel itself.

- Set the QtCreator in “Release” mode;
- Press the **Build** icon (“hammer” in the bottom left corner);
- When the compilation ends correctly a green bar appears in the bottom right corner.

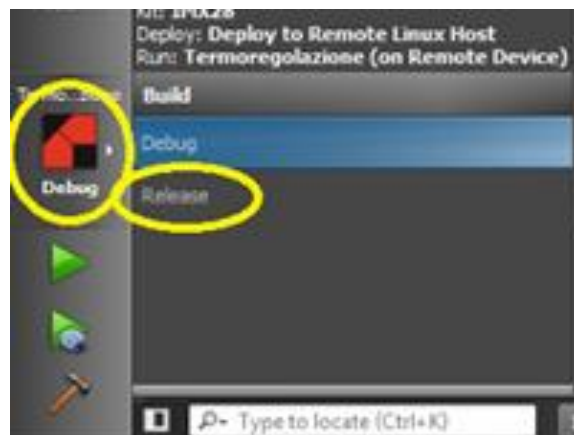


2.1.12 Download to the panel of a graphic application

Connect operator panel to PC by a LAN cable. **First time** you download the executable file (Deploy) you must select “Projects” → “Run” and write “**stop**” (lowercase) in “Run custom remote command”:

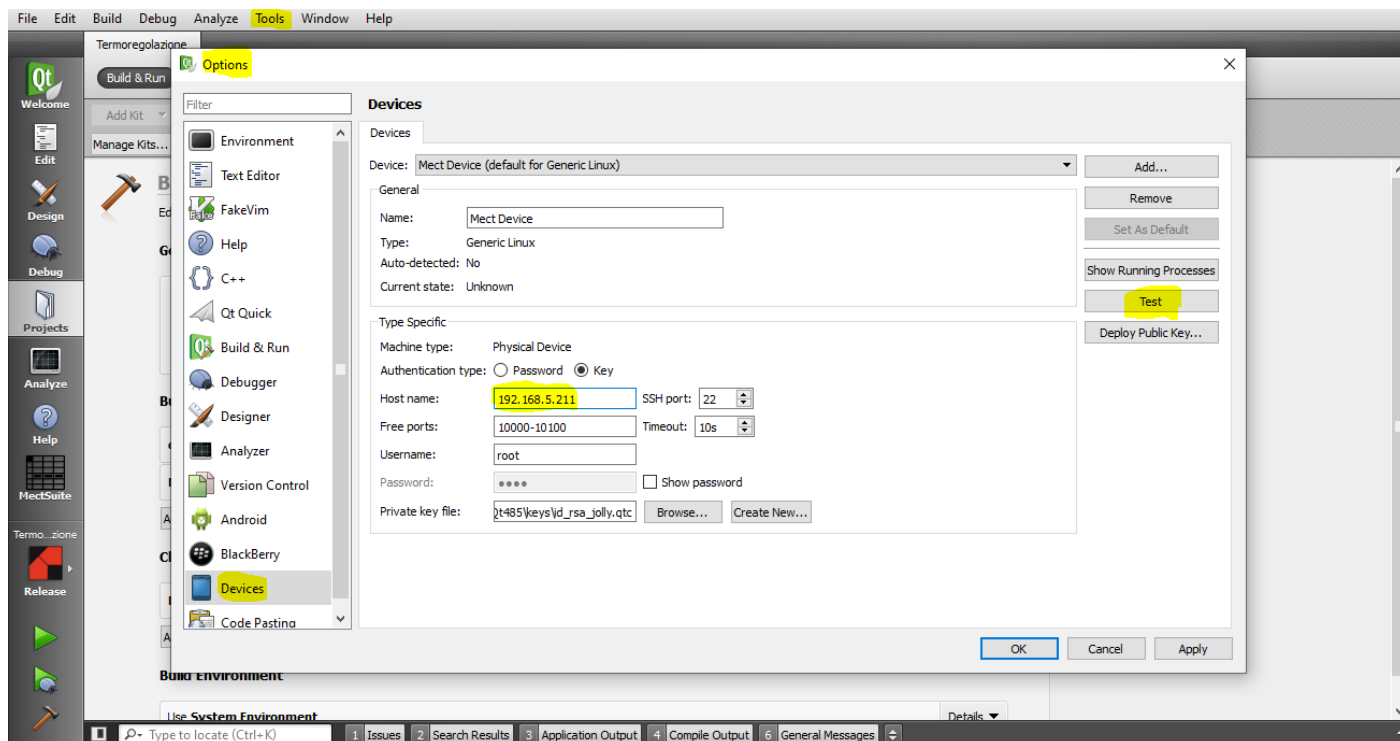


It's better to work in “Release” mode because the application is smaller for the target.



If necessary, it is possible to use a different IP address or a password in the dialog in “Tools → Options → Devices”.

Passphrase: **Vpn:Update1207**



Please check connection between PC and panel. To do it press “Test” key in the right side of the previous figure.

After parameters settings it is possible to send project to the target using the arrow in figure (see yellow circle):

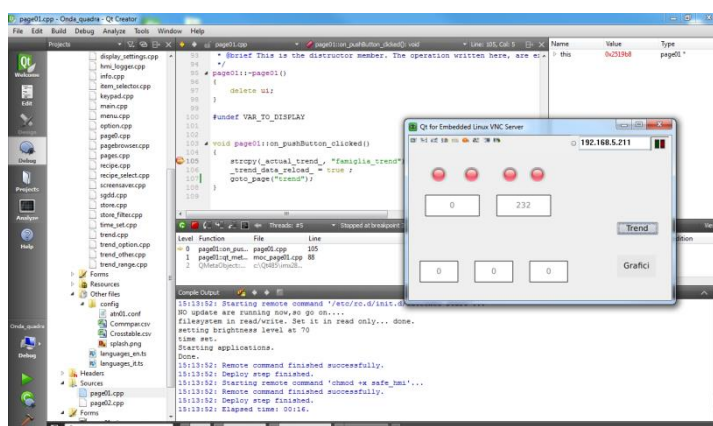


In “[4] Compile Output” you find the copying log (Deploy) and errors.

In “[3] Application Output” you find the application messages.

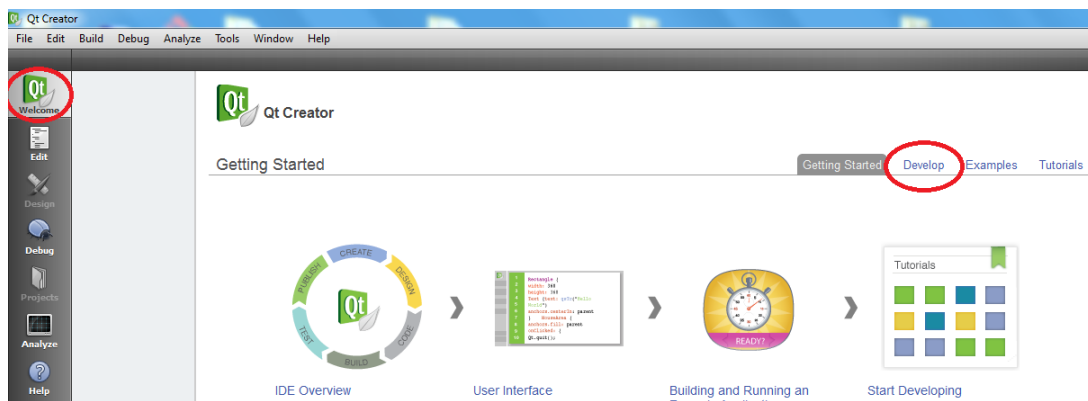
2.1.13 Activation of VNC

You can mount the panels both in horizontal and in vertical position and the configuration is determined to create the project. Moreover the VNC is enabled by default: this means that you can easily see the panel screen from your PC (by using a VNC viewer like for instance UltraVNC Viewer).



2.2 OPENING AN EXISTING HMI PROJECT (QtCreator)

Launch “Qt Creator” and select the Tab “**Develop**”



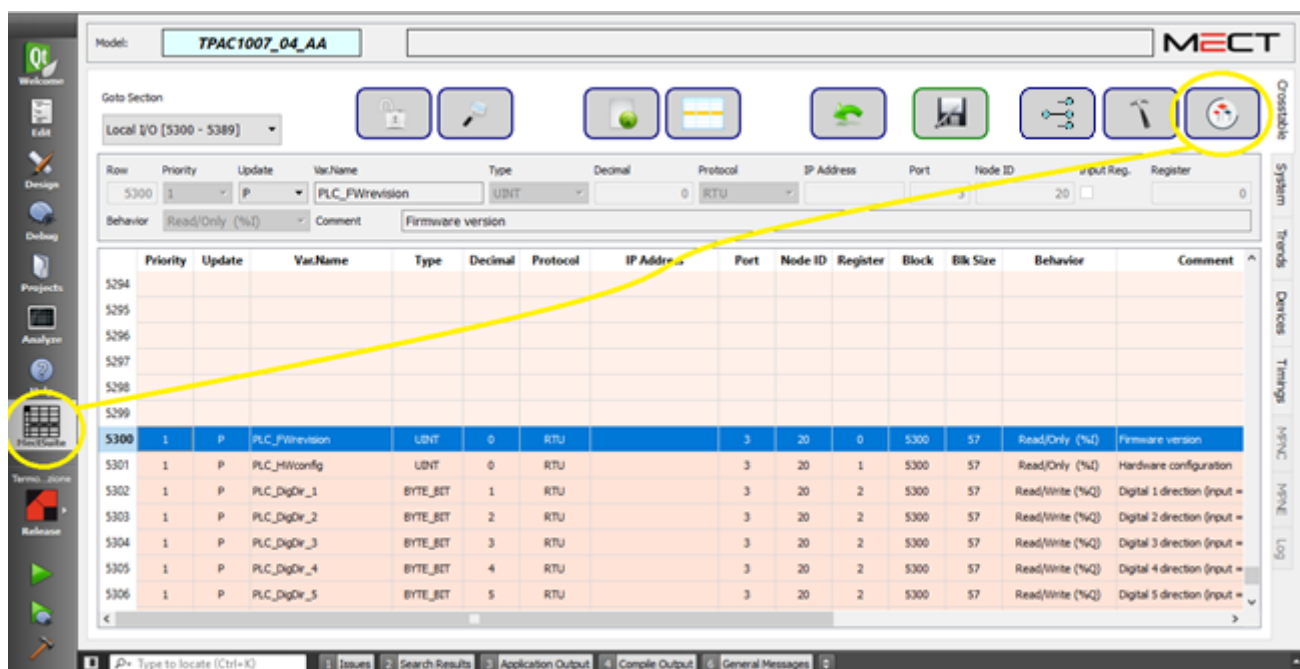
- Select your project from “**Open Project**”
or
- Select your project from “**Recent Projects**”

Warning: If you have renamed or moved the project folder you must verify that the folder name and the location where it is located, there are no spaces or special characters!.

2.3 OPEN THE PLC SOFTWARE

ATCMcontrol Engineering is the software used for managing PLC applications.

PLC software is started by the  Key of the crosstable.



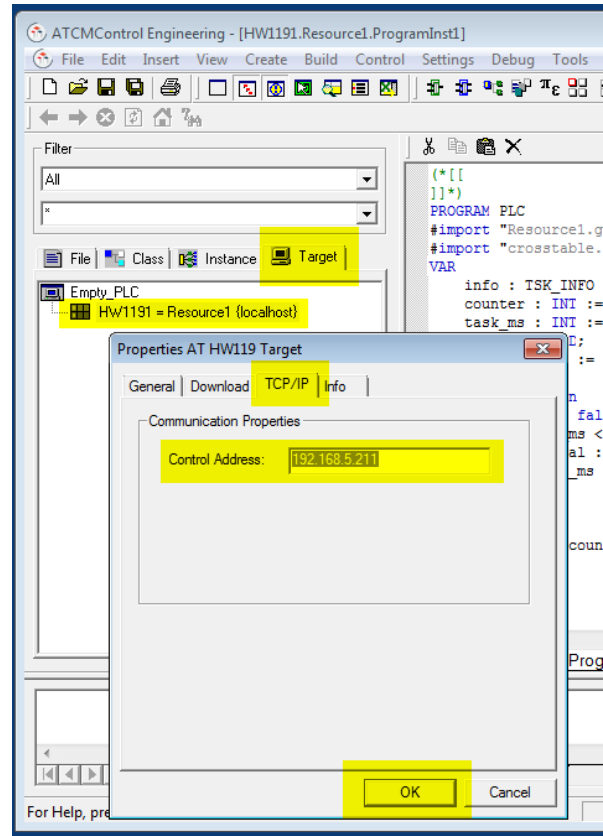
The variables of the Crosstable coincide with PLC software.

You can select the IP address from tab [Target] and in target TPAC popup select in tab TCP/IP the Control Address (default is 192.168.5.211).

Then you can build the application pressing **F7** (Build → Build all): there must be “0 errors” and “0 warnings”.

You can copy and start the application in the panel by selecting “**Flash (and Download)**” on the target TPAC pop up and confirming “debug connection”.

If appears an error dialog should retry to select “**Flash (and Download)**”.



2.4 APPLICATION EXAMPLES (MectApps)

Some application examples (both HMI and PLC) are bound to the Mect Suite software: those examples are useful for describing the system features. You can find the example projects in the **MectApps** folder in C:\Qt485

The application examples are sorted in folders according to the target panels: **TP1043**, **TPAC1007**, **TPAC1008** ... and in **AnyTPAC** the generic ones.