iPRO

PROGRAMMABLE CONTROLLER

OPERATION MANUAL iPRO.GENIUS

Vers. 1.0

1. INDEX

14. CONNECTIVITY

15. ADMINISTRATOR SITE

2. WARNING

WARNING: TO PREVENT FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

	CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE, REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.
	THE LIGHTNING FLASH WITH ARROWHEAD SYMBOL, WITHIN AN EQUILATERAL TRIANGLE, IS INTENDED TO ALERT THE USER TO THE PRESENCE OF UNINSULATED "DANGEROUS VOLTAGE" WITHIN THE PRODUCT'S ENCLOSURE THAT MAY BE OF SUFFICIENT MAGNITUDE TO CONSTITUTE A RISK OF ELECTRIC SHOCK TO PERSONS.
	THE EXCLAMATION POINT WITHIN AN EQUILATERAL TRIANGLE IS INTENDED TO ALERT THE USER TO THE PRESENCE OF IMPORTANT OPERATING AND MAINTENANCE (SERVICING) INSTRUCTIONS IN THE LITERATURE ACCOMPANYING THE APPLIANCE.

WARNING: 	**Dixell Spa can accept no responsibility for any possible damage due the usage of not supported modems.** **Dixell Spa. reserves itself the right to modify this manual without notice. The last version available can be downloaded from the website.** **This controller is compliant with standard EN 12830 if it is used together with probes that are compliant with standard EN 13485**

WARNING: 	**This manual is part of the product and should be kept near the instrument to easy and quick reference.** **The instrument shall not be used for different purpose from those described in this manual. It cannot be used as a safety device.** **Check the application limits before proceeding.**

WARNING: 	**Check the supply voltage is correct before connecting the instrument.** **Do not expose to water or moisture: use the controller only within the operating limits avoiding sudden temperature changes with high atmospheric humidity to prevent formation of condensation.** **Warning: disconnect all electrical connections before any kind of maintenance.** **Fit the probe where it is not accessible by the End User.** **The instrument must not be opened.** **Consider the maximum current which can be applied to each relay (see Technical Data).** **Ensure that the wires for the probes, loads and the power supply are separated and far enough from each other, without crossing or intertwining.** **In case of applications in industrial environments, the use of mains filters (our mod. FT1) in parallel with inductive loads could be useful.**

DIXELL reserves the right to modify or change its products without prior warning.

3. INTRODUCTION

3.1 Main Features

iPRO family, dedicated whether for HVAC units (iPRO Chill and Domo) or for general purposes and refrigeration (iPRO Genius), is characterized by the most advanced technology in connectivity and processing speed.
It is based on a powerful platform that includes one hardware configuration that is able to expand the actual solution in the market, and a software that, thanks to the ISaGRAF® development environment allows the development through standard programming languages.
An easy and useful HMI is also guaranteed through the VISOGRAPH graphic display, as the expandability and the solution to many applications are satisfied with a complete range of accessories, among which, I/O expansion modules and proportional electronic valve management, modem, wiring…

The iPRO Genius family satisfy all requirements regarding the controlling and management of refrigeration, heating, ventilation, electric power and all building automation services.
They are suited for all applications in the PLC world and they find applications in many shopping centres, hospitals, airports, boatyards, energy management plants, and so on…
These controllers provide a high level of technology for ease of external connectivity and programmability providing simple answers to every application's needs, while ensuring a complete local or remote monitoring.

- Fully programmable controllers and high connectivity.
- VISOGRAPH programmable graphic display (LCD – 240x96 pixels).
- Ethernet for connection to an intranet-internet network and to others programmable controllers for a distributed application management.
- USB (host) that allows the download of applications, parameters, data/alarm logger and the applications and parameters upload. It is possible also to upgrade the BIOS of microprocessor.

- CANBus digital communication serial protocol for the connection to other programmable controllers, to I/O expansion modules.
- Two master and slave RS485 serial output.
- ModBUS-RTU standard communication protocol that allows connection to Dixell digital controllers, to XWEB supervising and controlling systems or to applications developed by third Party Systems.
- BACnet communications allows the system to have easy and immediate integration with different manufactures ensuring a complete collaboration.
- The possibility to have a connection to the expansion modules in order to increase system capacity.
- 20VA max power absorption.

3.2 Technical data

LINUX Operative System
200MHz CPU
32bit processor
32MB RAM memory
128MB flash memory capacity (80MB free)

10 configurable Analog Inputs (configurable as Digital Inputs)
6 Analog Outputs (configurable as Digital Outputs)
20 Digital Inputs (free contacts)
15 Digital Outputs (Relay 5A)

Ethernet 10/100
Modem (Internal and External)
2 Master bus (RS485 and Can-bus)
1 Slave bus (RS485 MODBUS RTU)
1 USB
1 VISOGRAPH connection

Power Supply: 24 Vac-dc
Operating temperature: -10 ÷ 60 °C
Storage temperature: -20 ÷ 70 °C
Relative humidity: < 90% (no condensing)
Power consumption: 10W
Protection: IP20 (IP40 for VISOGRAPH)

3.3 Alarm Management

The alarm management system is the fundamental element that increases the plant efficiency, ensuring an immediate identification of plant problems and activates automatic strategies to prevent possible damages. The following possible options are available with iPro GENIUS.

- Alarm sending management by e-mail or sms
- Direct internet connection
- Point-to-point connection via modem, GSM and PDA modem
- Remote command sending via sms
- Possibility of updating the (iPro) on-board software via e-mail

3.4 Plant Status Display

The plant maintenance staff can easily have a report of application status in order to decide how and when to intervene. The report contains all of the most important values, the plant status and operating set point.

3.5 ISaGRAF

In order to create programs that will be uploaded into the iPro series Dixell has selected ISaGRAF®; a software environment that enables you to create local or distributed control systems. ISaGRAF® offers a combination of a highly portable, robust management engine (Virtual Machine) and an intuitive application development environment (Workbench). The output of the development environment is selectable as either portable “C” source code or TIC (target independent code). The ISaGRAF® Virtual Machine is a powerful, optimized and very fast control engine that executes the TIC. Virtual Machine and all options are offered ready to use on NT, Linux, CE 3.0 and QNX. Additionally, this control engine has been designed such that the source code of the Virtual Machine is available in a toolkit

format, providing portability to any OS on any hardware platform. The Enhanced options for ISaGRAF® transform this outstanding controller into a top of the line PLC, DCS or RTU.

3.6 Why ISaGRAF ?

- This development environment is international, complete, standard
- Is ideal for small applications but it can manage several I/O points
- It is the most used (more than 40.000 developers in the world and more than 500.000 applications in the last 10 years)
- It includes 5 different programming languages coded according to IEC61131
- It integrates the best system for simulation and remote debugging
- It is supported all over the world (essential for training and assistance)

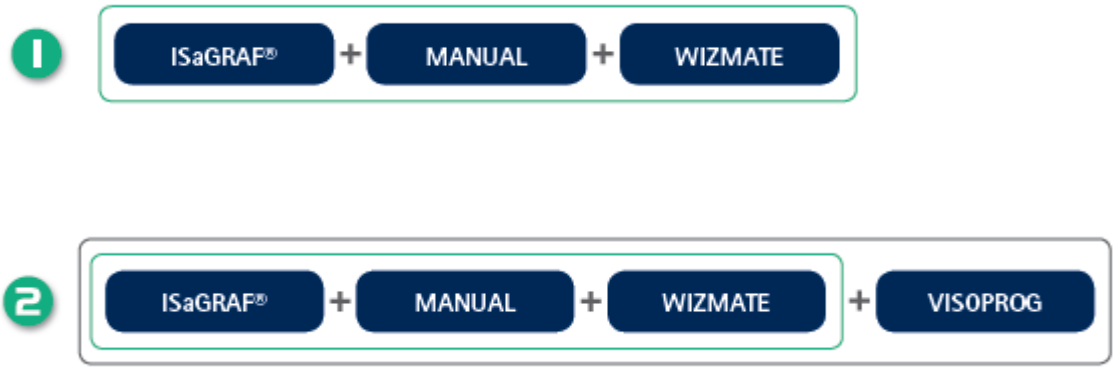
The ISaGRAF® Application development Workbench supports all the standard IEC 61131 control program languages plus Flow Chart.

- SFC: Sequencial Function Chart
- ST: Structured Text
- FBD: Function Block Diagram
- IL: Instruction List
- FC: Flow Chart
- LD: Ladder Diagram

3.7 Development tools

IPRO-TOOL is a complete tool, provided by Dixell, that allows the final user to work independently to create programs for iPRO controllers, taking advantage of all the programmable series potential. The package includes manuals and the **WIZMATE** software, a useful instrument that allows a simple iPRO controllers programming mode. Another utility provided by Dixell is the **VISOPROG** software for the graphic interfaces creation of **VISOGRAPH** displays.

The user can choose between two options:



3.8 Upgrade programs from previous version of ISaGRAF (3.x)

For iPRO is possible to manage programs that have been developed with ISaGRAF 3.x version; it is not possible the opposite.

If the program contains ISaGRAF standard function block, they can be converted automatically.

If the program contains ISaGRAF custom functional block (for example blocks made from other company), it will be necessary to codify and rewrite them for the new version.

3.9 Minimum system requirement for PC

When connecting through the LAN, the PC client computer must have installed these components:

- Windows 98®, Windows 2000, WindowsXP.
- Pentium II 300MHz with 64Mb ram or higher
- Java Virtual Machine
- Explorer 5.5 or higher, Firefox

If necessary, inside the CD-ROM you will find the Java Virtual Machine program distributed by Sun® Microsystems.

Java is a trademark of Sun Microsystems, Inc.

Dixell S.p.a. is not responsible for any kind of damage occurring after the loading of the Java Virtual Machine program into the user's PC.

3.10 Inside the packaging

4. BASIC Input/Output CONFIGURATION

iPro

PROGRAMMABLE CONTROLLERS

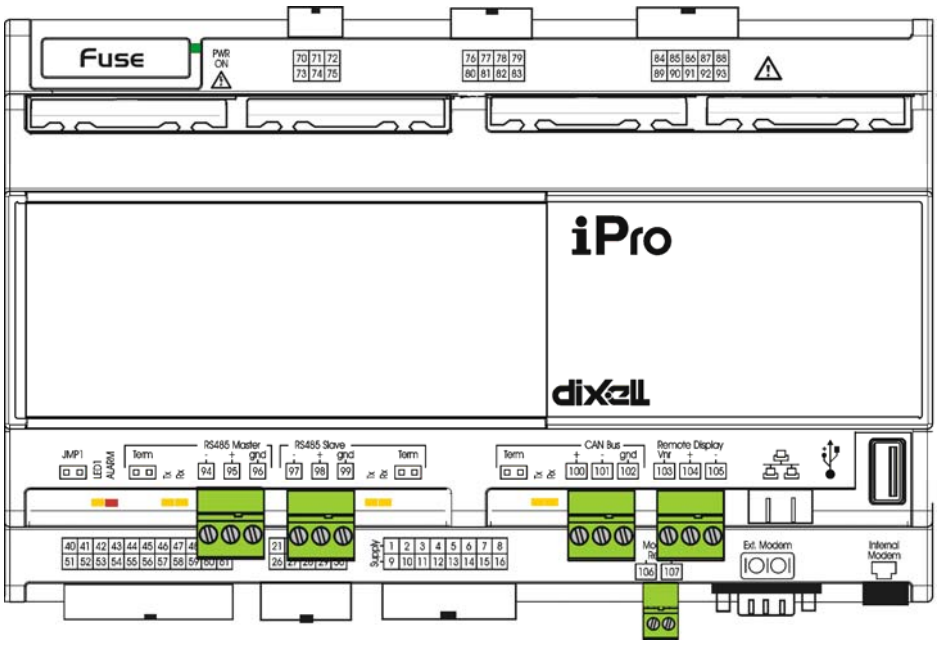
D: 4 DIN Rail

D: 10 DIN Rail

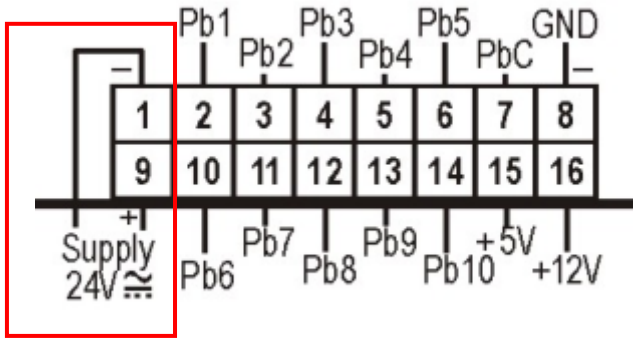
IPG110D	General purposes programmable controller with 10 relay outputs
IPG115D	General purposes programmable controller with 15 relay outputs
IPROEX60D	Expansion module for iPro family programmable controllers

FEATURES	IPG110D	IPG115D	IPROEX60D
Power supply	24Vac/dc (from TF20D)	24Vac/dc (from TF20D)	24Vac/dc (from TF10D)
Probe inputs			
0÷1V - 0÷5V - 0÷10V - 2÷20mA - 4÷20mA - NTC - PTC - DI	10 config	10 config	7 config
Digital inputs			
Opto-insulated	20 config	20 config	3 config
Relay outputs			
Configurable	9 x 5A + 1 x 8A	12 x 5A + 3 x 8A	6 x 5A
Other outputs			
PWM outputs for fan speed module	2	2	
0÷10V or 4÷20mA outputs for fan speed module	2 config	2 config	
0÷10V outputs for external relay drives	4 config	4 config	3 config
Remote keyboards (up to 2)	VGIPG	VGIPG	
Master serial output	RS485	RS485	
Slave serial output	RS485	RS485	
USB	pres	pres	
Modem output	GSM, XWEB Modem opt	GSM, XWEB Modem opt	
CANBus output	pres	pres	pres
Ethernet enabled	opt	opt	
Other			
Expansion module	IPROEX60D	IPROEX60D	
DIP switch for address selection			pres
Internal modem	opt	opt	
RTC	pres	pres	
Buzzer	pres	pres	

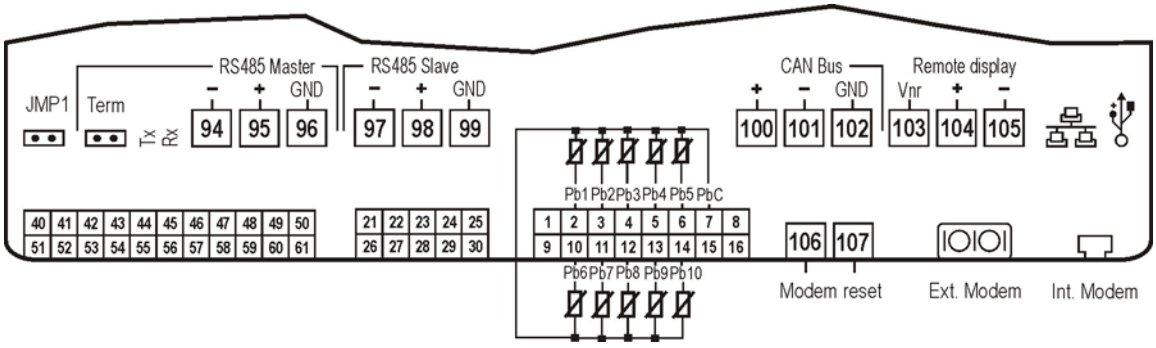
Configurable means that every inputs or output can be configured different each other.



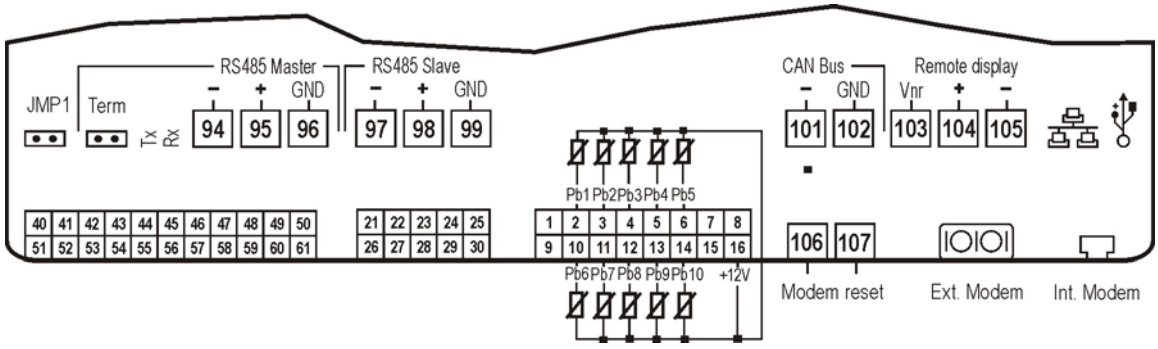
4.1 Power Supply



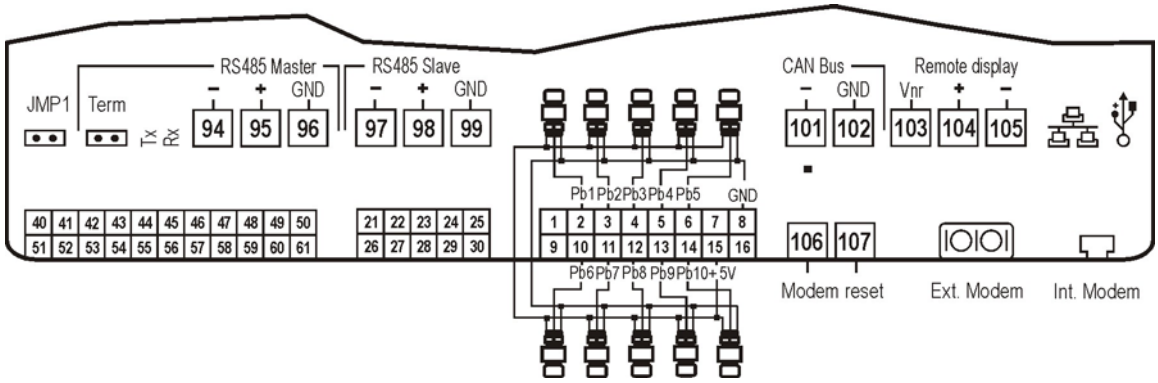
4.2 Analog Inputs (Probes PTC-NTC)



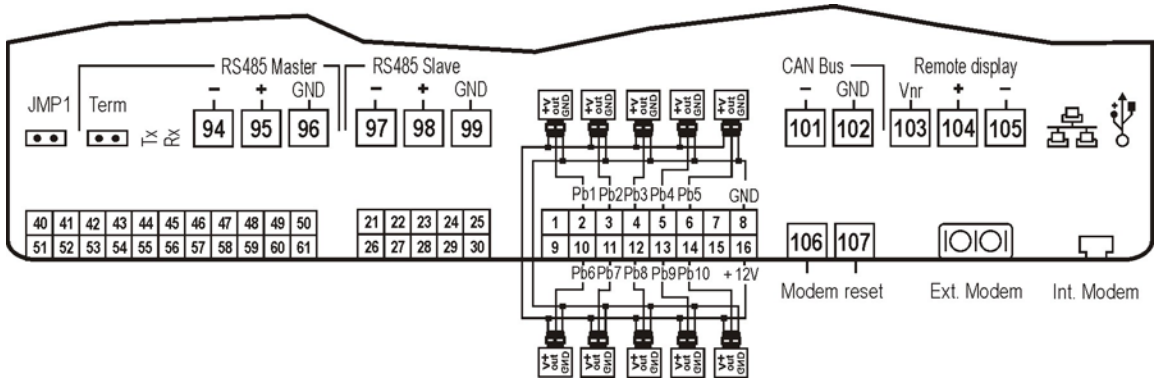
4.3 Analog Inputs (Pressure transducers 4÷20mA, probes 0÷20mA)



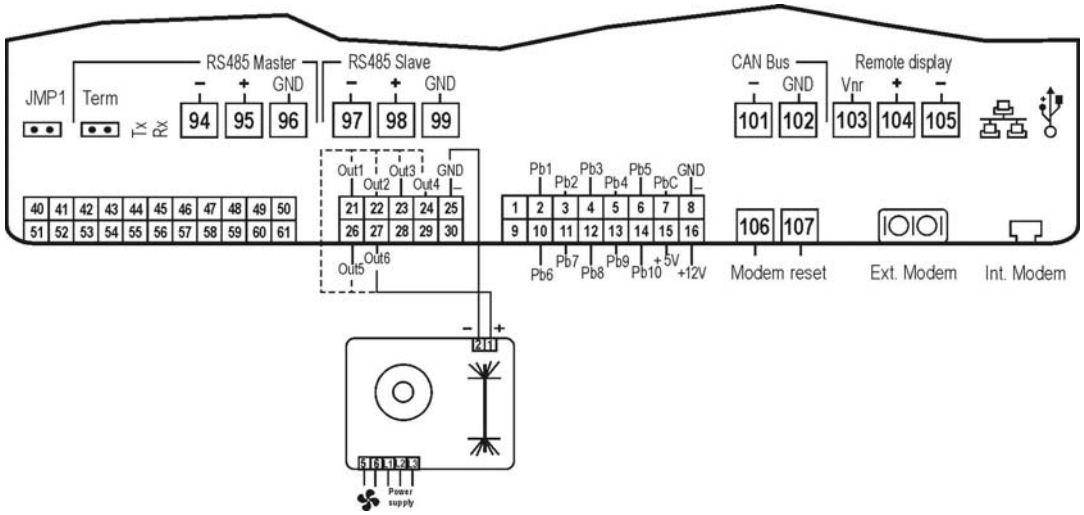
4.4 Analog Inputs (Pressure transducers 0÷1V, Ratiometric 0÷5V - 0÷10V)



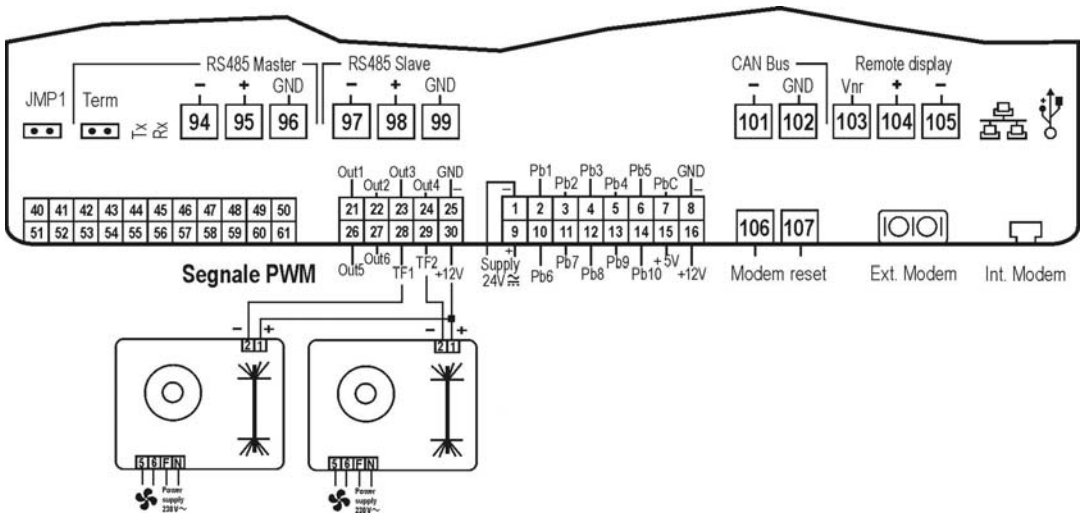
4.5 Analog Inputs (Probes 0÷1V - 0÷10V)



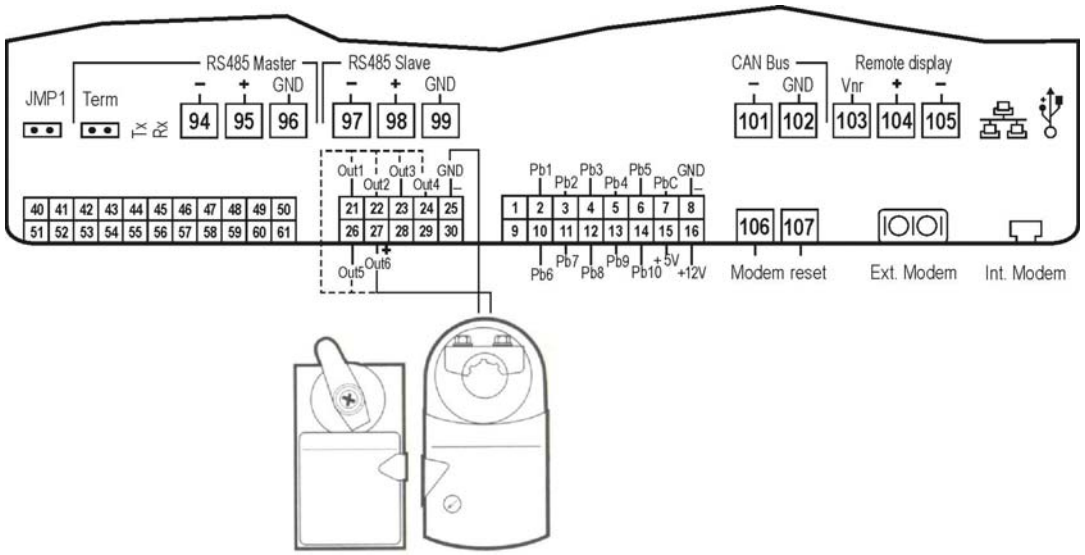
4.6 Analog Outputs (0÷10V - 4÷20mA signal for condenser controls)



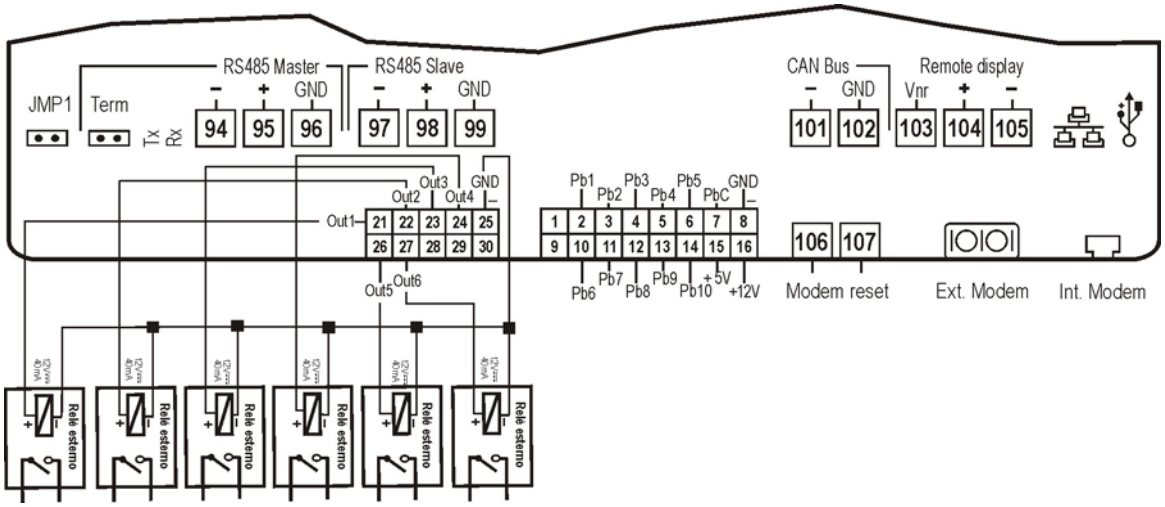
4.7 Analog Outputs (PWM signal for fan speed module)



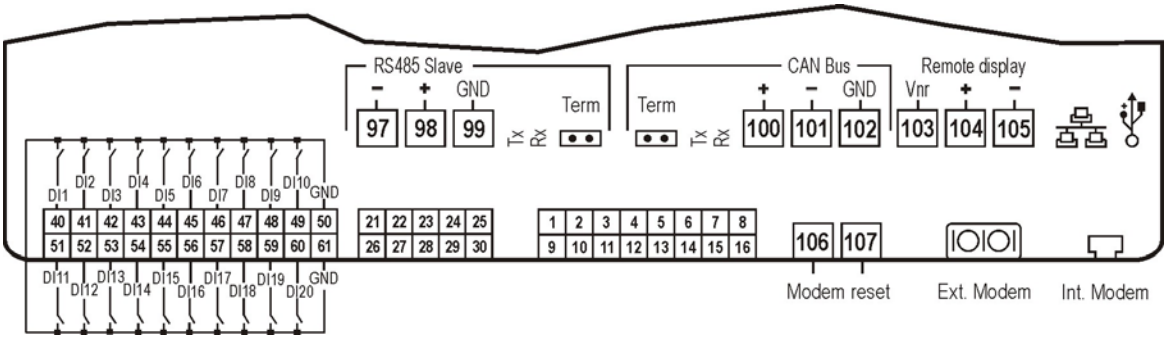
4.8 Analog Outputs (proportional signal 0÷10V, 4÷20mA for actuators/ servo-motors)



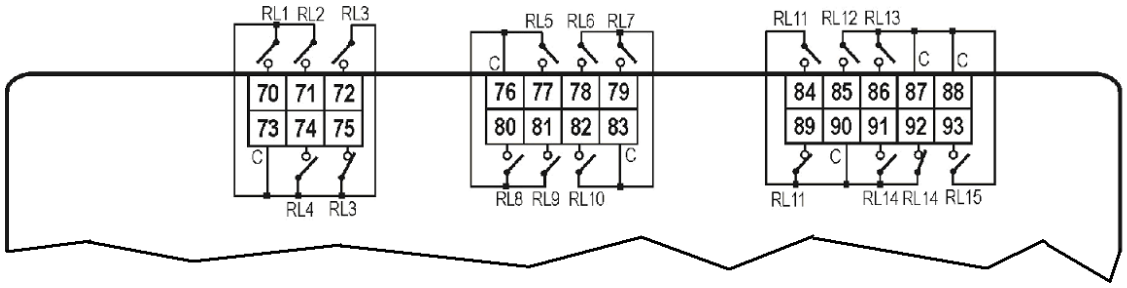
4.9 Analog Outputs (configured to control remote relay)



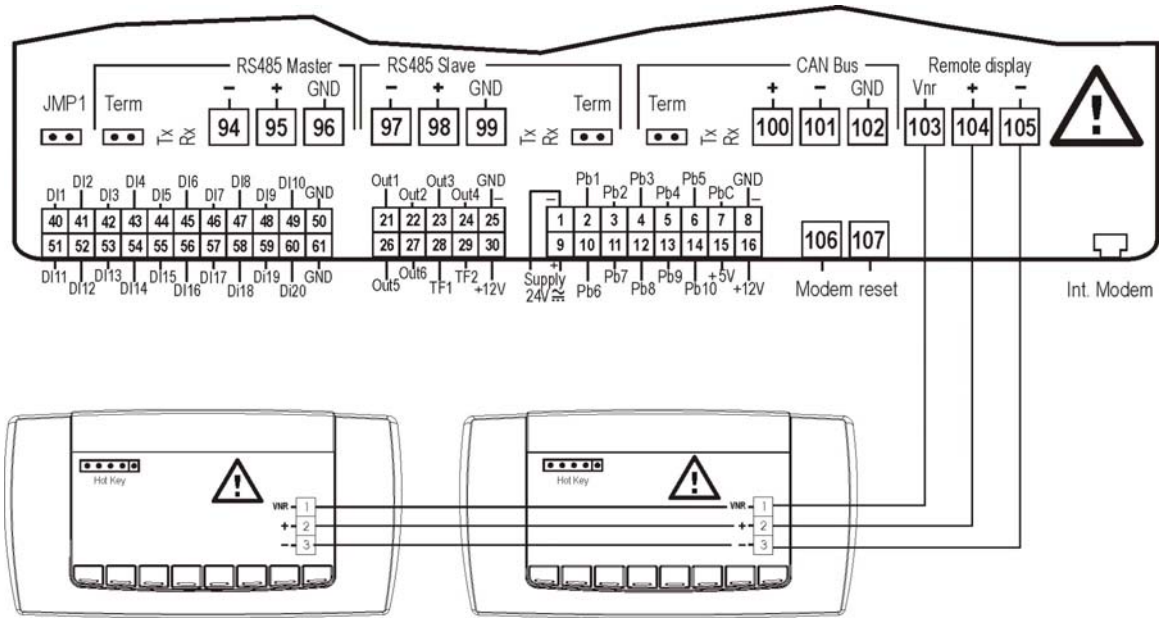
4.10 Digital Inputs



4.11 Digital Outputs

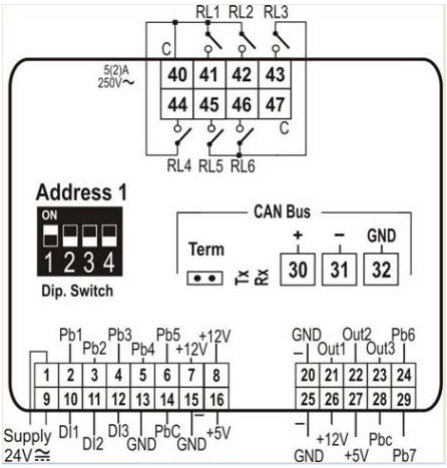


4.12 Visograph connection



IT IS VERY IMPORTANT TO RESPECT THE POLARITY OF CONNECTIONS TO AVOID THE DAMAGING OF THE VISOGRAPH.

4.13 Expansion Module (specifications and connections)



Can bitrate = 100Kbit/s (set-up this value through the browser

Power supply: 24V Vac/dc

Analog Inputs: 7 configurable
0÷1V, 0÷5V, 0÷10V,
0÷20mA, 4÷20mA, NTC, PTC, DI

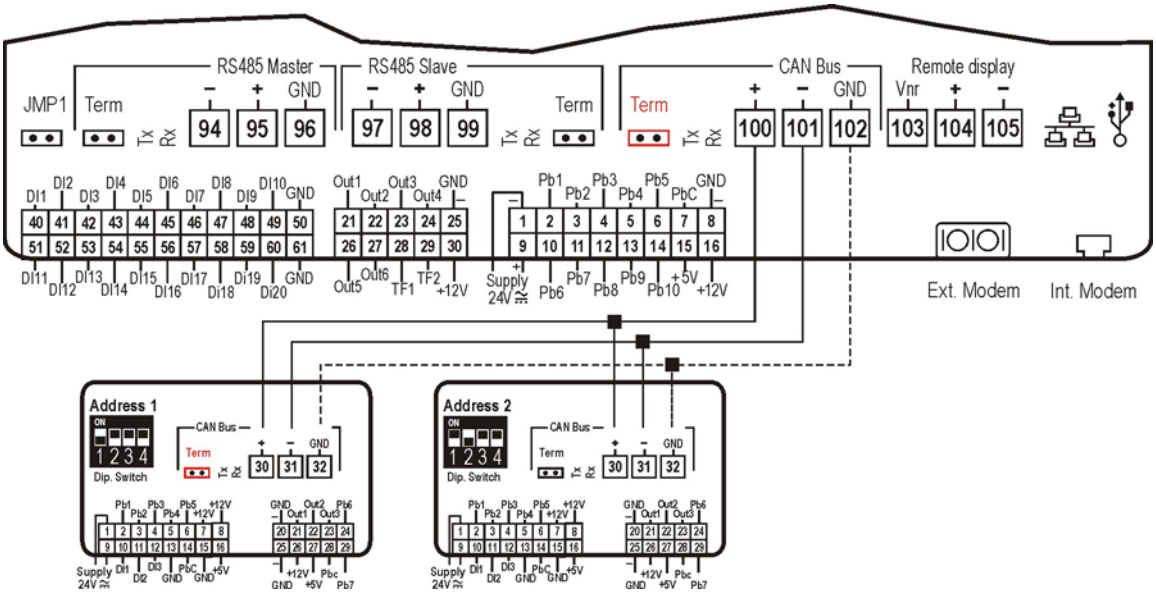
Analog Outputs: 3 configurable
0÷10V (or DO for relay)

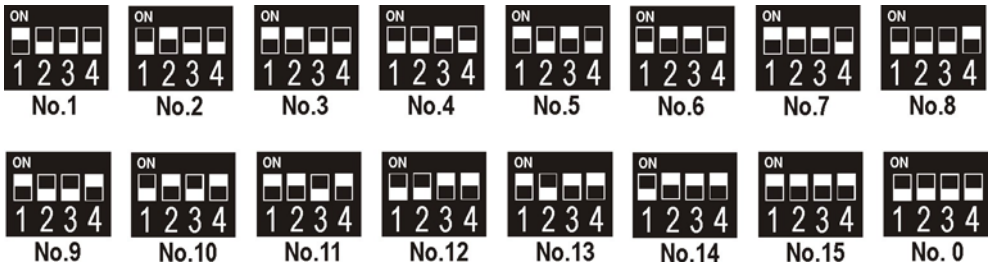
Digital Inputs: 3 (free contacts)

Digital Output: 6 relay 5A 250V

Connection: 1 CANBus

Address: Dip switch 4 positions





4.14 Other connections

For all the other connections, please refer to the section No. 14.

5. HOW TO START

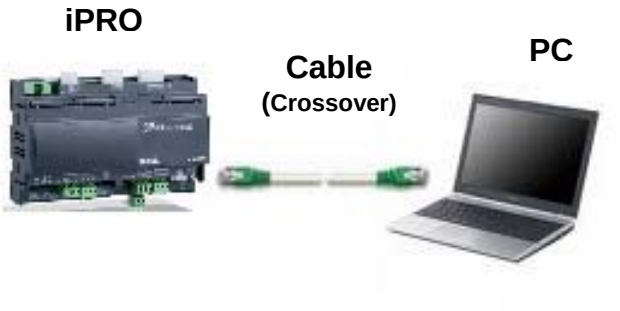
5.1 Ethernet 10/100 connection

With this connection is possible:

- To connect the iPRO with the personal computer; through ISaGRAF workbench you download and debug the application.
- To connect more iPRO; different applications on different iPRO to exchanges variables.
- To send mail and sms; you can program your iPRO so that it can sends mail/sms on time or on demand.
- To visit your own website; you can program iPRO with your own web site. With a standard browser, a user can read/write variables.

5.2 Direct connection (between iPRO and PC with a cable)

With this kind of connection is possible to connect directly your personal computer with the programmable controller iPRO. In this case, you need a standard “Crossover Cable” (cod. Dixell CAB/WEB/PC). The PC can communicate with the iPRO only if the settings in the devices are aligned; this means that the PC and the iPRO have to work in the same network.



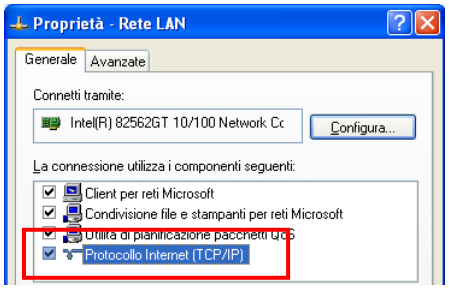
The procedure is the following:

- Disconnect your computer from the data network of your company and connect the PC with the iPRO through the Crossover cable.
- The personal computer has to be set in the same network of the iPRO.
  - In the windows environment click with the mouse on “start” button 

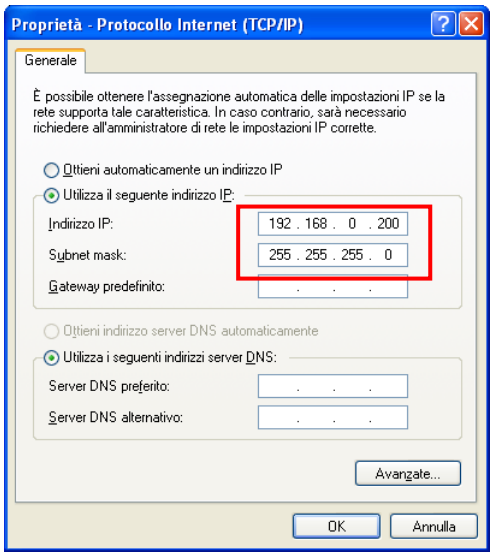
.
  - Choose “Control Panel” and select “Network and dial-up connections’ 

.
  - Choose “Local area connection” 

.
  - Choose “Properties” and double click on “Internet Protocol (TCP/IP)”.



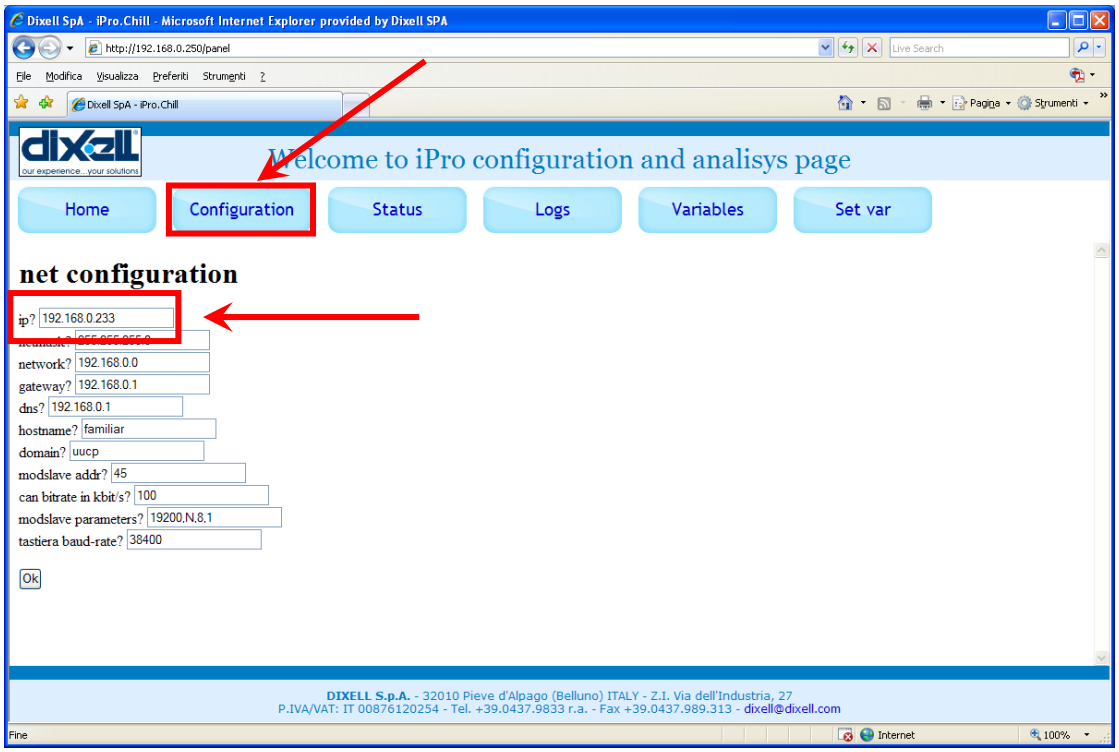
  - In this window set the following parameters (as showed in the picture):
    - IP address: 192.168.0.200
    - Subnet Mask: 255.255.255.0



  - Click “OK” to confirm.

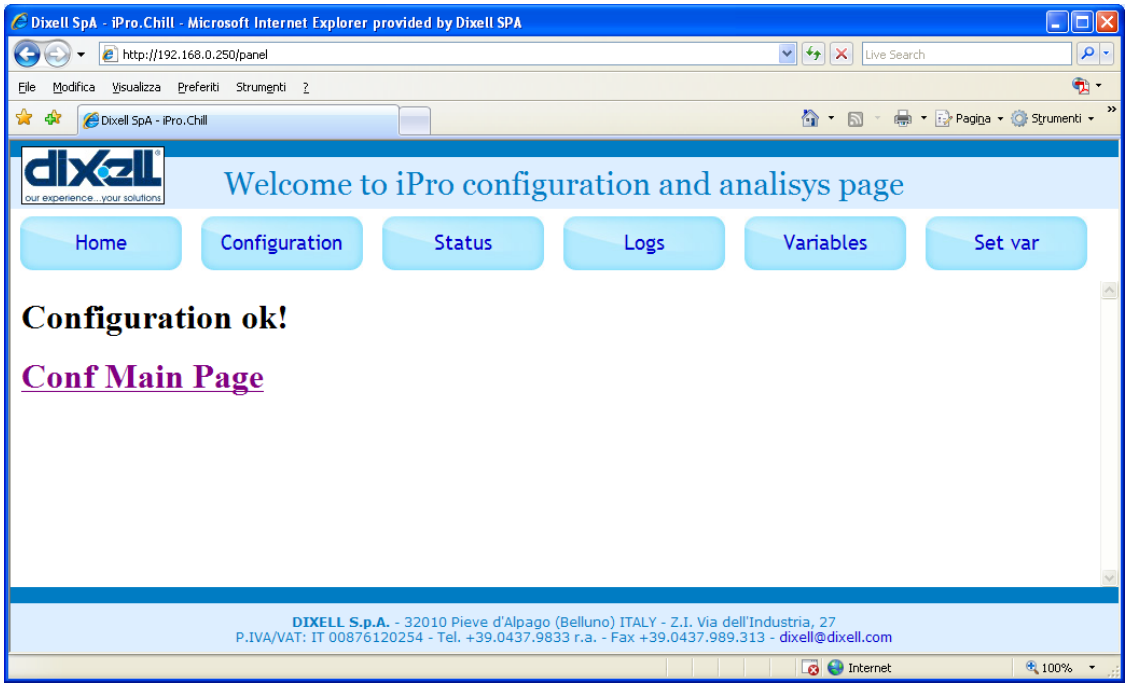
Launch the browser in your computer and write the following web site address: http://192.168.0.250/panel (if your IP is different, write the correct one):

If necessary is possible to change the IP address; click the Configuration button and in the IP box write the new address (for example if your IP address is: 192.168.0.233).



Click “OK” to confirm the operation.

If everything is ok, the message will be:



Now it is necessary to restart the iPRO.

To test the connection follows the procedure in the chapter 5.3.

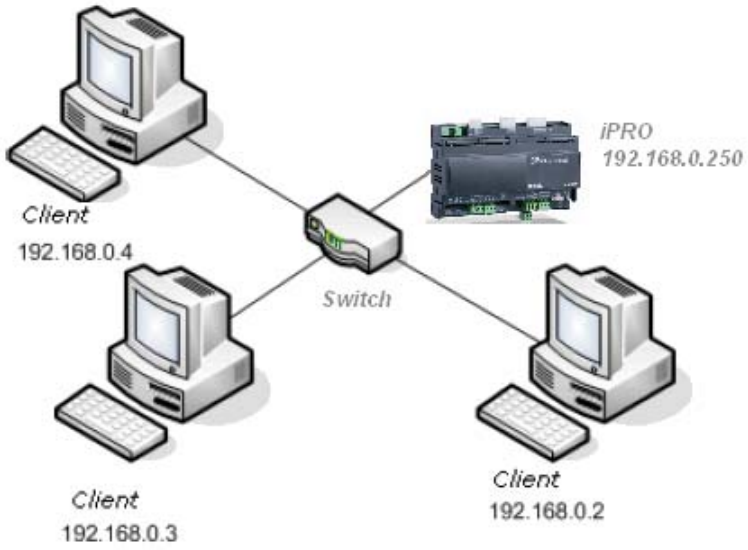
5.3 Intranet / Ethernet connection (Local Area Network)

The Intranet or Ethernet connection should be initially managed by the net administrator that will assign one free IP address to reach the iPRO. This number is an example of what you should expect with the default IP of the iPRO: 192.168.0.250.

After receiving the address from your network Administrator the iPRO must be set with this number (through the procedure described in the chapter 5.2).

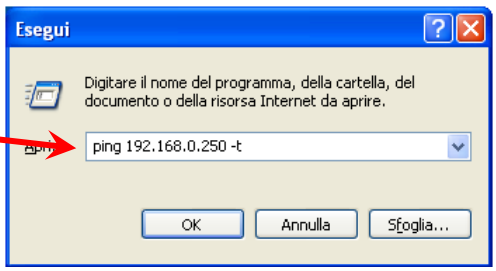
Use a standard RJ45 network cable to connect the unit to your existing LAN.

The Intranet method allows the connection to interact with iPRO from all the PC Clients.

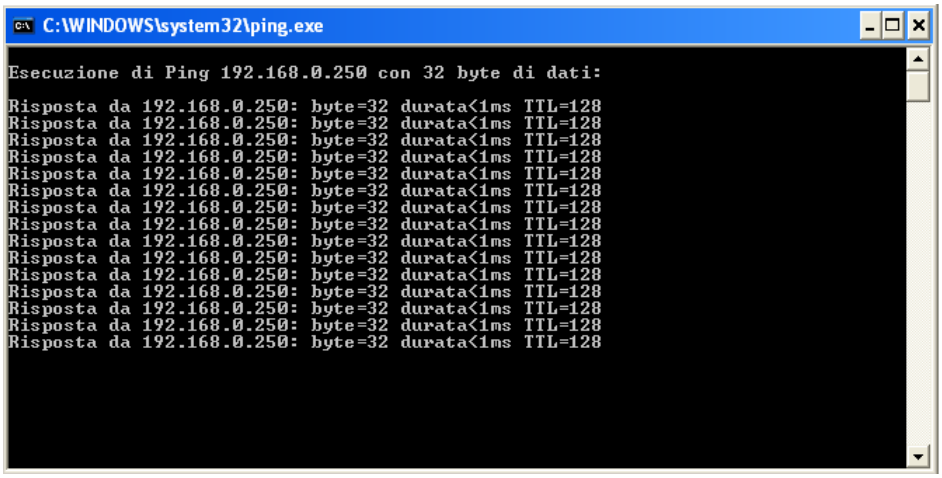


To check if the connection has been established try in this way:

- From your computer launch: start -→ run
- In the box write the following string:
- Then click OK.



If the connection is OK, in this window you will see the following information:



5.4 Port forwarding

Port forwarding allows remote computers (e.g. public machines on the Internet) to connect to a specific computer within a private LAN.

The ports that have to be opened are:

- 22 for SSH protocol
- 80 for browser (internet explorer, firefox, …)
- 1131 for ISaGRAF WorkBench
- 6666 used for remote update

5.5 Modem connection

6. ISAGRAF INSTALLATION AND SET-UP

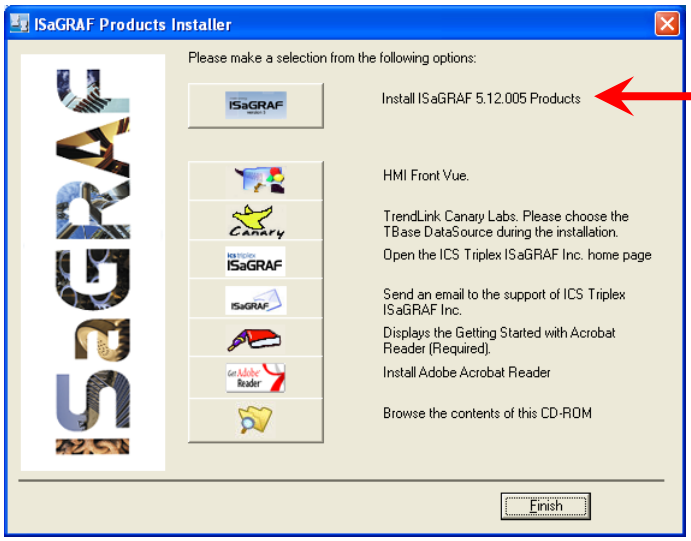
6.1 Requirements

To develop the software with ISaGRAF are necessary:

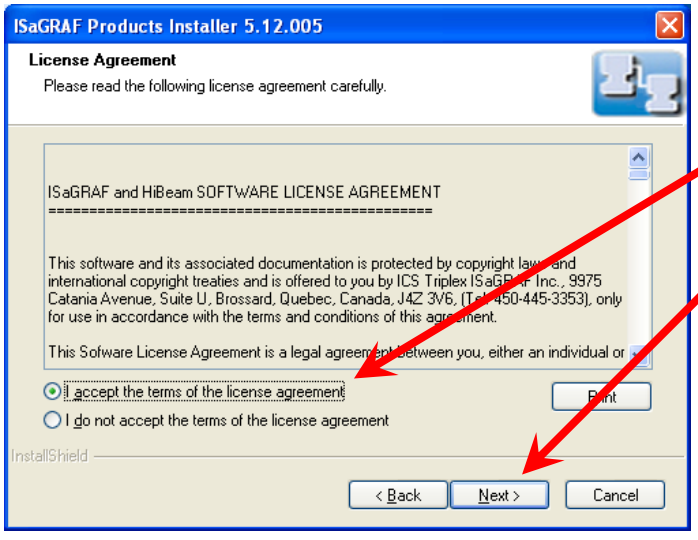
- Software (it is possible to install the program from the CD or download it from the ISaGRAF Website).
- To have the ISaGRAF USB KEY

6.2 How to install the ISaGRAF software

Insert the CD in your computer; the CD will start automatically.



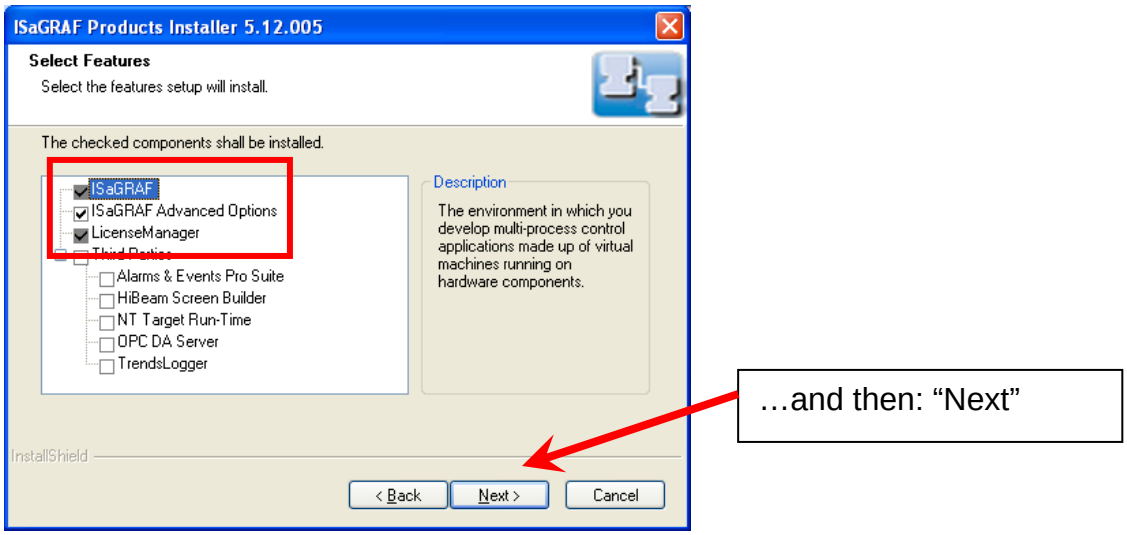
You have to choose the first option.

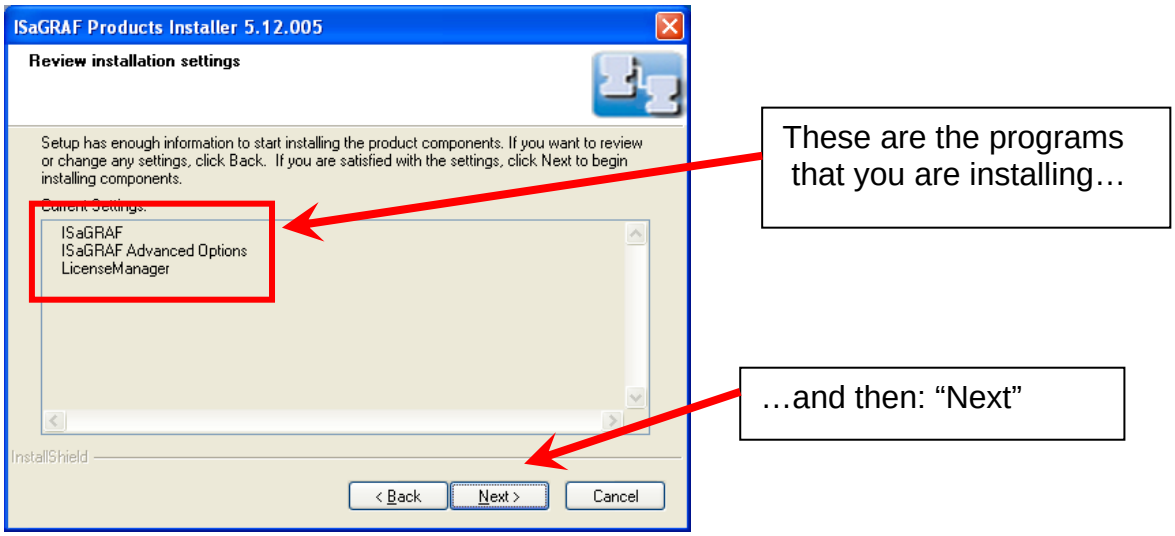


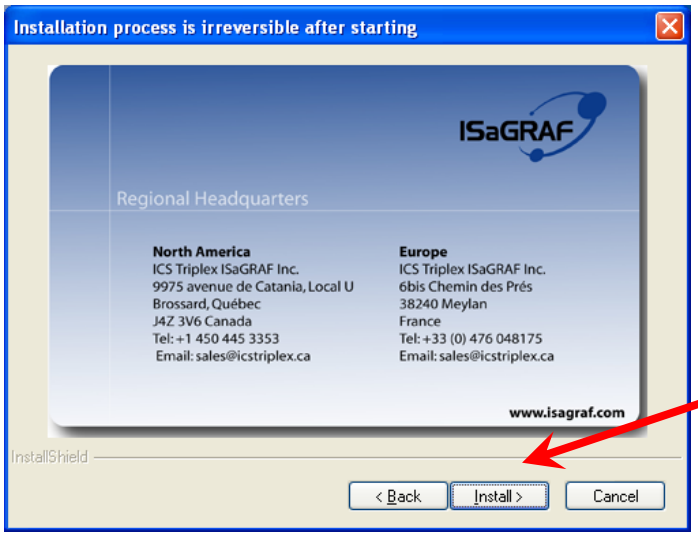
You have to select: " I accept the terms"

…and then: "Next"

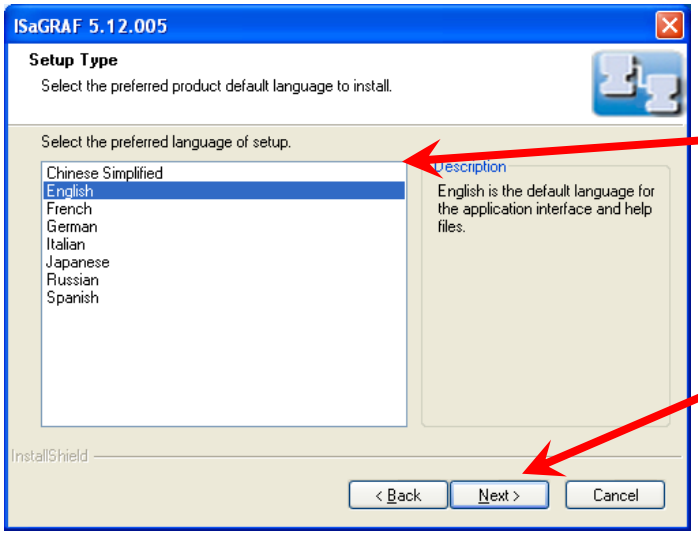
Please install ONLY the programs selected as showed here below:





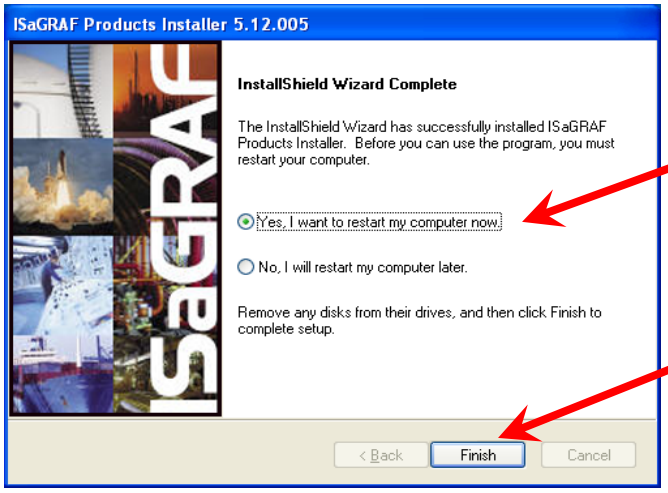


…select: “Install”



Choose the languages…

…select: “Next”

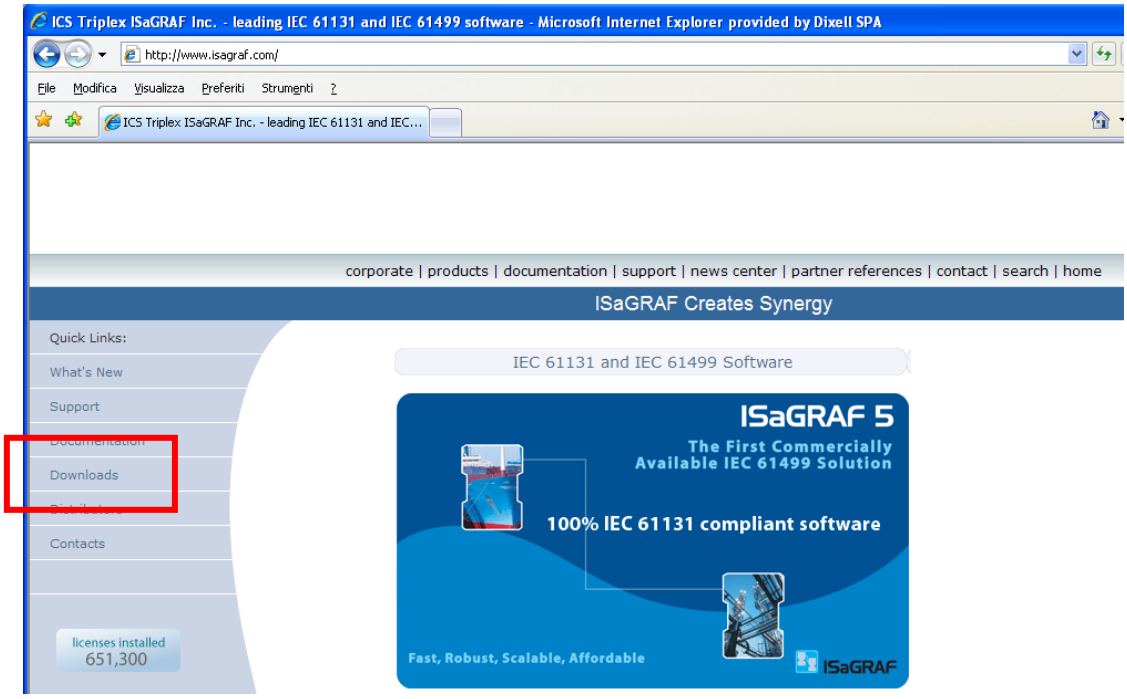


At the end of the installation, please restart the computer

…select: “Finish”

6.3 How to download the software from ISaGRAF website

Open the browser in your computer and write the following address: www.isagraf.com and choose Downloads.



Then choose the ISaGRAF version to download (before to do this, check the Dixell website to verify the latest revision approved by Dixell).

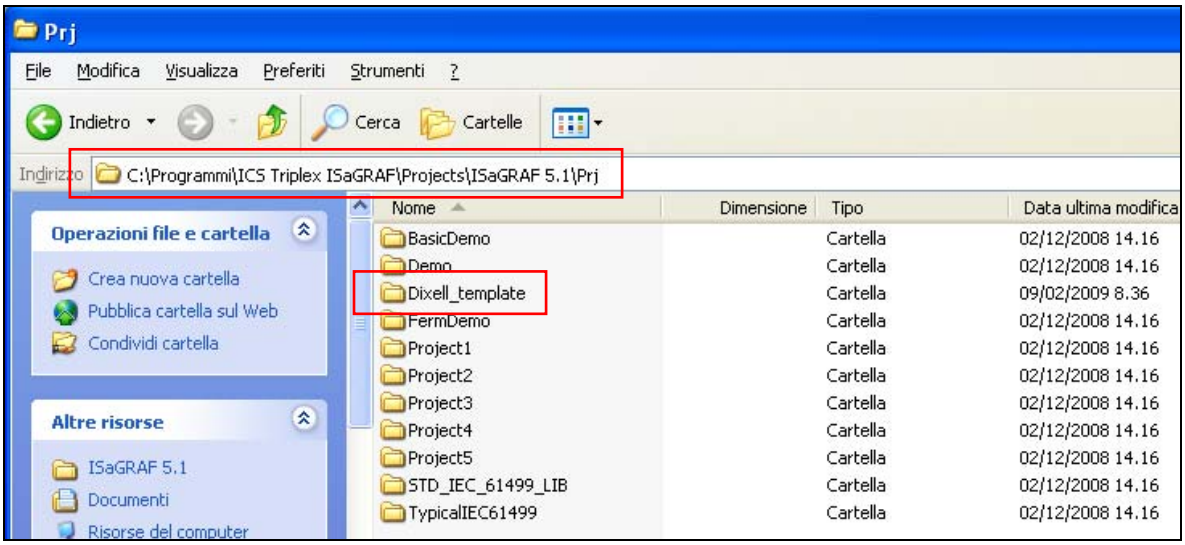
The procedure to install and set-up of ISaGRAF software is the same as above.

6.4 How to set-up the ISaGRAF program

First, it is necessary to copy in this directory of your PC:

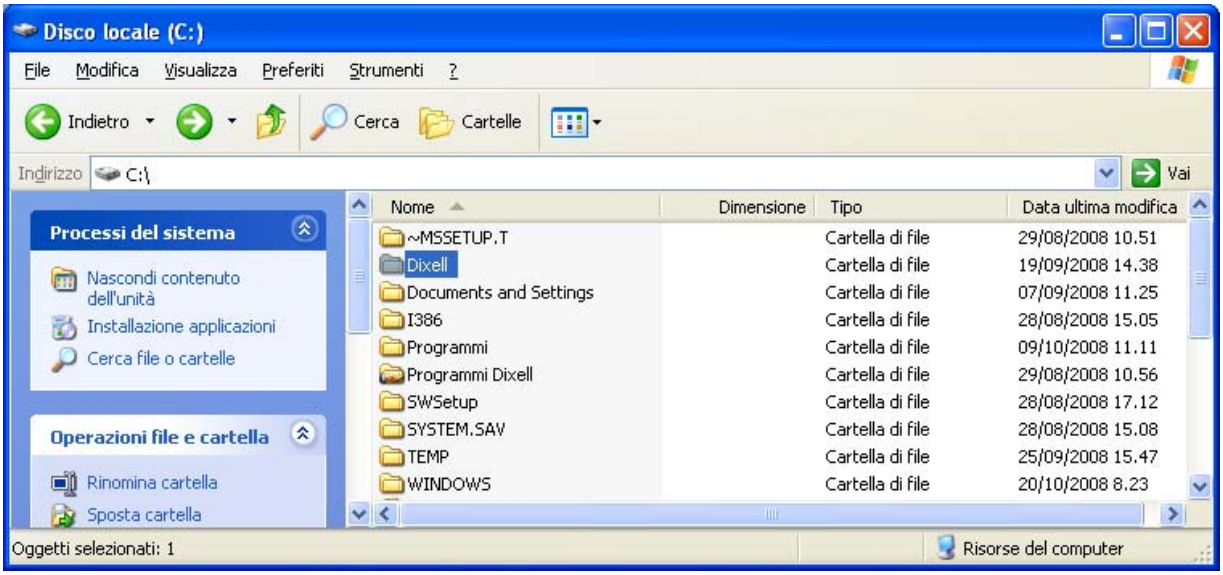
- *C:\Programmi\ICS Triplex ISaGRAF\Projects\ISaGRAF 5.1\Prj*

the folder *"Dixell_template"* as showed here below (you can find and download this folder directly from the Support Area inside the Dixell website in the "ISaGRAF section).



This is the Template project necessary to start with your new project.

Second, in the disk "C:\" , copy the folder "Dixell" as showed here below.

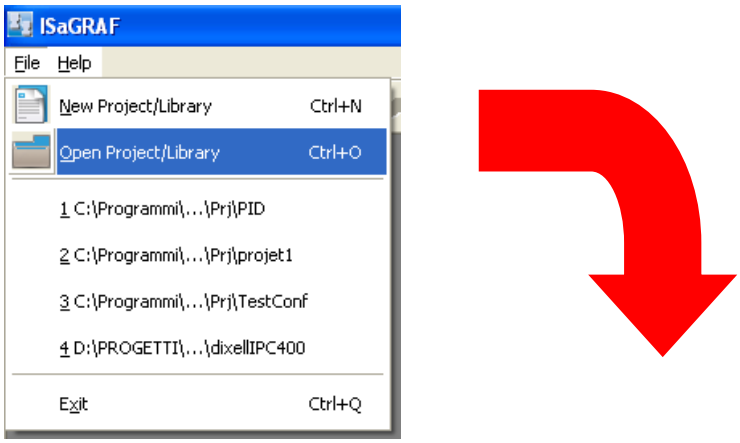


Inside this folder, there is the DIXELL GFL (general function library).
You can find this folder inside the Dixell website in the "ISaGRAF Function Blocks" section.

6.5 Start with the new Project

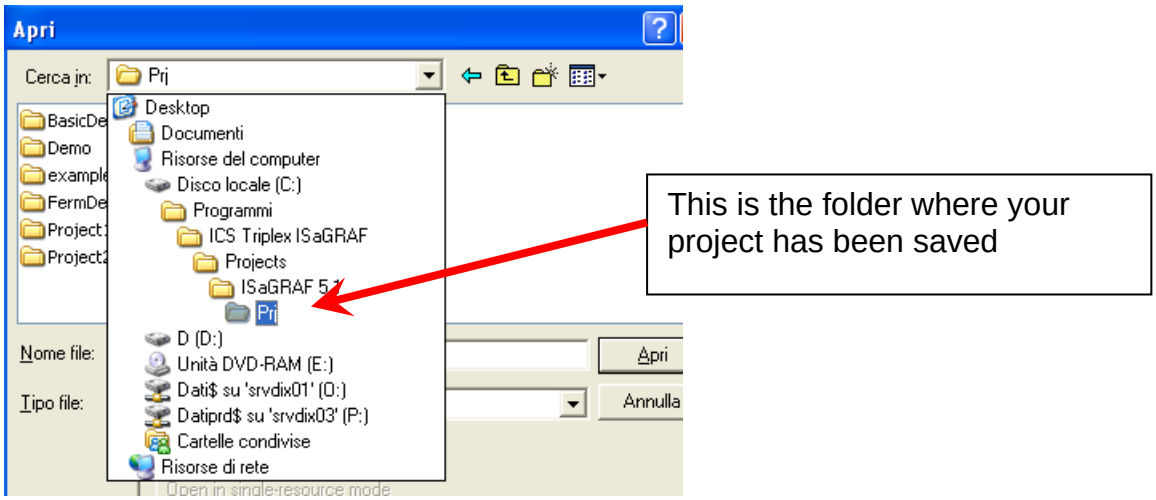
Launch the ISaGRAF program and select:

File -→ Open Project/Library

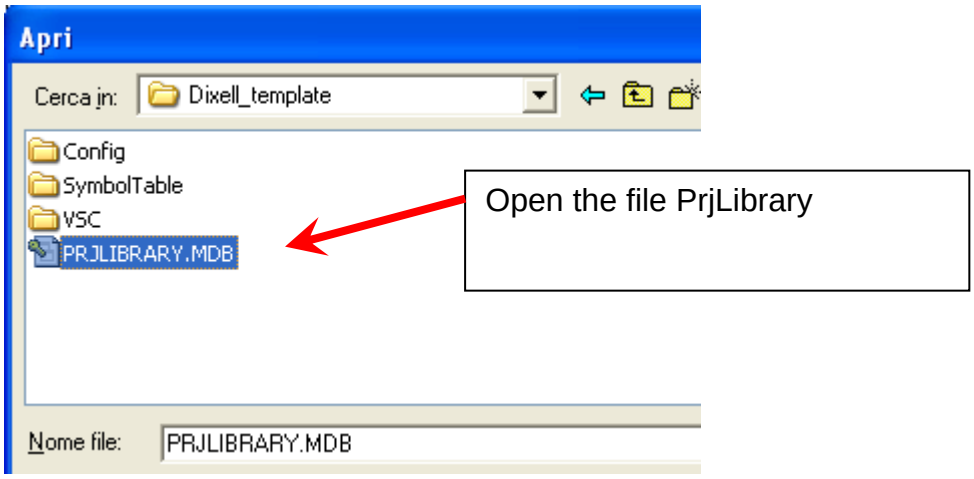


The file to open is inside the project that we have saved in:

- *C:\Programmi\ICS Triplex ISaGRAF\Projects\ISaGRAF 5.1\Prj*

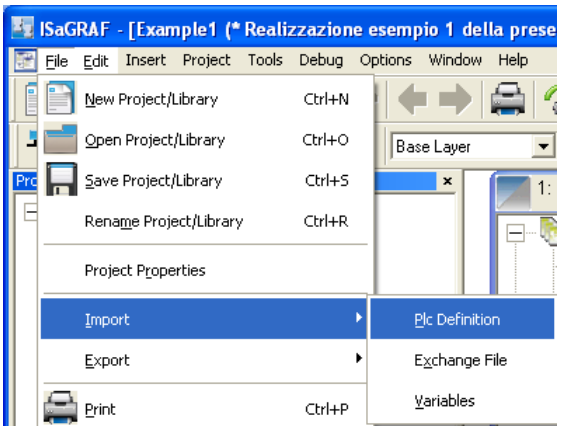


Double click on Prj

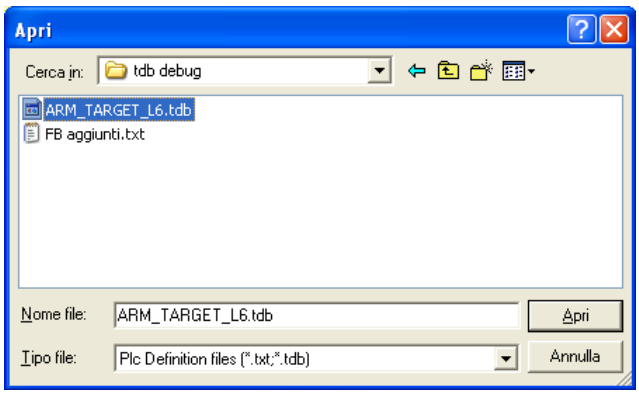


When you have opened your project, it is important to import the “tdb” file.

This file has been generated by Dixell to describe the property of iPRO to the ISaGRAF workbench; this file include all the latest information about the improvement of the standard application of iPRO. To import the file in the project: File → Import → Plc Definition .



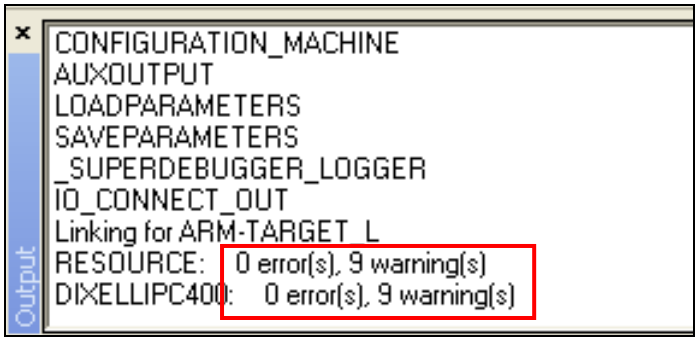
Import the “tdb” file (you can find and download this file directly from the Dixell the Support Area inside the Dixell website in the “ISaGRAF section).



The default name of the tdb file is “ARM_TARGET_L6.tdb”.

After these operations save  and compile  the project.

To check if your application is ok, after the compilation, you can see on the bottom of ISaGRAF window if there are errors or warnings.

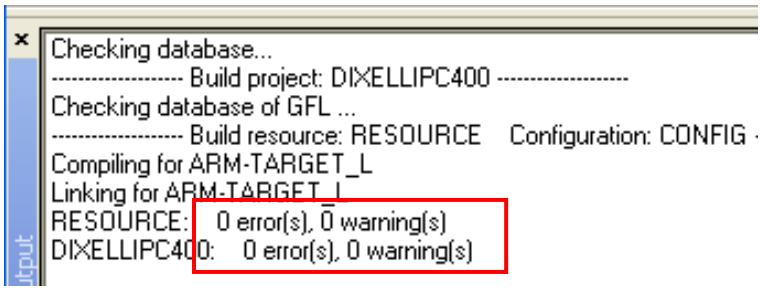


If there are some errors you have to check your application otherwise you can't download it in the device. If there are some warnings, you can download the application.

To remove the warning messages, follow this procedure:

1. Project → Clean Project/Library
2. Project → Clean Resource
3. Tool → Compact Database

Then save and compile again; The new messages should be:

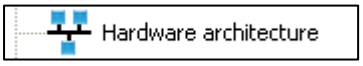


All these file are available in the Dixell web site (www.dixell.com) inside the support area.

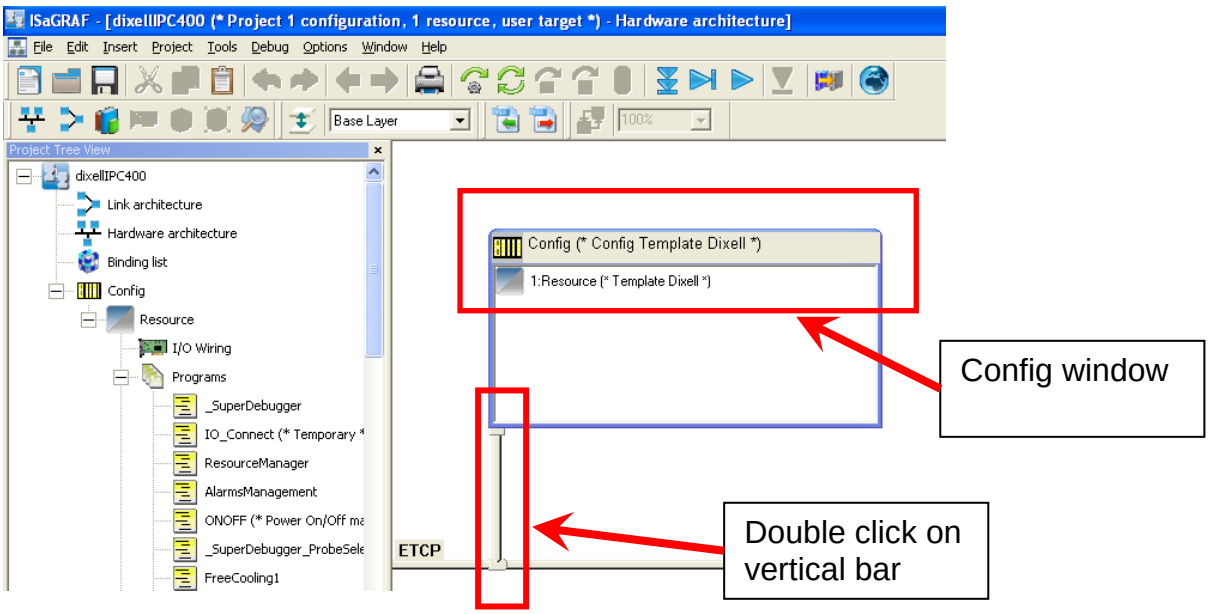
Pay attention because if you have already developed your project with an old version of the tdb file is not necessary to import the new one in your project.

This operation is necessary only when you start with a new project and if the developer needs to use a new Function Block not available in the previous versions.

The last operation to do to complete the set-up is to define the IP address in the ISaGRAF workbench.

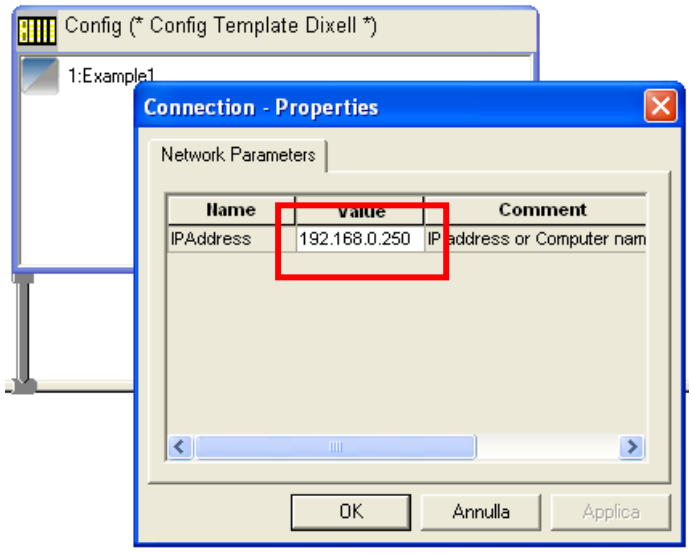
Click the icon:  or 

and then double click on vertical bar:



If the vertical bar is not visible, move the “Config” window until the vertical bar will appear.

Write inside the box the IP address of your iPRO, then OK.



Now the set-up of ISaGRAF is completed and you can start with your application.

7. THE ISAGRAF WORKBENCH

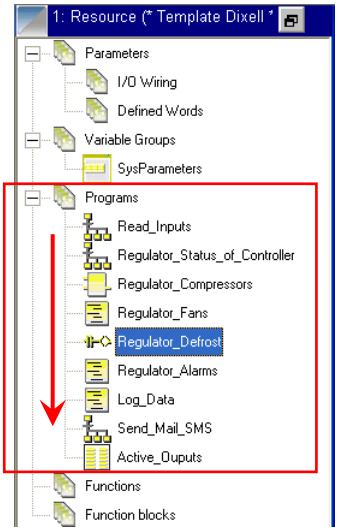
7.1 Definitions

Before to start with the examples is important to fix some important definitions.

Resource: it is your project; inside there are the elements of your project.

The elements of your project are:

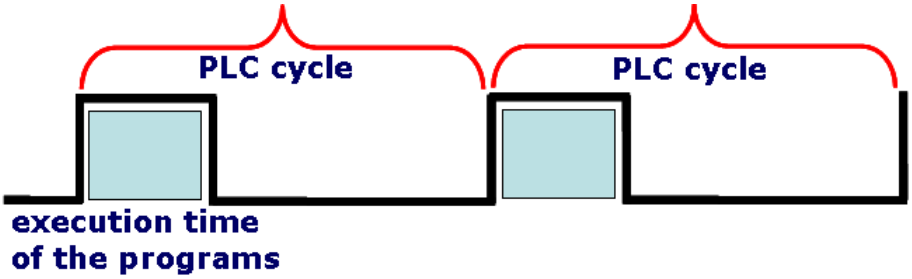
Programs: it is the software that you develop to execute your application.



In this picture, for every PLC Cycle, iPRO executes the programs: Read_Inputs → Regulator_status_of_controller → Regulator _Fans → ……

The number and the order of the programs depend on your software.

PLC Cycle: it is the time that synchronize the execution of the programs. For every PLC cycle, iPRO executes the list of the program.

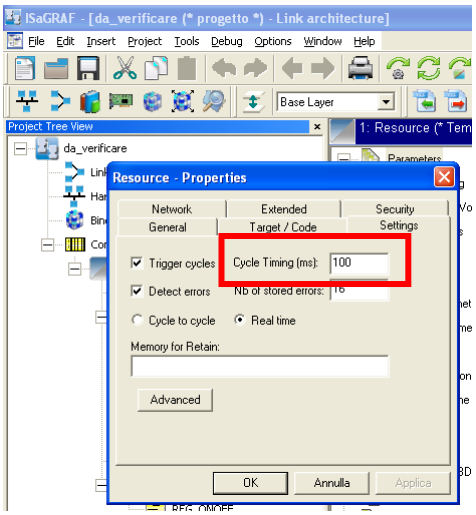


It is important to define this value considering that the CT must be:

- NEVER = 0ms (zero ms)
- ALWAYS compare the Current Cycle Time (CCT) and the Programmed Cycle Time (PCT) with the following rule:

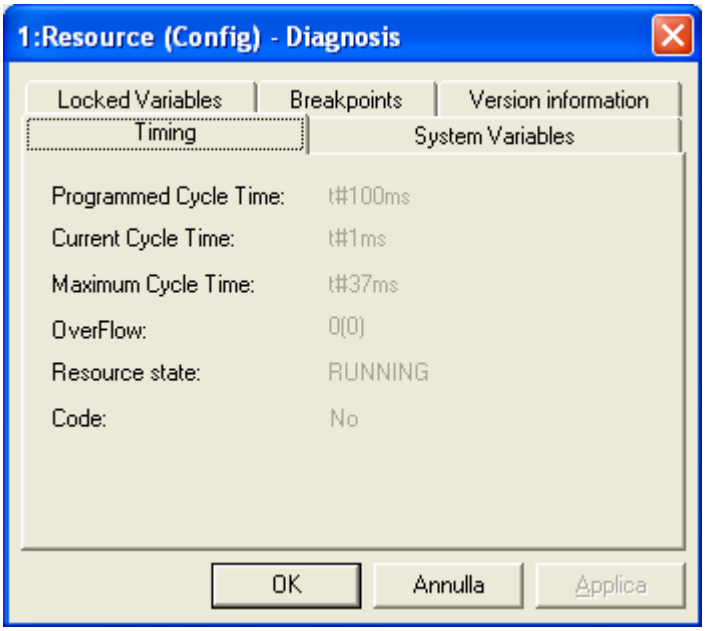
PCT > (2 x CCT)

To check the Cycle Timing choose: Edit → Properties → Settings



During the Debug is possible to verify if the PCT is correct.

Choose: Debug → Diagnosis, and in the Timing tab all these information are available.



Function blocks: they are a general routine (software) executed in different programs. It is possible to “call” the FB in every part of the program; in this way is not necessary to write the same program a lot of time. Besides you can save them in the library and also protect them with a password.
These FB can be developed by ISaGRAF, Dixell and from third party.

Variables: they are values that can change during the execution of the program.
For each variable we can define:

- NAME: it is the name of the variable
- COMMENT: the description of the variable (free field)
- GROUP: you can organize the variables in different groups.
- INIT VALUE: it is the value when the program starts.
- TYPE:
  Bool: can assume the value 0=FALSE, 1=TRUE
  Dint: can assume values from -2147483648 to +2147483647
  Real: can assume floating point values
  String: contain character strings (with specified the length)
  Time: contain values used in time expression
  Any: function block
- DIMENSION: specifies the dimension of the array of variables
- RETAIN:
  Yes: the value will be saved in not volatile memory
  No: the value will not be saved
- ATTRIBUTE:
  Read: the application can read the value but not change it
  Write: the application can modify the value but not read it
  Free: the application can read and modify the value
- DIRECTION:
  Input: the application reads the value from field
  Output: the application writes the value to the field
  Internal: any other variables

- ADDRESS: where to save the value of the variable

Name	Type	Addre...	Comment	Dimension	Group	Init. value	Attribute	Alias	Scope	()	Direction	Retain	Wiring
AI01	DINT				SysParameters		Read		Global		Input	No	%ID3.0
⊞ AI02	DINT	2B	[1,0,0,100,-10,0,0,0]	[1..30]	CurrentTime		Read		Global		Input	No	%ID3.1
AI03	DINT	2C	[1,0,0,100,-10,0,1,0]		SysParameters		Read		Global		Input	No	%ID3.2
AI04	DINT	2D	[1,0,0,100,-10,0,0,0]		None		Read		Global		Input	No	%ID3.3

In the example here below, it is possible to understand how to define the variables.
There are some important information that have to be taken in consideration when:

the TYPE of the variable is REAL; use this kind of variable only if strictly necessary (for operation with Log, Exp, Cos,…).
An example is for the temperature: if the value is 25.4°C instead of to work with REAL variables, we can consider the temperature as DINT so we can work with 254 as decimal.

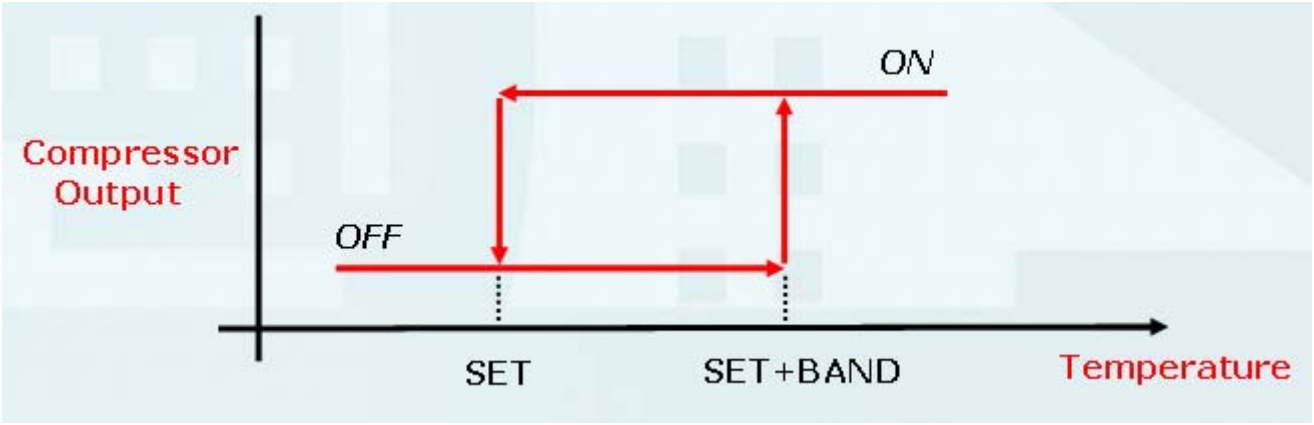
the RETAIN is Yes; don't change the value frequently because every memory has a maximum number of writing and the application can damage the flash memory.
The minimum period suggested is 30 minutes.

7.2 How to make a regulator ON-OFF

The purpose of this example is to introduce how to develop a program with ISaGRAF; this first example will be developed with the ST language.

Our target is to create a Regulator ON-OFF for Compressor (Direct Action).

The diagram of this regulator is:



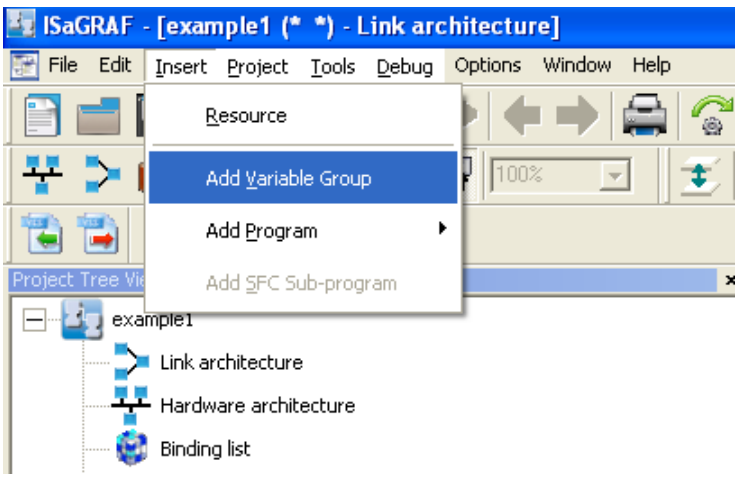
The meaning of this diagram is:

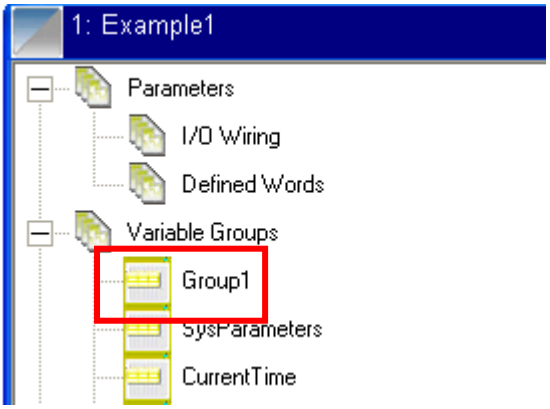
- IF Temperature is higher than SET+BAND the compressor is ON
- IF Temperature is lower than SET the compressor is OFF

With these information is clear that our VARIABLES are:

- Temperature, type DINT
- SET, type DINT
- BAND, type DINT
- Compressor, type BOOL

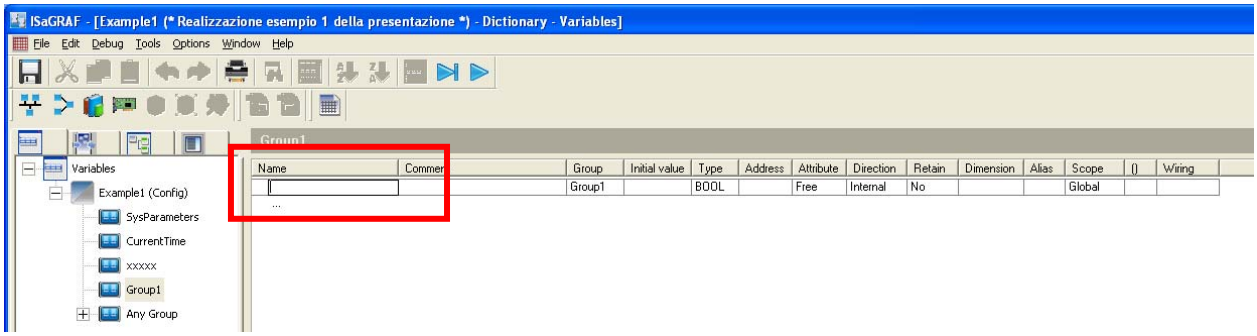
Now we can create a new variable group:





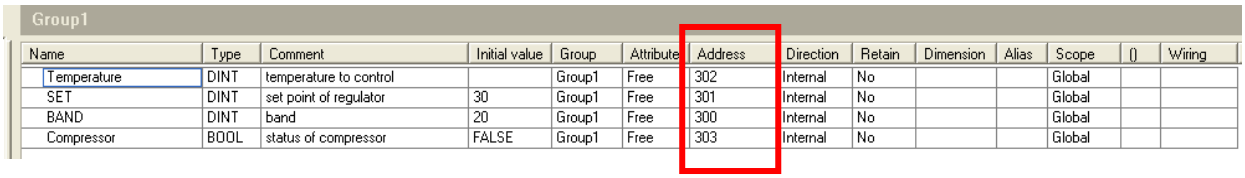
Now the new group has been created and we have called it “Group1”.

Double click on Group1:



Double click below name to fill in all the fields (Name, Comment, Type, Address…)

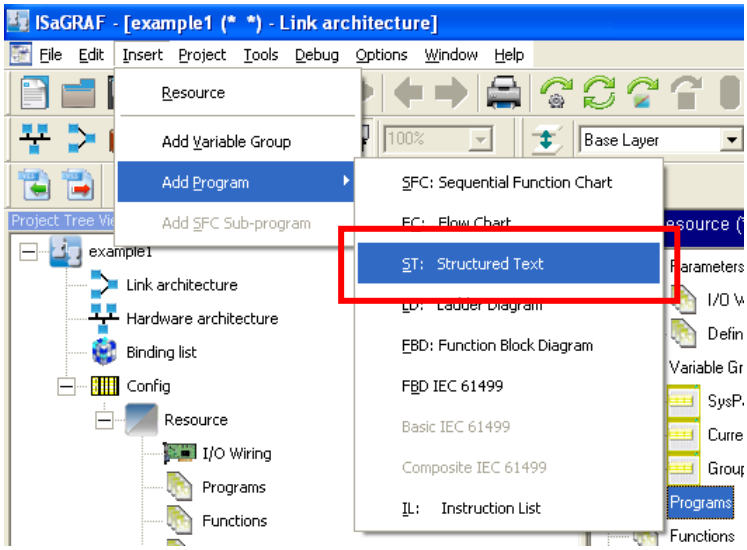
For each variable we have to define the characteristics:



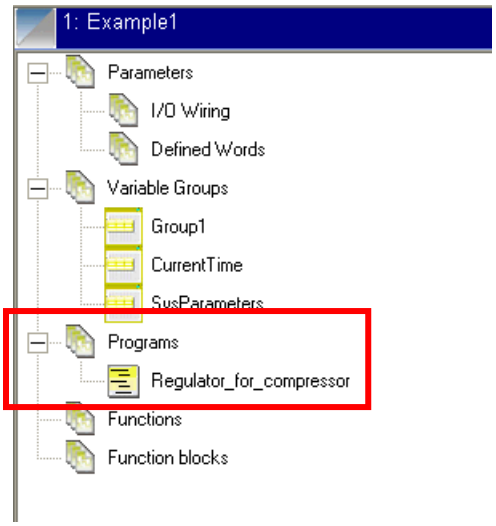
Here we have also define the “Address”; it is necessary to read the value from Visograph.
Now we are ready to add a new ST program and we call it “Regulator_for_compressor”.

Change the window from the Dictionary  to the Program  :

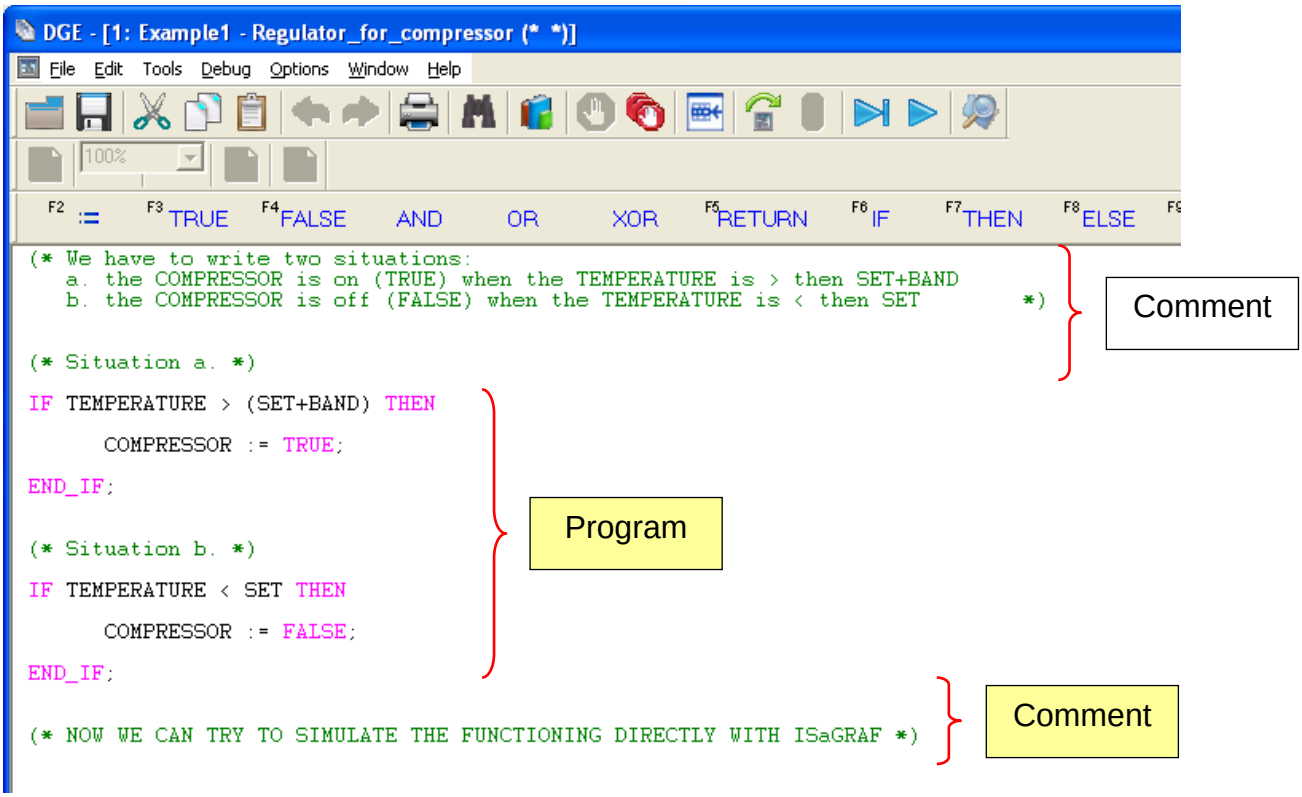
Click on Insert → Add Program and choose the language that you prefer:
This example will be developed in ST language.



The new program will be called Regulator_for_compressor.

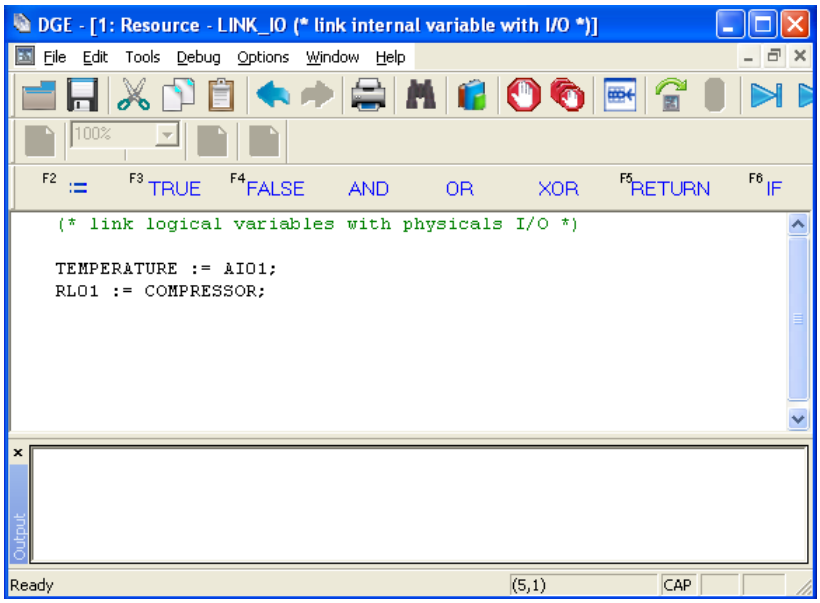


The next step is to write the program (double click on Regulator_for_compressor):



In the example here above, the variables are not linked with the physical output; these variables are only logical. To link these variables with the physical output we have to write another program.

The new program will be:



The physical input and output are defined inside the Variable Groups “SysParameters”. The AI are the analog inputs, the DI are the digital inputs, the AO are the analog outputs and the DO are the digital outputs.

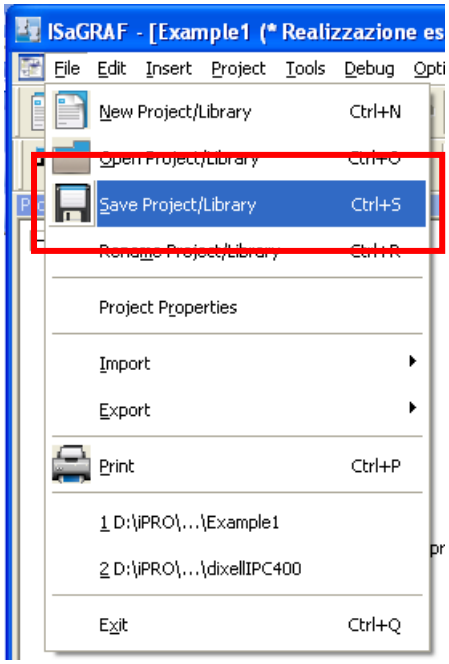
The ConfAI is the value to configure the probe type; for example if your AI01 is a PTC probe, ConfAI01 = 1.

It is also possible to define immediately the physical I/O; in this case the program will be:

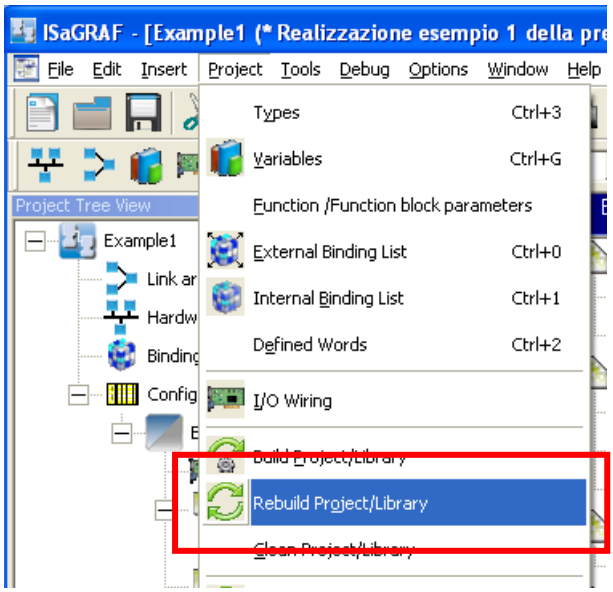
```
F2 :=   F3 TRUE   F4 FALSE   AND   OR   XOR   F5 RETURN   F6 IF   F7 THEN   F8 ELSE
(* Situation a. *)
IF AIO1 > (SET+BAND) THEN      (* we can change the AIO1 with the variable TEMPERATURE *)
      RLO1 := TRUE;             (* we can change the RLO1 with the variable COMPRESSOR *)
END_IF;

(* Situation b. *)
IF AIO1 < SET THEN
      RLO1 := FALSE;
END_IF;
```

We have substitute the logical variables with the physical variables.

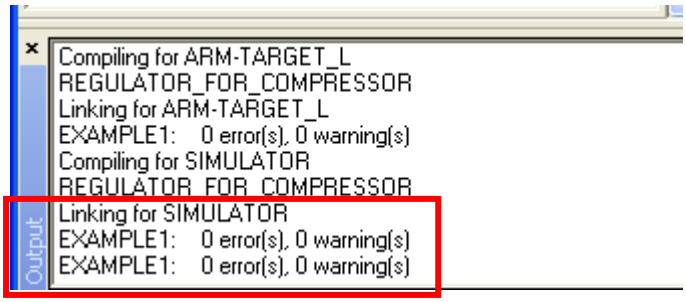
Now we can “SAVE” the project and……..



……and “REBUILD PROJECT”.



If the program is ok, in the bottom of the ISaGRAF window, the message will be:



At this moment, we are able to execute the program in two different ways:

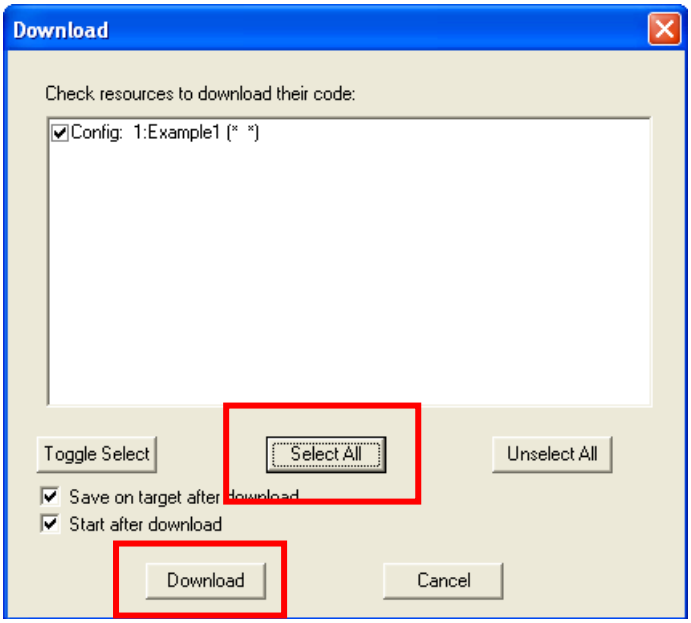
SIMULATION

Execution without the iPRO; this is the first debug of the program because it is immediate and complete (see page 48 for procedure).

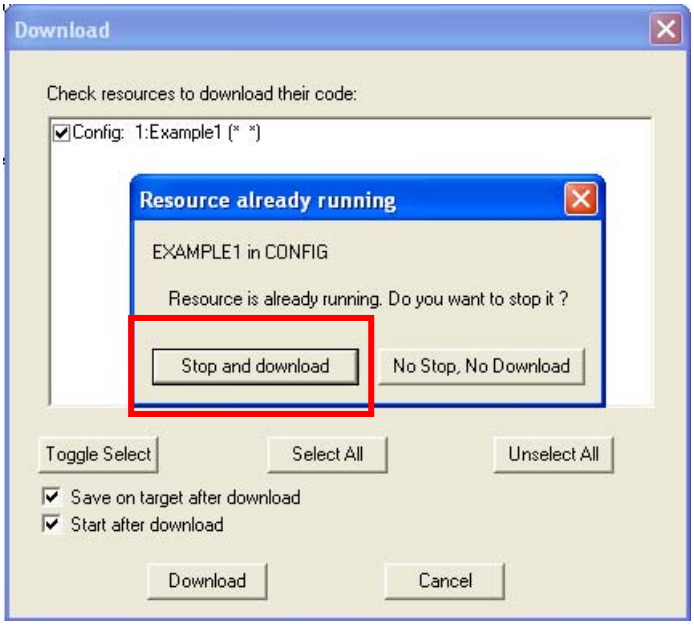
DEBUG TARGET

The application is running on iPRO. Before to do this is necessary to download the project into the iPRO; click the icon  to select the project to download.

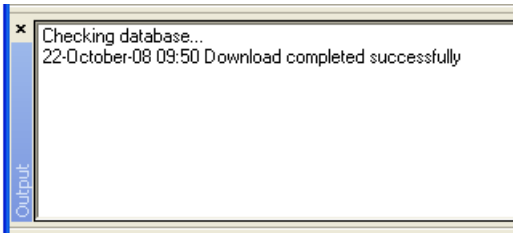
In this window choose “Select All” and then “Download”.



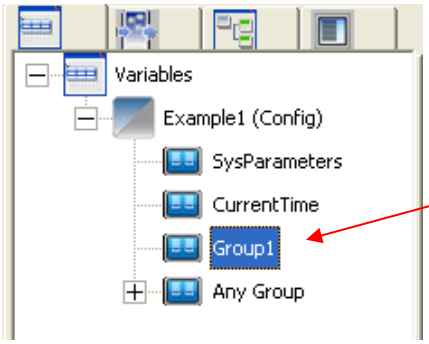
Then “Stop and download”.



At the end of the transferring this message will appear in the bottom of ISaGRAF.



The red semaphore  means that the SIMULATION or DEBUG TARGET are running.
To stop the execution is enough to click on semaphore.
During the execution of the program we can read, write and lock the variables.
If you click this icon  the variables will appear; with this window is possible to check the status of your application.



We are checking the value of our variables (Group1) but we can also to check the value of all the other variables present

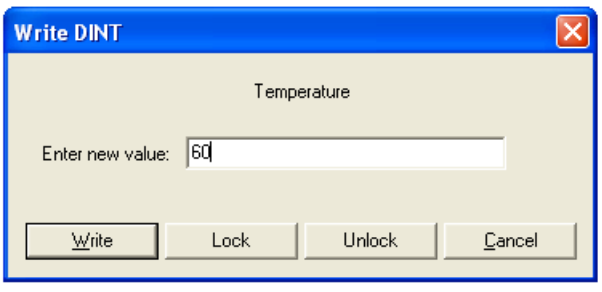
Group1

Name	Comment	Locked	Initial value	Logical Value	Physical Value	Type	()	Dimension	Group	Attribute	Scope	Direction	Retain	Address
Temperature	temperature to control	No		0		DINT			Group1	Free	Global	Internal	No	302
SET	set point of regulator	No	30	30		DINT			Group1	Free	Global	Internal	No	301
BAND	band	No	20	20		DINT			Group1	Free	Global	Internal	No	300
Compressor	status of compressor	No	FALSE	FALSE		BOOL			Group1	Free	Global	Internal	No	303

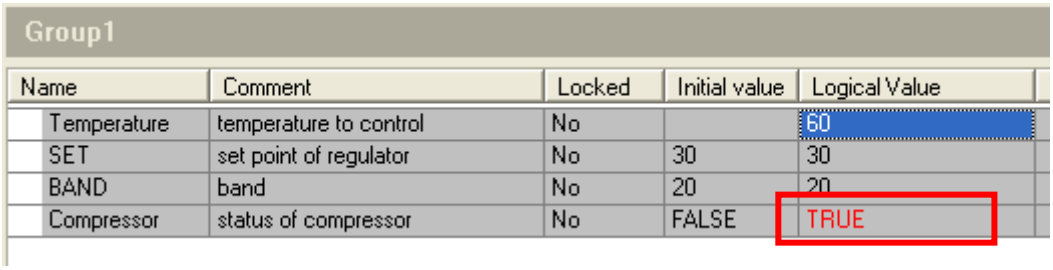
We can force the value of the input; for example we want to switch on the compressor. Double click in the box of Logical Value of the temperature: try to insert the value “60” and then confirm with “Write”:

Group1

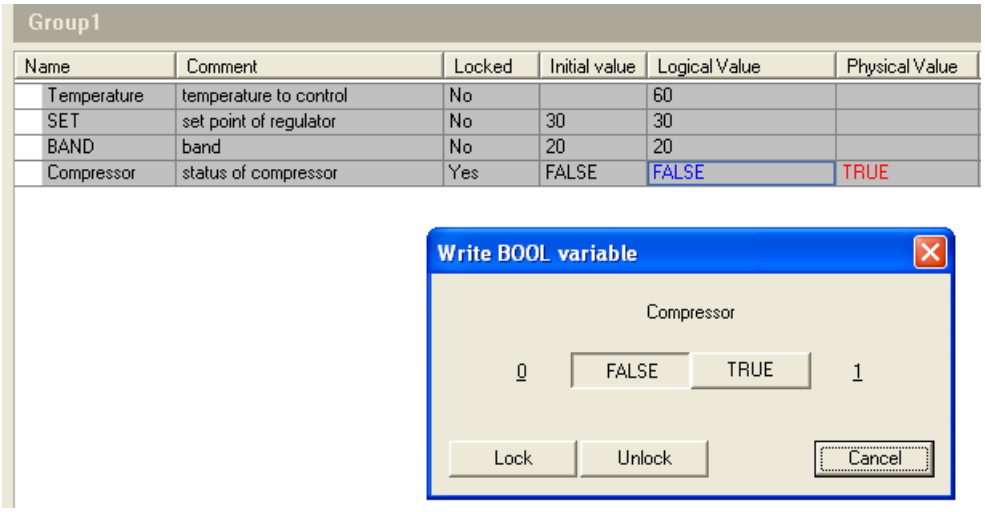
Name	Comment	Locked	Initial value	Logical Value	Physical V
Temperature	temperature to control	No		0	
SET	set point of regulator	No	30	30	
BAND	band	No	20	20	
Compressor	status of compressor	No	FALSE	FALSE	



Here below you can see what is happened:



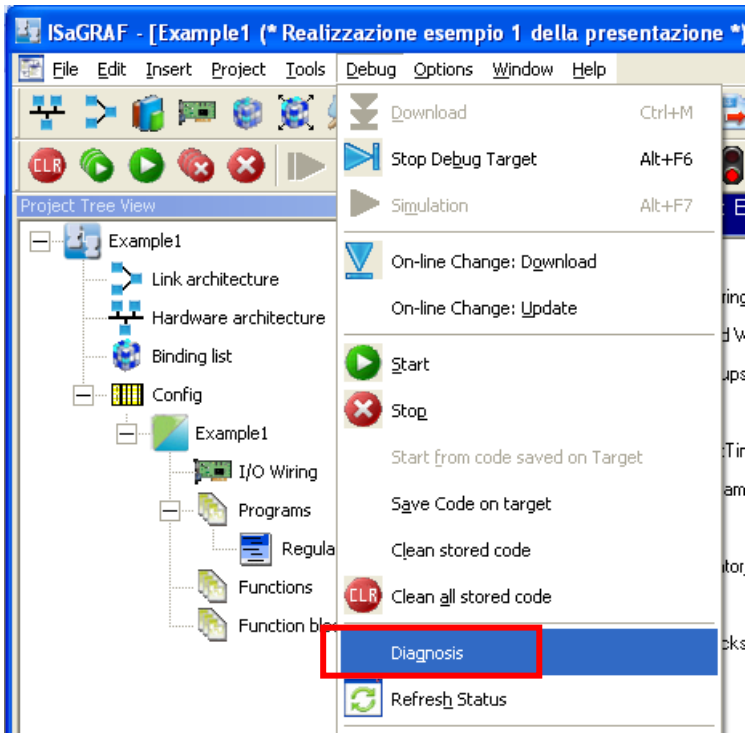
It is also possible to lock and unlock the variable; for example we can lock the variable of compressor. During the test, to avoid to damage the compressor, we can lock the compressor in off (variable must be FALSE) and then change all the other variables to understand what happen in all the other resource of our application (fan, pump, valve,…).

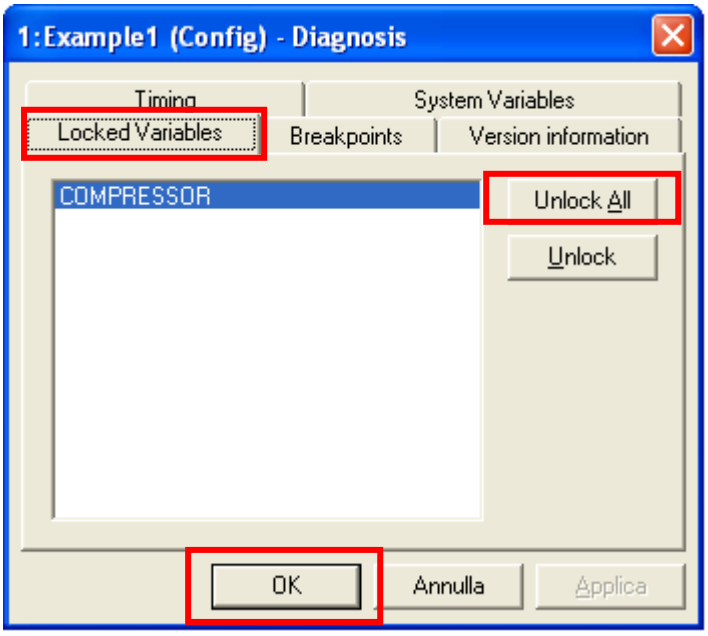


Here above the information are very clear; in our application the compressor should be on (TRUE) but, due the variable lock as FALSE, the compressor is off. Now you can change all the other variables and in any case the compressor will be off.

Once the DEBUG is finished, it is important to UNLOCK all the variables.

To do this is enough to click on DEBUG → DIAGNOSIS, choose the tab “Locked Variables”, and select “Unlock All” as showed here below.



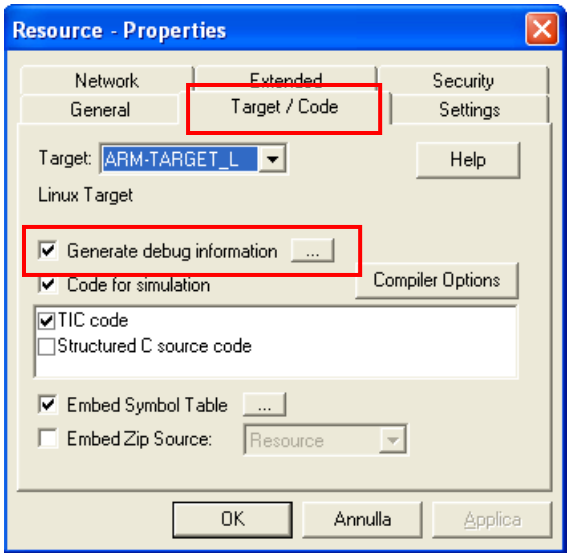


7.3 Debug Step by Step

This function is useful to check in your application what happen when the inputs change; you can see in which part of your application the program is stopped because it is waiting some new information or event.

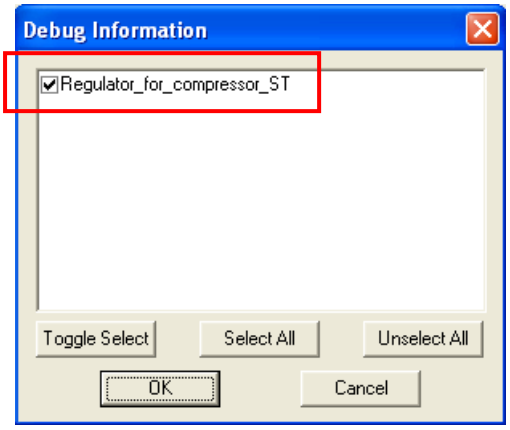
To enable this function, click on the Resource bar 

and , with the right button of the mouse, chose Properties; in window here below, choose the tab "Target/Code" and check "Generate debug information".



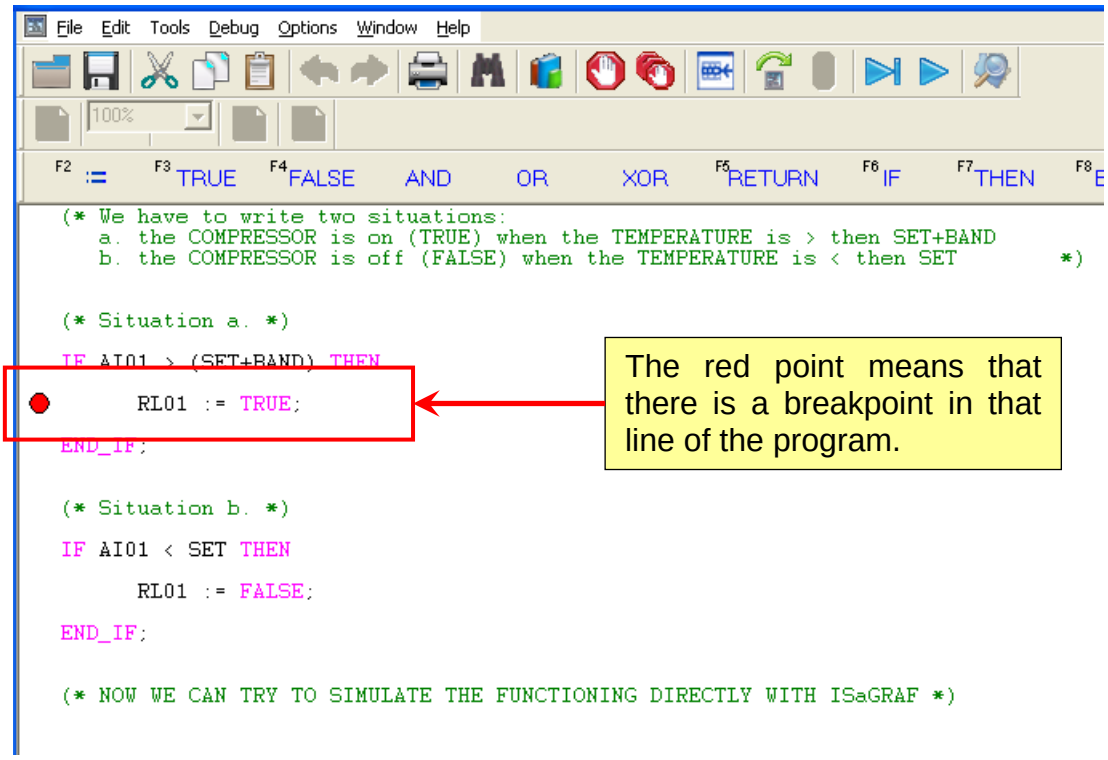
Then, through the icon 

, select the program to debug:

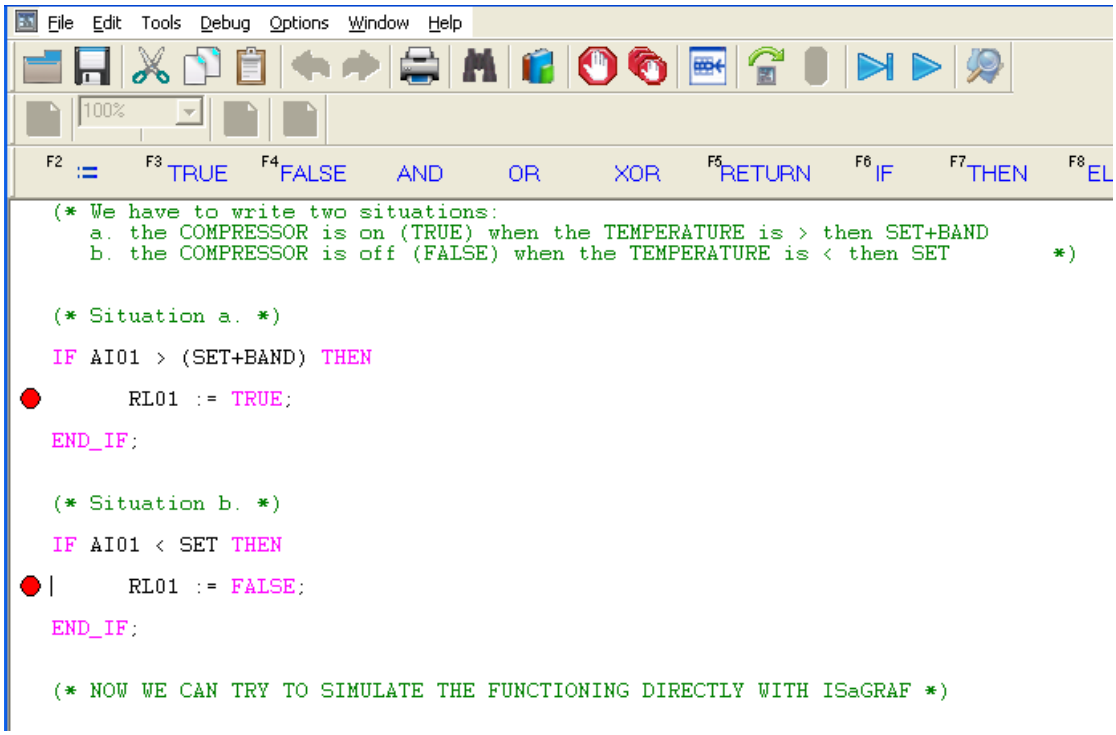


Now the Debug Step by Step is enable; the next operation to do is to decide in which part of the application or program put the "Breakpoints".

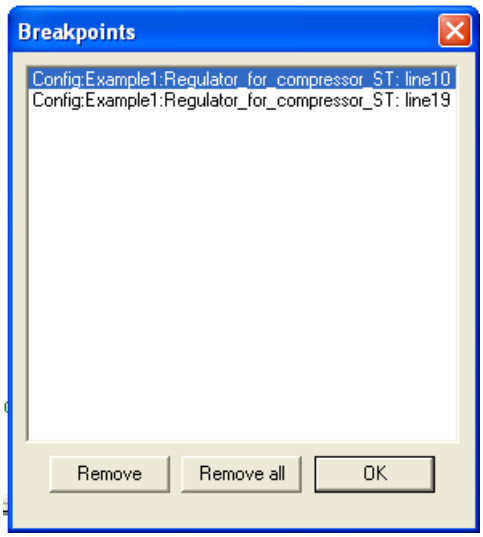
Open your program and with this icon  add the breakpoints; place the cursor at the beginning of the line of your program and click the breakpoint icon.



You can add other breakpoint.



To check how many breakpoints there are in your application and if you need to remove them, click the icon  :



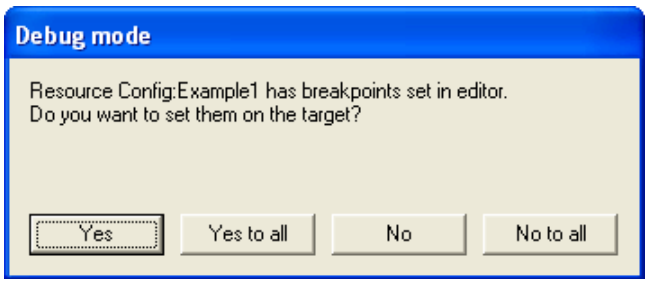
If the step by step set-up is completed, save and compile the application.

To test the system there are two ways:

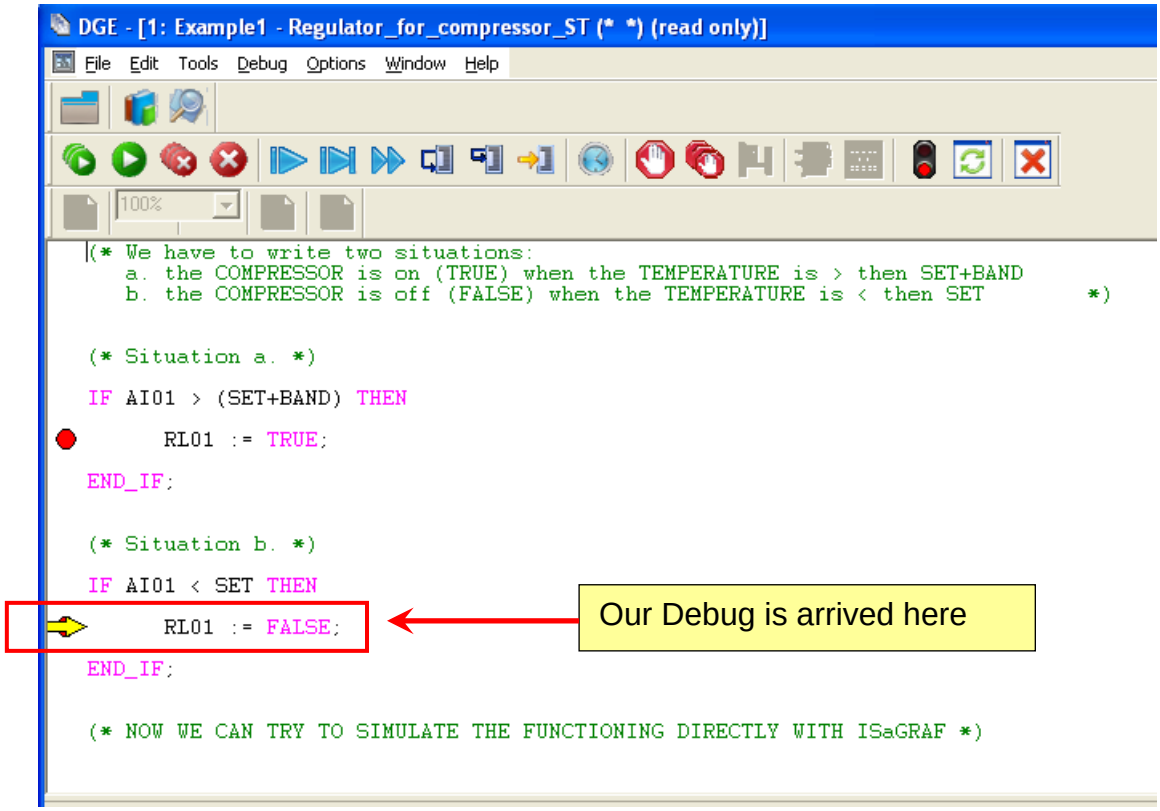
- with SIMULATION  .
- with DEBUG TARGET  ; in this case the following operations are necessary:
  - download the application with the breakpoints in the target
  - disable the Watchdog (see the “Website for iPRO” chapter)

BE AWARE: when the debug test has been completed and you are in the DEBUG TARGET, to enable the Watchdog is necessary to reboot the Target (iPRO).

When you will launch the debug, the ISaGRAF workbench will ask you the following information; confirm with “Yes” or “Yes to all”.



The window with your application will be open; a yellow arrow will show you the position where the debug is arrived (obviously if there are breakpoints).



The commands available for the “Debug Step by Step” are:

-  Switches an application to “real-time” mode”
-  Switches an application to “cycle-to-cycle” mode
-  Executes one cycle
-  Steps to the next
-  Steps into the next
-  Locates the current step
-  Stop the debug

7.4 The ISaGRAF instruction manual

Once you have installed the ISaGRAF environment, it is possible to find the complete documentation of ISaGRAF development tool inside the folder:

C:\Programmi\ICS Triplex ISaGRAF\Documentation 5.1\Users Guide\.....\workbench.pdf

8. PROGRAMMING LANGUAGES

8.1 ST language – General concepts

The environment of ST language is composed by:

- *STATEMENT*

:=	assignment
( )	priority
IF, THEN, ELSE, ELSIF, END_IF;	binary selection
CASE, OF, ELSE, END_CASE;	selection
WHILE, REPEAT, END_WHILE, END_REPEAT;	iterations
FOR, TO, BY, DO, END_FOR;	indexed iterations
RETURN;	program termination
EXIT;	iteration statement termination
BOOLEAN OPERATOR (decreasing priority)	
NOT	boolean negation
AND	boolean AND
OR	boolean OR
XOR	boolean exclusive OR
=, <>, >=, <=, <, >	comparisons
+, -, *, /	arithmetic operators

Beware of:

WHILE and REPEAT have to be used with special care.

arithmetic operator can be used for integer DINT or REAL.

- *TIME*

+	addition
-	subtraction

Beware of subtraction: negative timer as result means nothing.

- *STRING*

  ASSIGNMENT

  := direct copy

  CONCATENATION

  + concatenates two strings

  COMPARISON

  =, <>, >=, <=, >, < alphabetical order

- *CONVERSION FUNCTION*

  ANY_TO_BOOL conversion to boolean

  ANY_TO_DINT conversion to double INT

  ANY_TO_REAL conversion to real

  ANY_TO_TIME conversion to timer

  ANY_TO_STRING conversion to string

  Example:

  If we have two variables: SEC (type DINT) and SEC1 (type TIME) the assignation:

  SEC1 := SEC; **this is wrong**

  SEC1 := ANY_TO_TIME (SEC*1000); **this is correct**

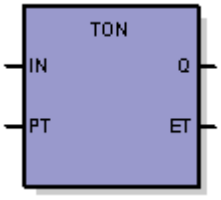
- *FUNCTION BLOCK CALLING*

  Declare instance into dictionary (each instance have a unique name)

  TON_Instance1 is an instance of TON

  Call instance of the FB (activation of instance by-passing the input parameters)

  TON_Instance1 (TRUE, t#3s)

  Get the returning parameters

  End_Time := TON_instance1.Q;

  Current_Time := TON_instance1.ET;

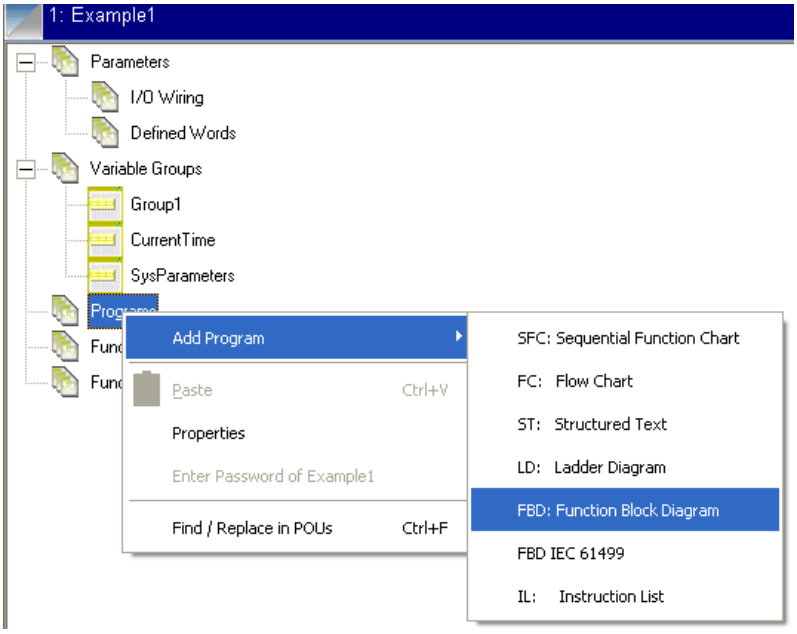
8.2 FBD language – General concepts

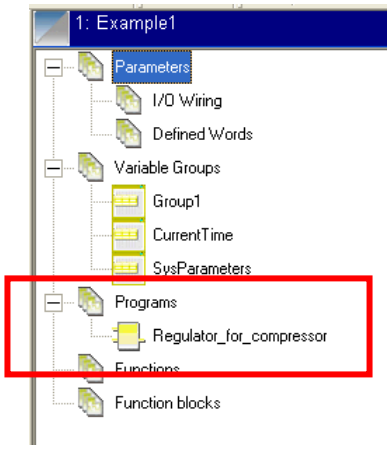
8.2.1 FBD example – ON/OFF regulator

The purpose of this example is to develop the same example of before but with the FBD language.

The steps are the same of example No.1 except for the step when you have to add the program; in this case you have to add the FBD program.

Pay attention because in this example we have called the FBD program with the same name of the ST program; inside one project is not possible to have different program with the same name

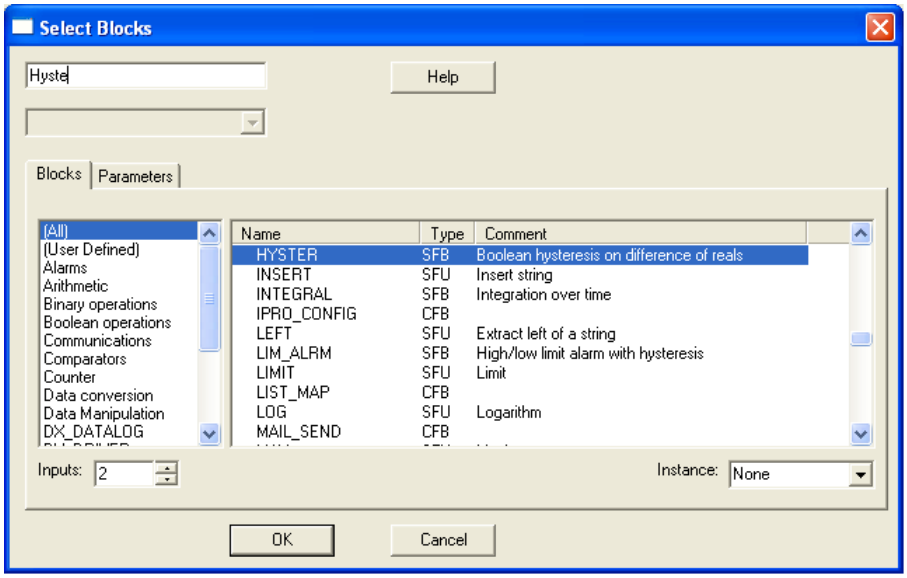




The next step is to write the program (double click on Regulator_for_compressor):

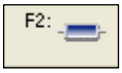
Once the FBD is open, we have to put the elements of our application; the first element is the Hysteresis block. Click the icon 

and then positioning it in the window.
With the tab here below select the block and then press OK.

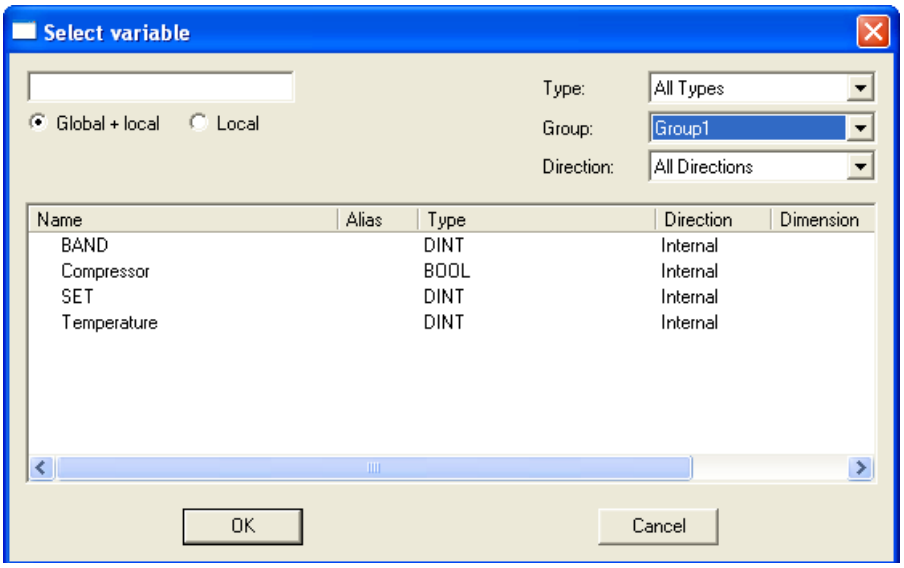


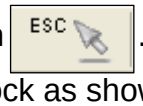
To confirm the operation click the icon 

.

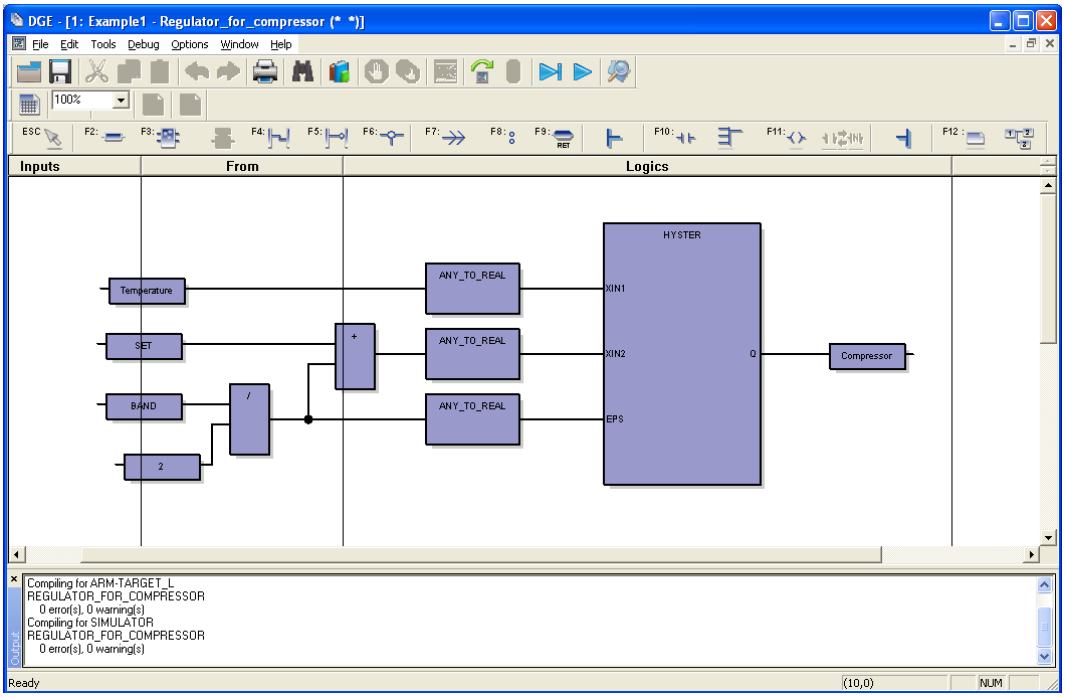
The other elements to put are the variables (defined in the Group1).
Click the icon 

and then positioning them in the window.
With the tab here below you can select the variables.



To confirm the operation click the icon 

.
The connect the variables with the block as showed here below:



From now, all the other steps are like the example1.

This means that you can develop the program with a different language but at the end the result is the same; summarizing:

- Before writing software, split the application in programs.
- Recognize if these programs have similar parts.
- Recognize if the FB necessary for your programs already exist
  - Take the FB from ISaGRAF library
  - Take the FB from Dixell Library
  - Take the FB from your personal library
  - Develop a new FB for your application
- For any program define the Variable Group
- Use the ST language to develop the new FB and use St or FBD language to develop your programs.

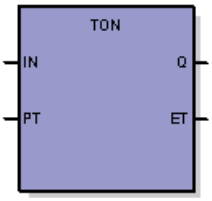
8.3 Function block FB

8.3.1 Introduction of Function Block FB

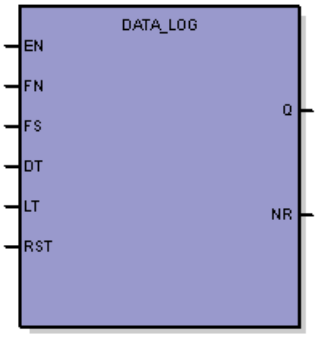
The Function Block are an applications/programs or a part of the applications/programs and they can be called when and all the times that you need.
To use the FB means that:

- it is not necessary to write a lot of time the same program
- it is possible to debug the single FB
- you can create and save for yourself a personal library
- you can use a lot of FB made by ISaGRAF, Dixell or third party
- the debug of the whole program is more quickly (save time and money)

Here below you can see some typical FB made by ISaGRAF and Dixell:



FB made by ISaGRAF



FB made by Dixell

The FB is composed by some Inputs (on the left side) and some Outputs (on the right side). When you use the FB in your program is enough to send them only the value of the variables to get the result; it is not necessary to know what happen inside the blocks.

Another important characteristic of the FB are:

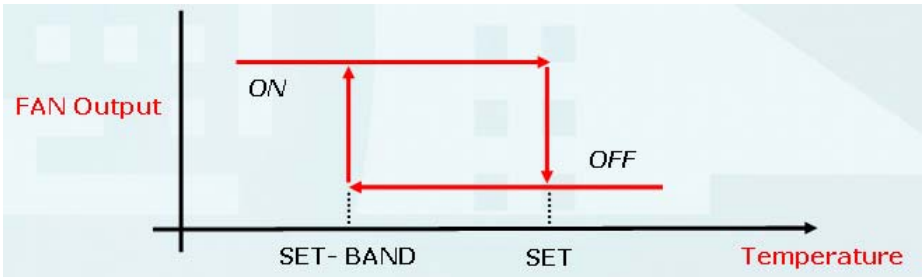
- the FB can be visible and modifiable
- the FB can be visible and modifiable with password
- the FB is protected (non visible and not modifiable)

8.3.2 How to create the FB

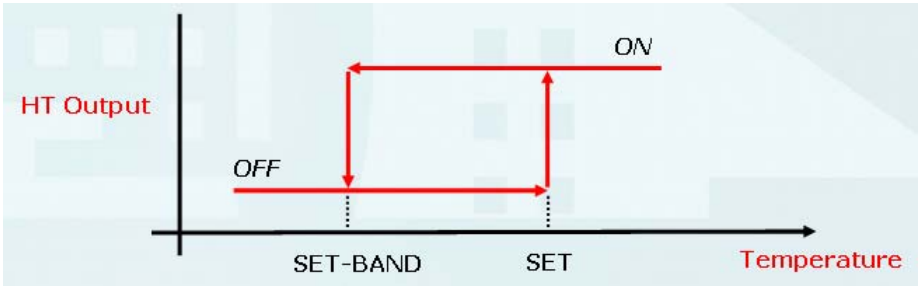
Starting from the Example No. 1, we can consider to control the following resources:

- Fan motor
- Alarm for high temperature
- Alarm for low temperature

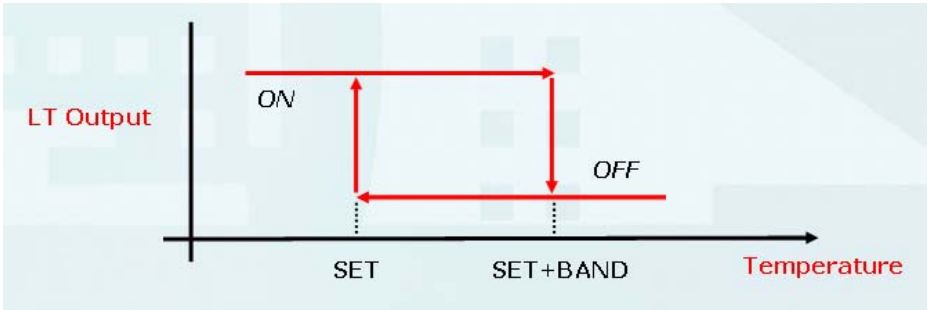
The diagram for each of them is:



Inverse Action



Direct Action



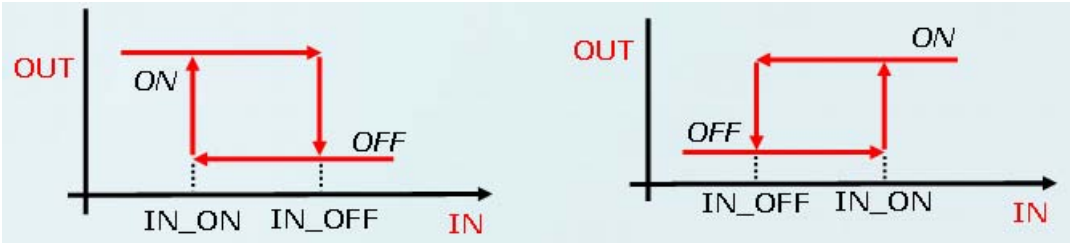
Inverse Action

Practically we can see that for every diagram we have:

- An analog variable that drives the output
- A bool variable as output
- A specific input value where the output is ON
- A specific input value where the output is OFF

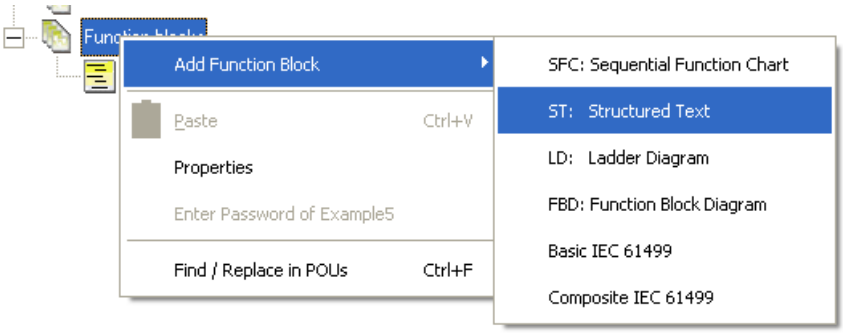
The only difference is the action : DIRECT or INVERSE.

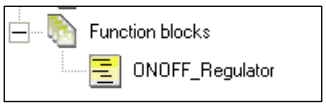
We can summarize the four diagrams in 2 diagrams:



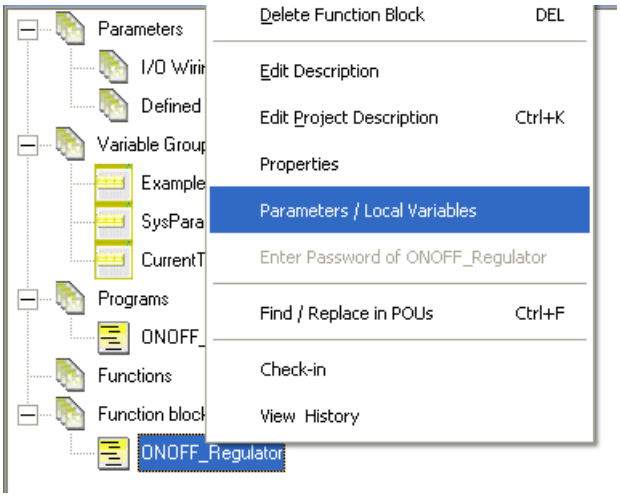
Now we have all the elements to create a FB that we call ONOFF_Regulator.

Add a new Function Block using the ST language:





This is our new function block; click on it with the right key of the mouse and choose “Parameters / Local Variables”.

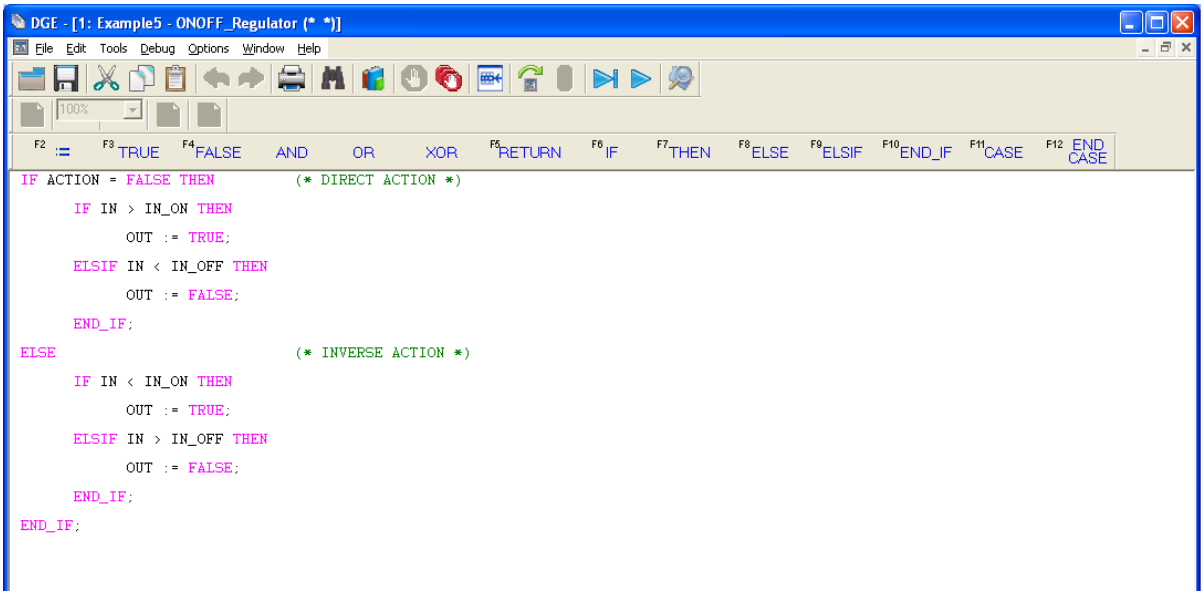


Add the 5 variables:

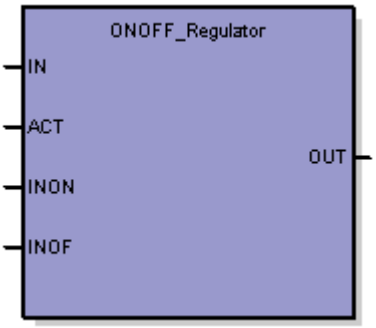
ONOFF_Regulator

Name	Short name	Type	Direction	Comment
IN	IN	DINT	Input	Analog input that drives the output
ACTION	ACT	BOOL	Input	Action type: FALSE=direct, TRUE=inverse
IN_ON	INON	DINT	Input	When the analog input reachs this value, the output is ON
IN_OFF	INOF	DINT	Input	When the analog input reachs this value, the output is OFF
OUT	OUT	BOOL	Output	Output

Double click on ONOFF_Regulator to write the program in ST language:



This is the Function Block that we have created just now:



Remember that you can use this FB when you want and all the times that you need.

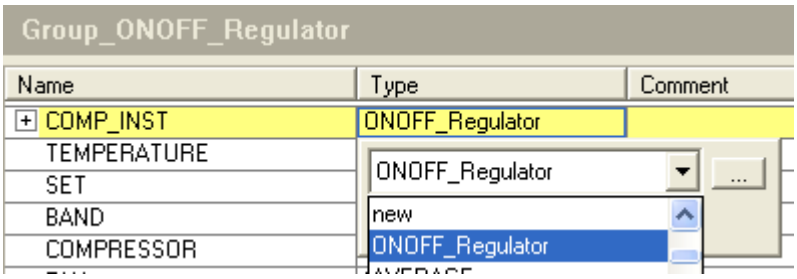
8.3.3 How to use the FB inside the programs

More or less the steps are the same used to write the program for Regulator ON/OFF; the only difference is that we have to add the “INSTANCE” to recall the FB inside the variables group. With the instance we can transfer the input values to the FB and the FB will return to us the result (for example in our case the output will be TRUE (ON) or FALSE (OFF)).

Takes in consideration the diagram of compressor.
We have to define the:

- variables (TEMPERATURE, SET, BAND, COMPRESSOR)
- instance (COMP_INST)

To call the function block ONOFF_Regulator , double click on the “Type” box of the instance COMP_INST.

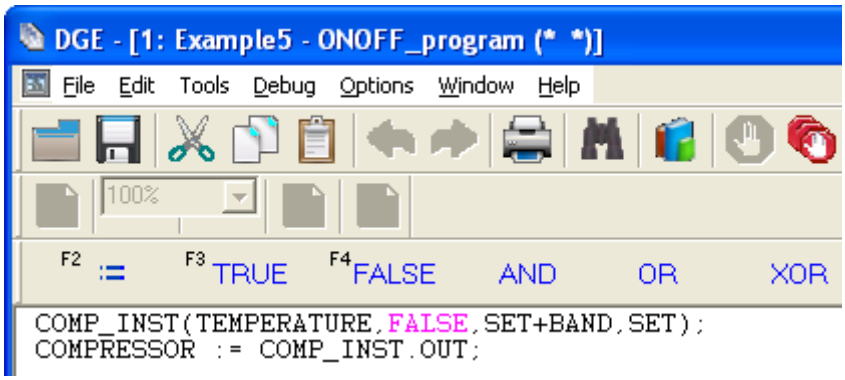


At the end, the configuration of your variables group is:

Group_ONOFF_Regulator

Name	Type	Comment	Address	Initial value	Group	Attribute	Direction
COMP_INST	ONOFF_Regulator				Group_ONOFF_Regulator	Free	Internal
COMP_INST.IN	DINT				Group_ONOFF_Regulator	Free	Internal
COMP_INST.ACTION	BOOL				Group_ONOFF_Regulator	Free	Internal
COMP_INST.IN_ON	DINT				Group_ONOFF_Regulator	Free	Internal
COMP_INST.IN_OFF	DINT				Group_ONOFF_Regulator	Free	Internal
COMP_INST.OUT	BOOL				Group_ONOFF_Regulator	Free	Internal
TEMPERATURE	DINT				Group_ONOFF_Regulator	Free	Internal
SET	DINT				Group_ONOFF_Regulator	Free	Internal
BAND	DINT				Group_ONOFF_Regulator	Free	Internal
COMPRESSOR	BOOL				Group_ONOFF_Regulator	Free	Internal

The last step is to write the program with ST and FBD languages:



It is very important to understand that the list of the inputs is not random; the sequence of the inputs must be like the sequence of the instance.

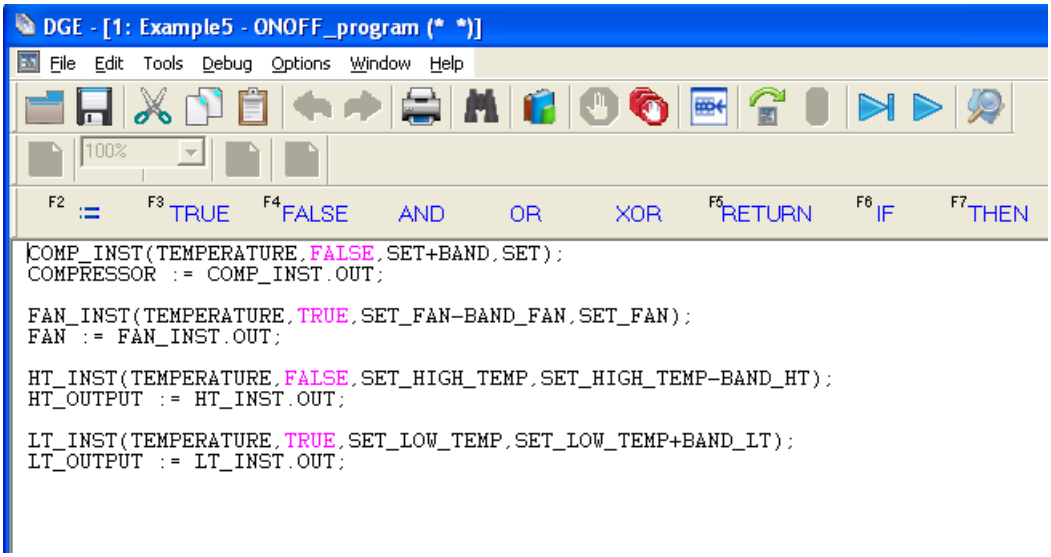
TEMPERATURE →
FALSE →
SET+BAND →
SET →

Name	Type
COMP_INST	ONOFF_Regulator
COMP_INST.IN	DINT
COMP_INST.ACTION	BOOL
COMP_INST.IN_ON	DINT
COMP_INST.IN_OFF	DINT
COMP_INST.OUT	BOOL

For all the other resources is enough to add the variables, instances and program for each of them.

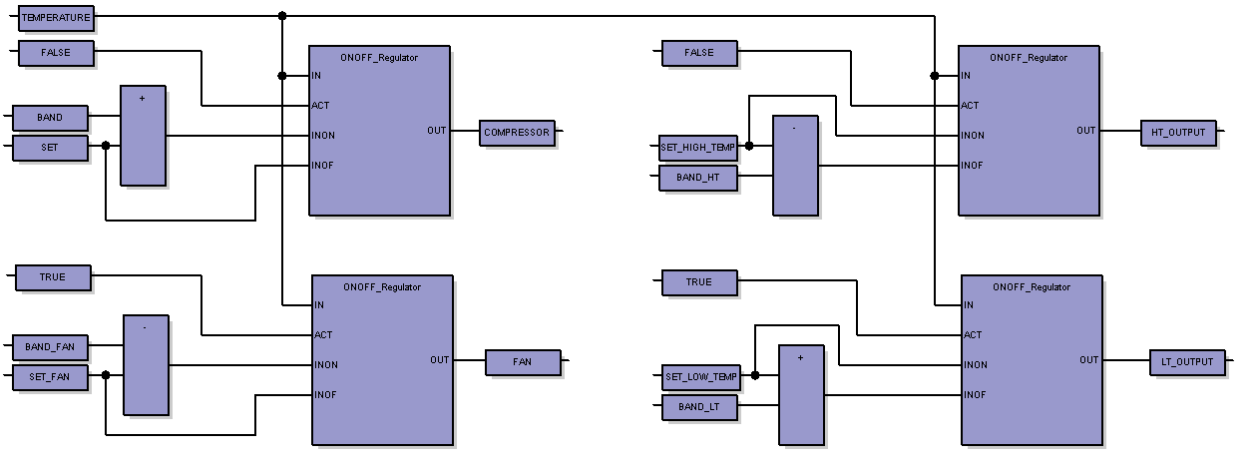
Group_ONOFF_Regulator

Name	Type	Comment	Address	Initial value	Group
COMP_INST	ONOFF_Regulator				Group_ONOFF_Regulator
TEMPERATURE	DINT				Group_ONOFF_Regulator
SET	DINT				Group_ONOFF_Regulator
BAND	DINT				Group_ONOFF_Regulator
COMPRESSOR	BOOL				Group_ONOFF_Regulator
FAN_INST	ONOFF_Regulator				Group_ONOFF_Regulator
SET_FAN	DINT				Group_ONOFF_Regulator
BAND_FAN	DINT				Group_ONOFF_Regulator
FAN	BOOL				Group_ONOFF_Regulator
HT_INST	ONOFF_Regulator				Group_ONOFF_Regulator
SET_HIGH_TEMP	DINT				Group_ONOFF_Regulator
BAND_HT	DINT				Group_ONOFF_Regulator
HT_OUTPUT	BOOL				Group_ONOFF_Regulator
LT_INST	ONOFF_Regulator				Group_ONOFF_Regulator
SET_LOW_TEMP	DINT				Group_ONOFF_Regulator
BAND_LT	DINT				Group_ONOFF_Regulator
LT_OUTPUT	BOOL				Group_ONOFF_Regulator



To complete the job, SAVE, COMPILE and EXECUTE your project.

The same program written with FBD language will be:



The considerations regarding the FB are:

- The description of regulator is immediate and complete.
- Every regulator is based on Function Block “ONOFF_Regulator”.
- Function block are made by everybody.
- Function blocks can have up to 128 outputs and inputs.

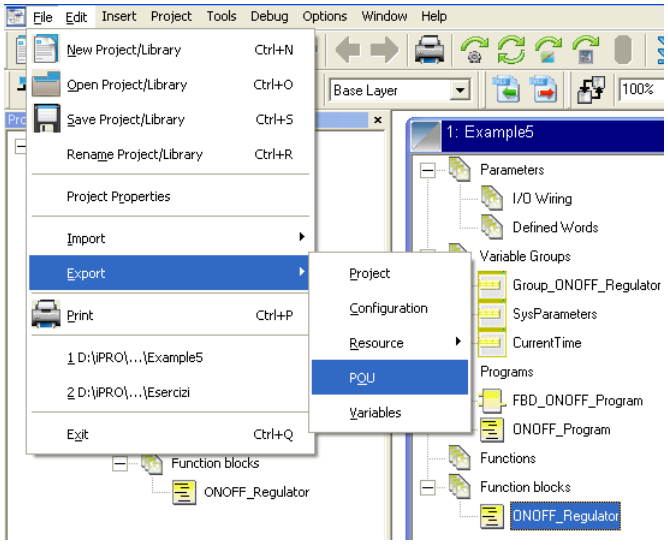
8.3.4 Exportation and Importation of FB

Through different ISaGRAF applications is possible to transfer the function blocks.

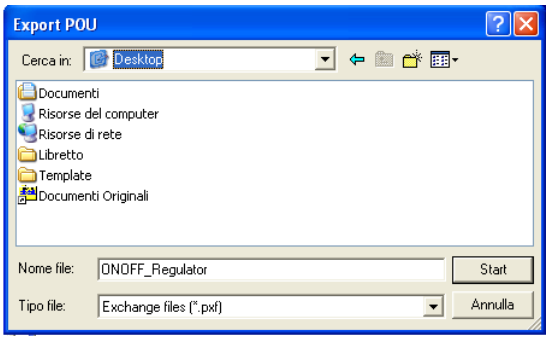
- *Exportation*

  Select the function block to export (in this example ONOFF_Regulator).

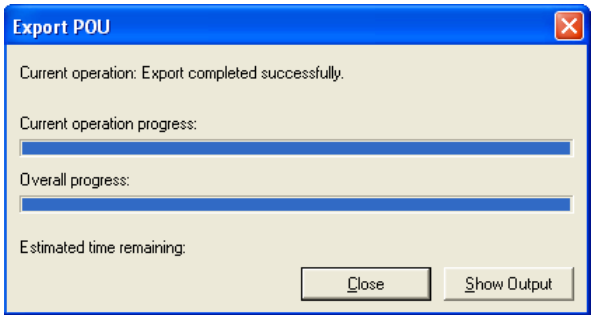
  Choose File → Export → POU



Select the directory to save the file (the extension of the file is .pxf).

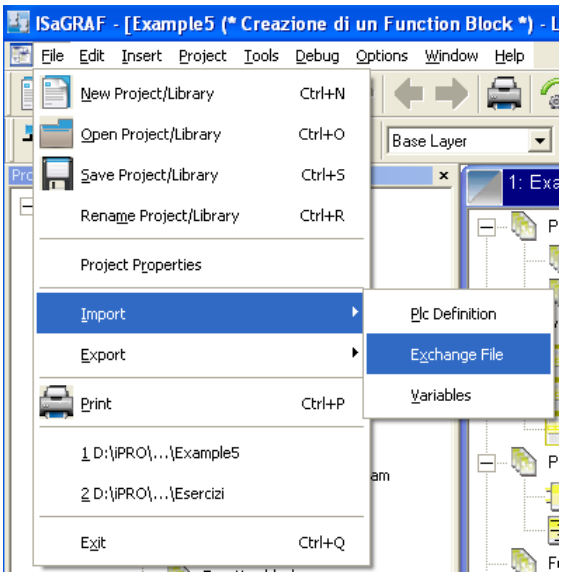


When the process will be finished, choose close in the following window.

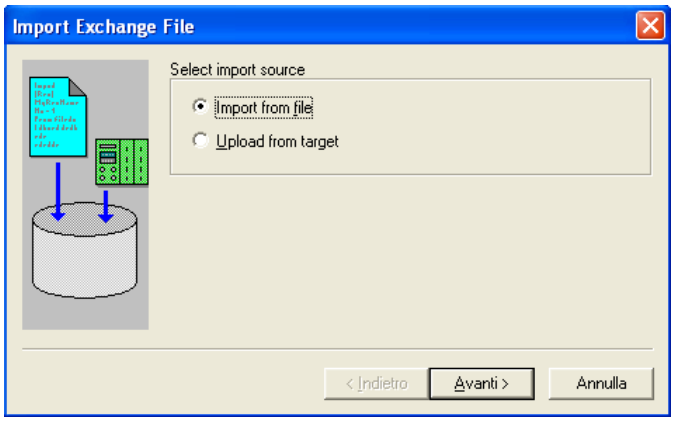


- *Importation*

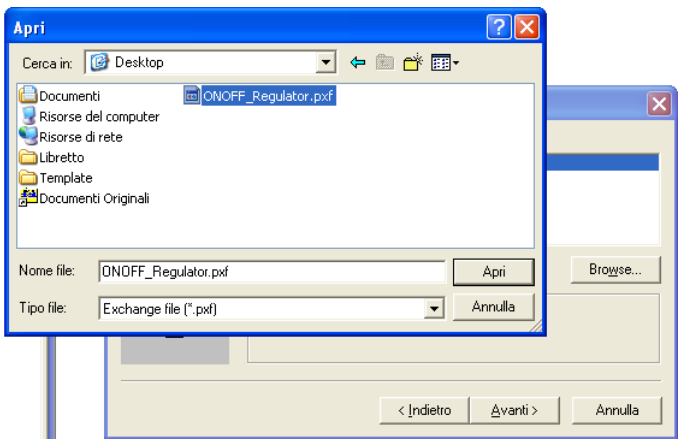
  Choose File → Import → Exchange File



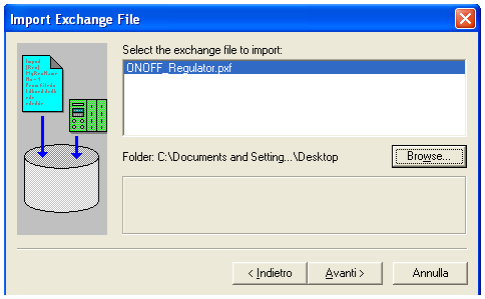
Select Import from file:



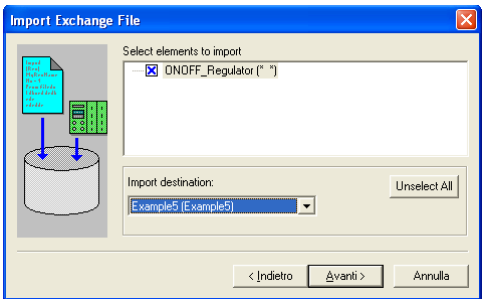
Choose the file saved before or the file in your library (file extension is pxf):



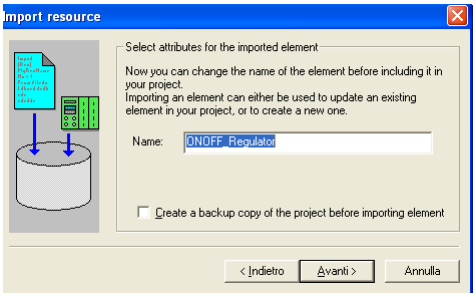
Select the exchange file to import:



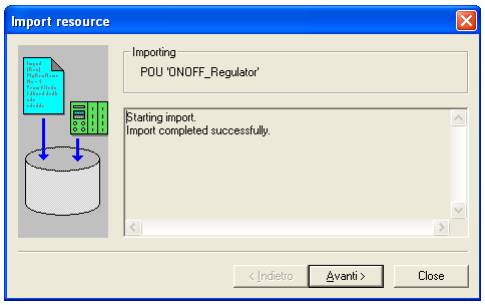
Select the elements to import:



If you want it is possible to change the name of function block



Check the result of procedure and exit:



Now in your project, in the function block folder you will find the ONOFF_Regulator.

8.4 Configuration files

The files, managed through the USB key, are recognized with different kind of “extension file”; here below the differences.

8.4.1 File CONF

The “.conf” file is the list of all parameters (map) that your application needs (for example: SET, BAND, etc...).

The correct syntax name for this file is an alphanumerical characters but with “- (minus)“ and “. (dot)” not at the first position of the name.

This files are standard text files with the following structure:

Parameter_name1=value

Parameter_name2=value

The iPRO can manage up to 10 .conf files; inside the iPRO you can save different .conf files for different users: for example one map for service people, one map for production, etc...

The files can be transfer to the iPRO using the USB.

8.4.2 File BIN

The “.bin” file is the file created by VISOPROG for the VISOGRAPH interface.

The correct syntax name for this file is an alphanumerical characters but with “- (minus)“ and “. (dot)” not at the first position of the name.

The iPRO can manage up to 5 .bin files; inside the iPRO you can save different .bin files for different users: for example one file for service people, one file for production, etc...

The files can be transfer to the iPRO using the USB.

8.4.3 File PARAM

The file param.txt is the list of parameters for iPRO.

Create a standard txt file with the following structure:

0=value

1=value

.....

9=value

The meaning of 0,1,2, etc is :

0=IP Address	1=HOSTNAME
2=DNS	3=DOMAIN
4=Modbus Address	5=NETMASK
6= NET	7=Net Gateway
9=MODSLAVE_Parameters	

The files can be transfer to the iPRO using the USB; at the end the iPRO will reboot automatically with the new configuration. (It is not necessary to write all the parameters).

8.4.4 File SPALT

The spalt files are files necessary to program the iPRO to send e-mail and sms.

These file are:

- *Default.spalt*

  this file includes the default parameters to configure the modem. You can change:

  ANALOG_ENABLE_DIAL_IN = 1: enable 0: disable

  ANALOG_RESET = intmodem/intreset if iPRO has internal modem

  extmodem/extreset if iPRO has external modem

  ANALOG_LOCAL_IP = iPro's IP during the dial-in.

  To debug in dial-in mode:

  change IP address in ISaGRAF – (through ISaGRAF Network Architecture)

  compile

  select debug

- *maileth.spalt*

  this file include the parameters necessary to send mail through internet.

  An example of configuration is:

  EMAIL_FROM=ipro
  EMAIL_TO=mario.rossi@libero.it
  EMAIL_SUBJECT=”test mail”
  EMAIL_SMTP_SERVER=smtp.libero.it
  EMAIL_AUTH=on
  EMAIL_USER=ipro400@gmail.com
  EMAIL_PASS=ipro400d
  EMAIL_TLS=on

  Compile with correct values each field.

- *mailmodem.spalt*

  this file include the parameters necessary to send mail through the modem.

  An example of configuration is:

  EMAIL_FROM=ipro
  EMAIL_TO=mario.rossi@libero.it
  EMAIL_SUBJECT=”test mail”
  EMAIL_SMTP_SERVER=smtp.libero.it
  EMAIL_AUTH=on
  EMAIL_USER=ipro400@gmail.com
  EMAIL_PASS=ipro400d
  EMAIL_TLS=on
  ANALOG_DIALOUT_TEL=0,7027020000
  ANALOG_DIALOUT_NAME=pluto@libero.it
  ANALOG_DIALOUT_PASS=trustn0ne
  ANALOG_DIALOUT_DIRECTPPP=0
  ANALOG_DIALOUT_NAME_P=name:
  ANALOG_DIALOUT_PAAS_P=word:

  Compile with correct values each field.

- *smsneteth.spalt*

  this file include the parameters necessary to send sms through Ethernet - Internet.

  An example of configuration is:

  NETECH_MACHINE_NAME=ipro_dixell

  SMS_NUMBER=+391234567890

  Compile with correct values each field.

- *smsnetmod.spalt*

  this file include the parameters necessary to send sms through the modem.

  An example of configuration is:

  NETECH_MACHINE_NAME=ipro_dixell

  SMS_NUMBER=+391234567890

  ANALOG_DIALOUT_TEL=0,7027020000

  ANALOG_DIALOUT_NAME=pluto@libero.it

  ANALOG_DIALOUT_PASS=trustn0ne

  ANALOG_DIALOUT_DIRECTPPP=0

  ANALOG_DIALOUT_NAME_P=name:

  ANALOG_DIALOUT_PAAS_P=word:

  Compile with correct values each field.

- *smsgsm.spalt (external gsm modem TC35)*

  this file include the parameters necessary to send sms through the gsm modem

  An example of configuration is:

  SMS_NUMBER=+391234567890

  Compile with correct values each field.

All these files can be transfer to the iPRO through the USB.

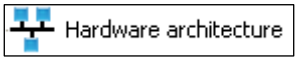
9. SECURITY

9.1 How to protect your application/program

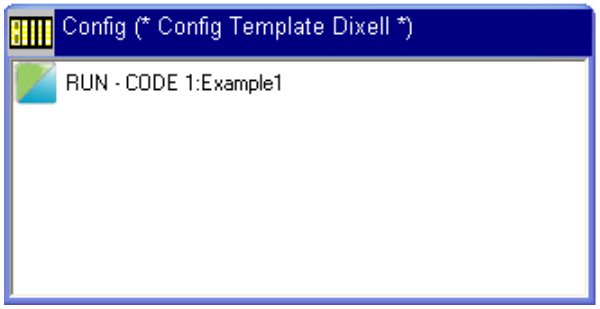
The owner of application can protect it, with a password, against unwanted access.

If your system is protected by password, it is possible to save a new application only if you have the source file of your application (ISaGRAF file); besides, you can download the application (isadix file – crypted) with the USB key to the iPRO, if the two password are the same (the password inside the iPRO and the password of the new file).

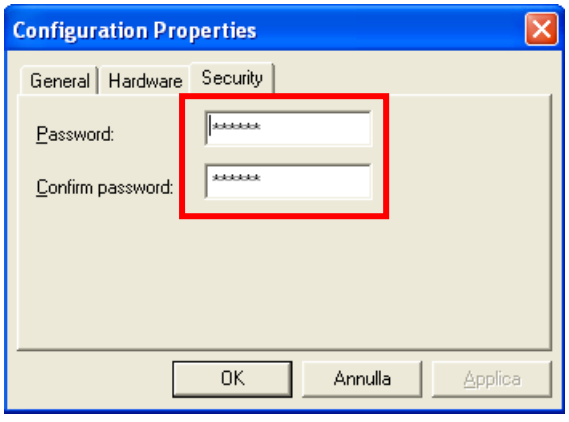
To protect your application please follow this sequence:

- Connect the iPRO with the PC and launch ISaGRAF.
- Download the application to the iPRO.
- Start the debug mode  , then hardware architecture 

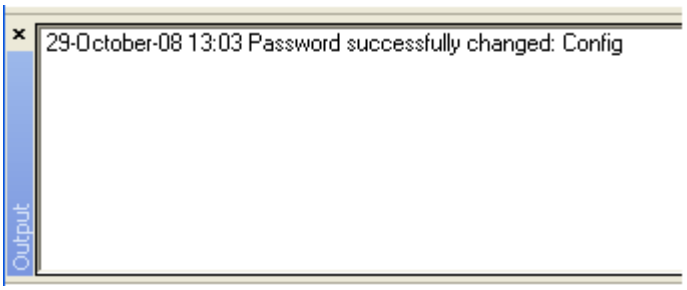
and double click on the blue bar “Config (*Config Template Dixell*)”:



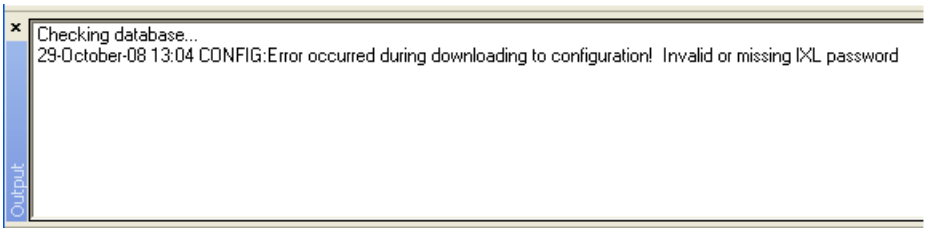
Now write and confirm the password (min 6 characters) as in the window here below:



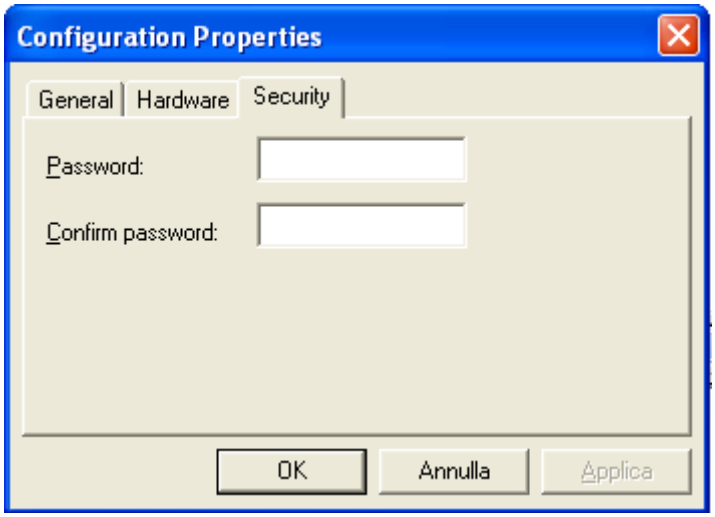
- If the procedure has been correct the message in the ISaGRAF window will be:



If you try do download another application without or with a different password the message showed by ISaGRAF will be:



To remove the password the procedure is the same as above but in the configuration properties you have to cancel the password.

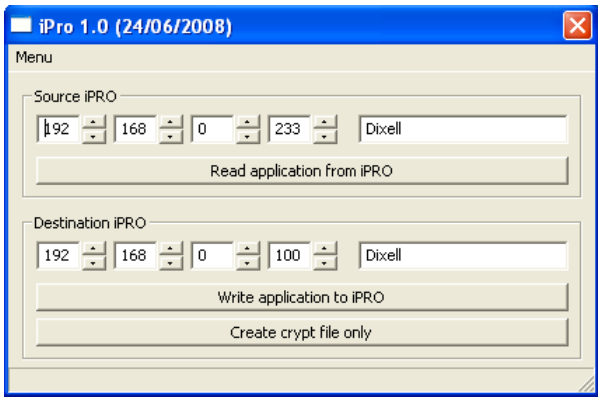


9.2 How to transfer or copy the application/program

It is possible transfer one application, if in your computer ISaGRAF is not installed, from:

- iPRO to PC
- PC to iPRO
- USB TO iPRO

All these procedure can be done with the iPRO software tool.

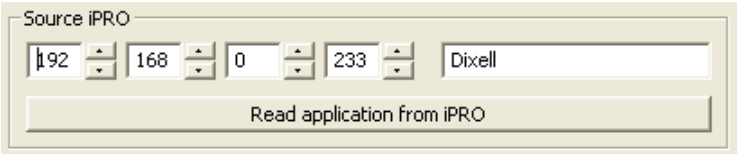


- *From iPRO to PC*

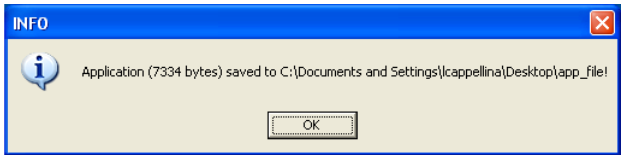
  To transfer the application from iPRO to the PC it is necessary to know the password of application inside the iPRO; if the application is not protected the default password is Dixell.

  Write the IP address of iPRO and the password.

  Then click on “Read application from iPRO”.



Save the file, for example, with the name “app_file”; the message that appear is:



In the folder, there are two files:

app_file → this is the file to transfer in the new iPRO (through Ethernet)

isadix → this is the file to use with the USB key
(only if the IPRO has the same password)

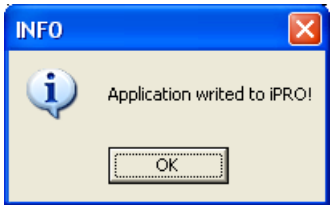
- *From PC to iPRO*

  To transfer the application from PC to the iPRO it is necessary to know the password of application inside the iPRO; if the application is not protected the default password is Dixell.

  Write the IP address and the password of the iPRO (not the password of the file).

  Then click on “Write application to iPRO”.

Choose the file, for example, the name “app_file”; the message that appear is:

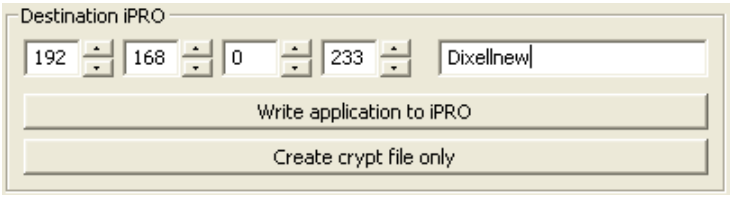


From this moment, the new password is the password of the file transferred inside the ipro; with this procedure, the previous application and password will be removed.

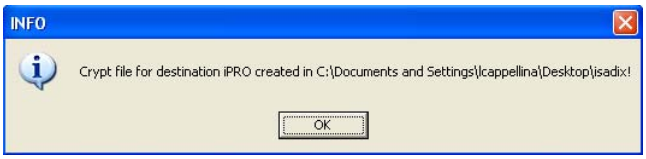
With this procedure, starting from an existing file, it is possible to create a new “isadix” file with a different password.

Write the new password.

Then click on “Create crypt file only”.



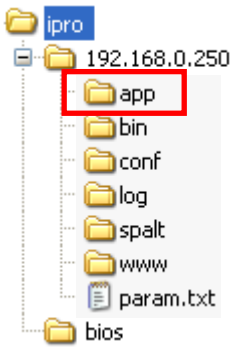
Choose the file, for example the name “app_file”; the message that appear is:



This mean that the new isadix file has been created with the new password.

- *From USB to iPRO*

  All the isadix files created can be downloaded directly in the iPRO using the USB key. It is enough to put the file isadix inside the folder “app” in the USB.

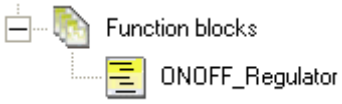


For each iPRO and each “app” folder it is possible to use only one isadix file.

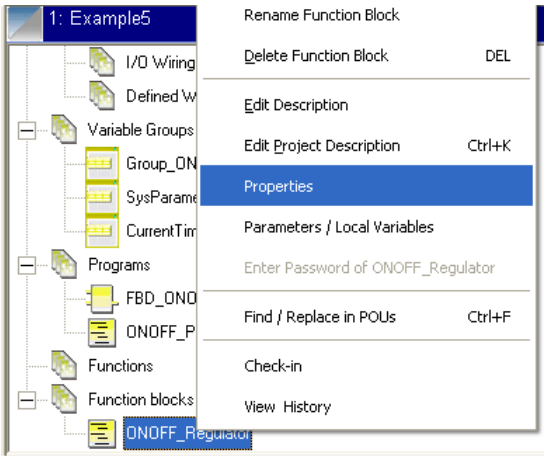
9.3 How to protect the function block FB

When one or more function blocks have been developed than is possible to protect them with a password. The function blocks are visible in the project but to open or modify them it is necessary the password.

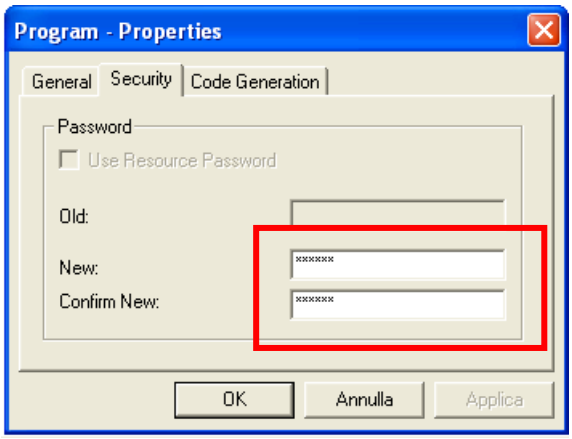
Select the function block to protect:



Click on the function block and with the right button of the mouse select properties:



Select security and write inside the boxes your password and confirm.



In your project the colour of function block will change colour from yellow to green; this mean that your block is locked but non saved yet.

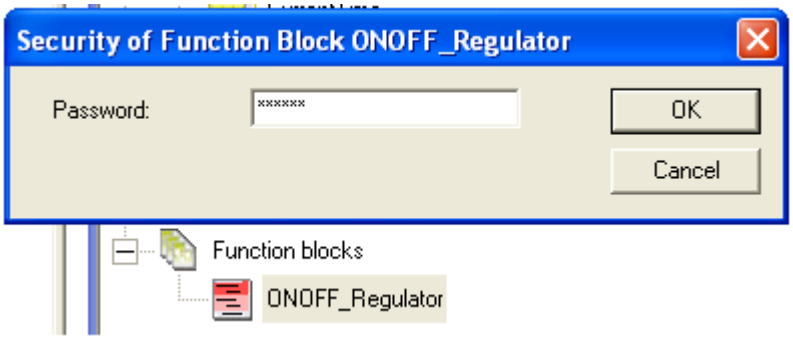
Try to save, close and open again the project.

Now the block is protect and the colour is red.

The exportation and importation are possible but in any case the block will be protected.

Only if you know the password will be possible to remove the protection and open the block.

To remove the password, double click on the function block:

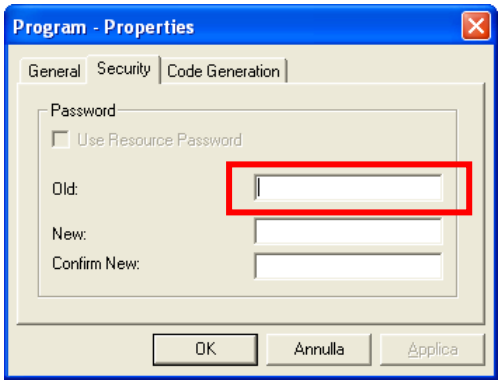


Write the password and confirm; the colour of the block become green.

Pay attention because with this procedure you are able to check the function block but the password is not yet removed.

To remove completely the password it is necessary to modify again the properties as above.

In this case in enough to write the password in the box here below and confirm.

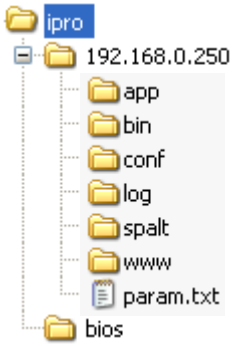


Now the block is completely unlocked and the colour will be yellow.

10. HOW TO USE THE USB KEY

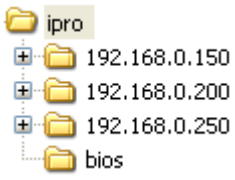
Through the USB key it is possible download and upload files from iPRO.

First off all it is necessary to set-up the USB key creating the following structure:



FOLDER	DESCRIPTION
ipro	This is the main folder common for all the iPROs.
bios	This folder, common for all the iPROs, contains the file to update the microprocessor; it is possible to download the latest version from Dixell website and the syntax of this file is: “updater-2008090300”.
192.168.0.250	This is iPRO’s IP folder with inside the files only for the single iPRO. If there are more iPRO is enough to create more folders with different IP; inside the IP folders the structure have to be the same.
app	Folder to download the ISaGRAF application (isadix file – crypted)
bin	Folder to download the Visograph application (up to 5 files)
conf	Folder to download the maps of the application (up to 10 files)
log	Folder to upload the log file from iPRO
spalt	Folder to download the spalt files with parameters for e-mail, sms and dial-in
www	Folder to download the personal website
param.txt	File with the parameters of iPRO (IP, Hostname, DNS)

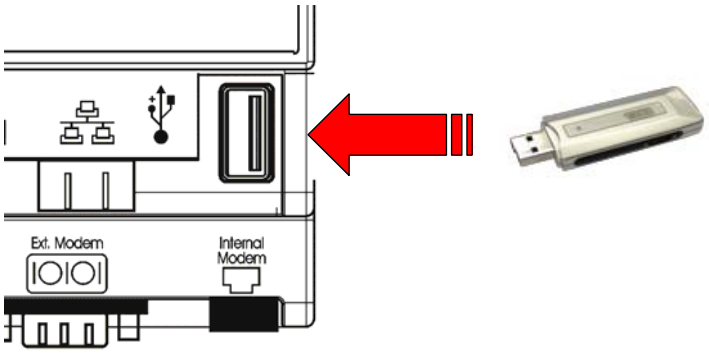
If you have more iPRO the structure of your USB key have to be:



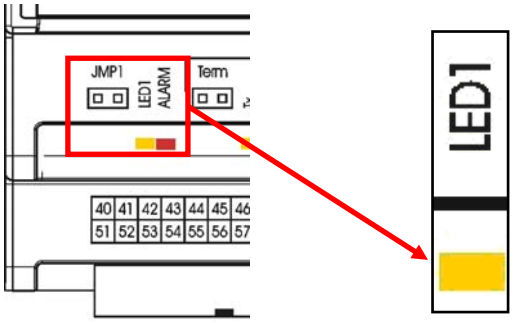
Inside each IP folder the structure is always the same; it is also possible to create, inside the IP folder, only the folder that you need. For example if you have to download a new bin file for the Visograph, it is enough to create only the “bin” folder.

To download or upload the files the procedure is the following:

- Introduce the USB key in the usb port of the Ipro.



- When the yellow led will blink, the file has been downloaded or uploaded; now you can remove the USB key.



- If necessary the iPRO will reboot automatically.

11. VISOPROG INSTALLATION AND SET-UP

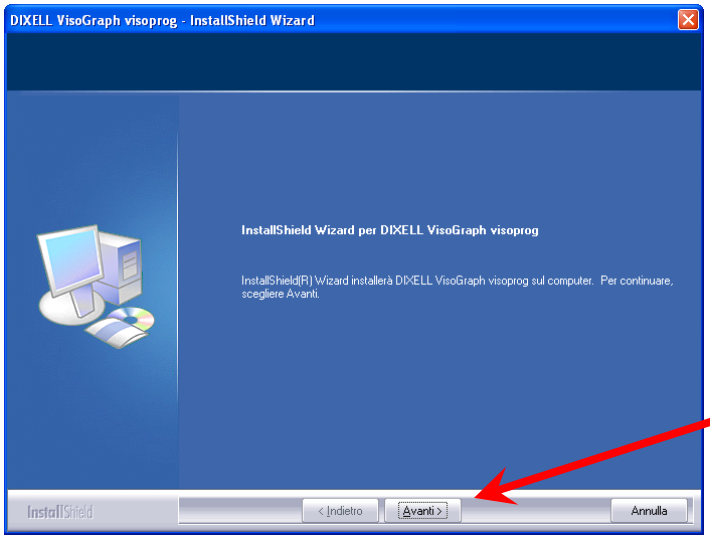
11.1 How to install VISOPROG software

To install VISOPROG software are necessary:

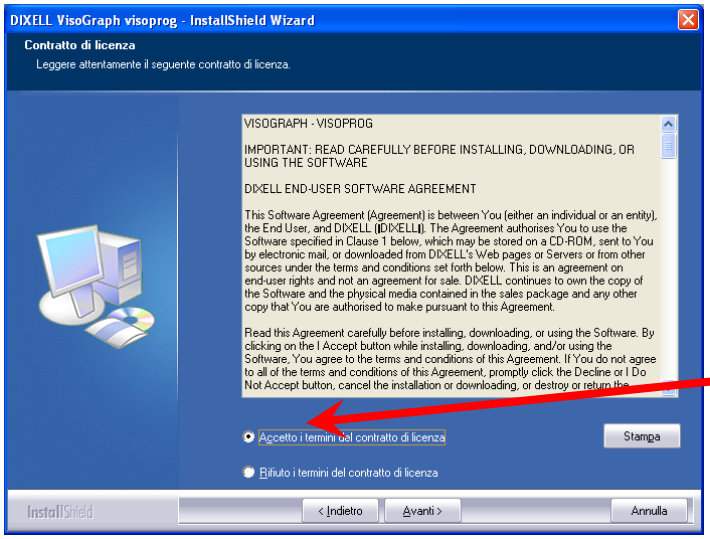
- Software CD.
- To have the PRODUCT KEY (provided by Dixell)

Insert the CD in your PC and launch the program 

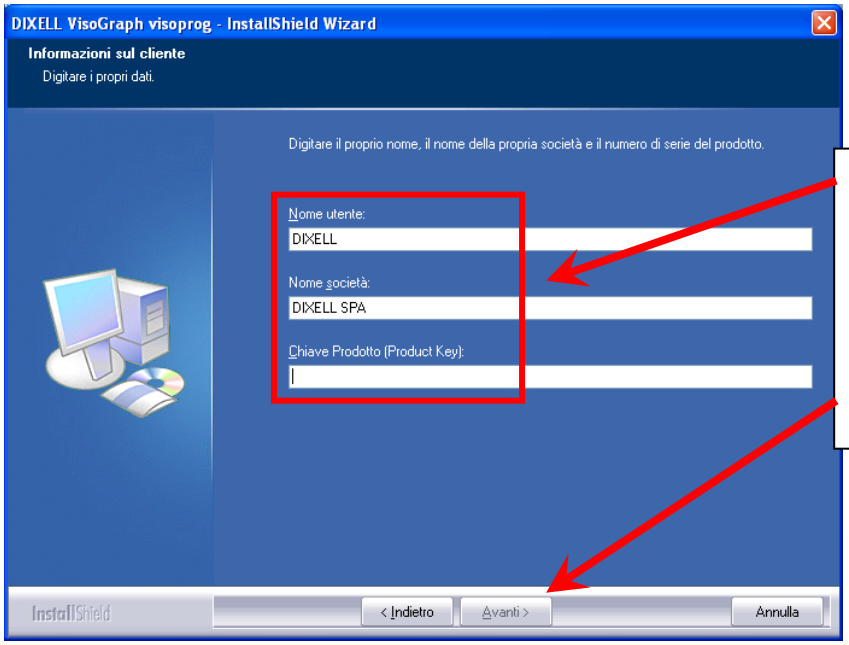
and then follow the instruction as showed here below



Choose "**Avanti**".



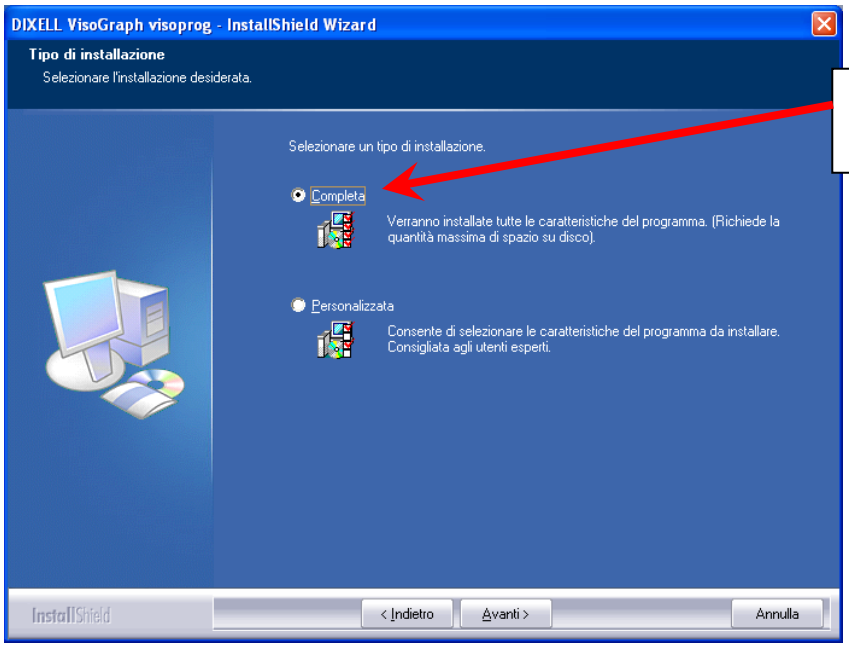
Choose "**Accetto….**", then "**Avanti**".



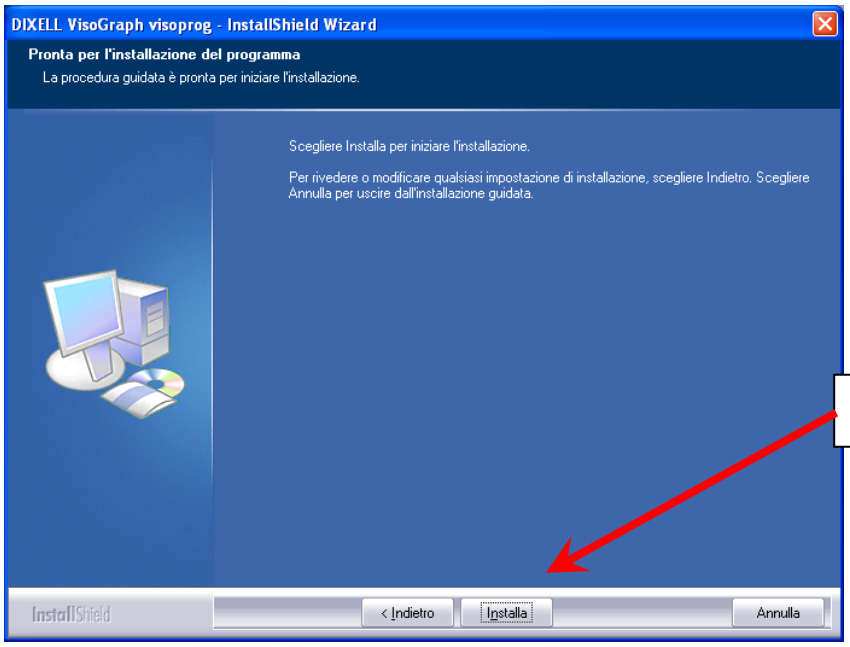
Fill in with these information:

- **Username**
- **Company name**
- **Product Key**

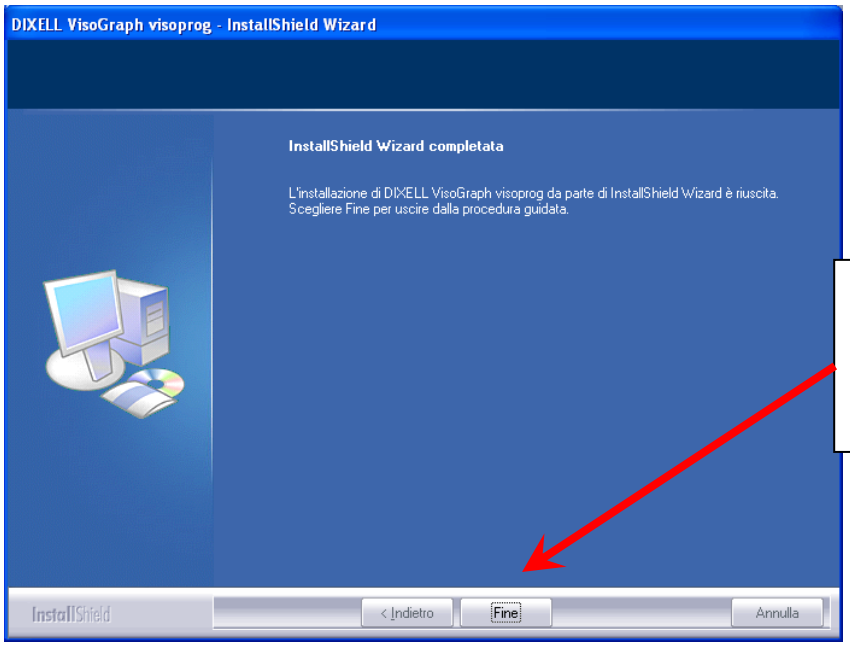
Then "**Avanti**".



Choose "**Completa….**", then "**Avanti**".

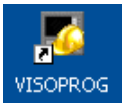


Choose "**Installa.**".



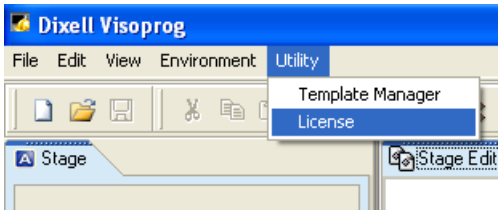
Now the installation is completed: choose "**Fine**" to close the windows

11.2 Licence Activation

Start the VISOPROG program with double click on the icon 

in your desktop:

To complete the installation choose Utility → License

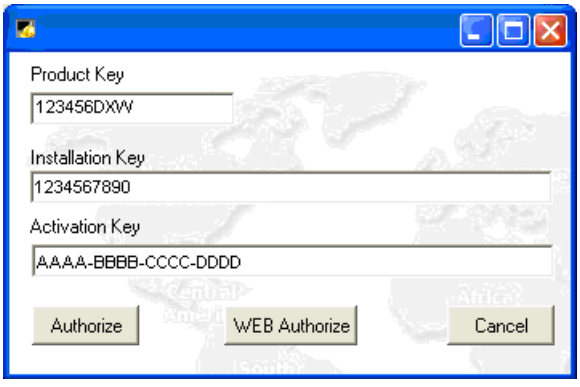


In the window here below you will find the information about your Product Key and the Installation Key (this number has been generated automatically by VISOPROG).

Now there are two ways to complete the authorization:

- Authorize : in this case you have to send the two codes (Product Key and Installation key) to Dixell by fax or mail to get the Activation Key.

- WEB Authorize : in this case you can get the Activation Key automatically (an Internet Connection is required)

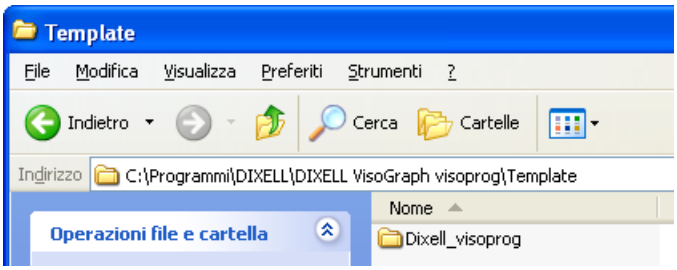


From this moment you can work with VISOPROG.

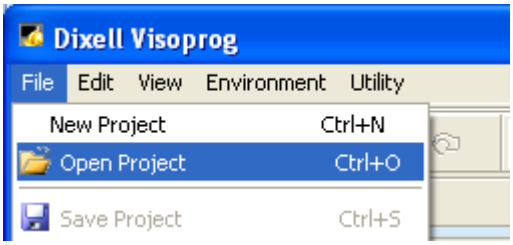
11.3 How to set-up the VISOPROG program

Before to set-up the program it is necessary to open a project.

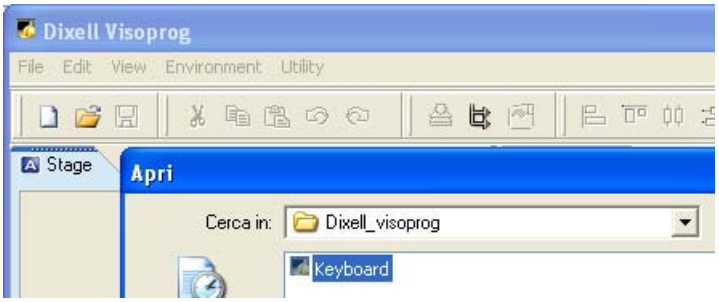
In the CD you can find the project “Dixell_visoprog” that you have to copy inside the folder “C:\Programmi\DIXELL\DIXELL VisoGraph visoprog\Template” in your computer.



Open the project copied just now:



And choose the file “Keyboard”:



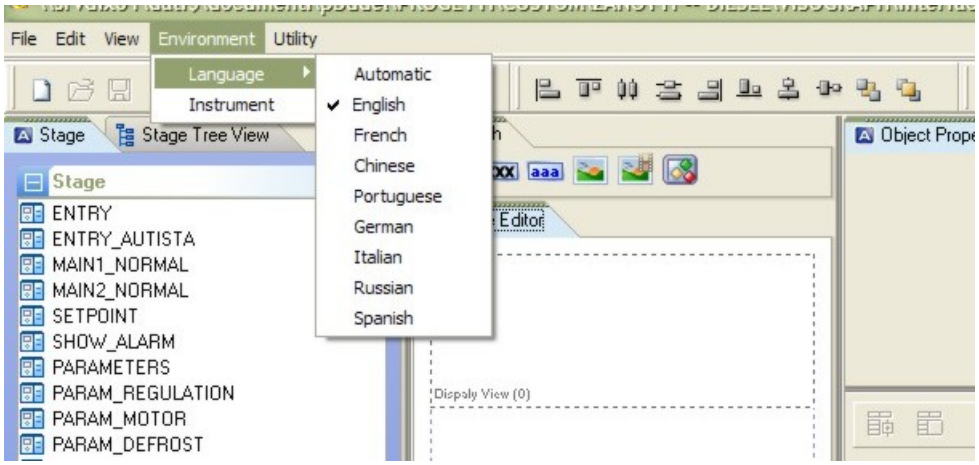
Now we have to sep-up the program with some information:

- Language to use.(Environment → Language)
- Connection between Visoprog and iPRO. (Environment → Instrument)
- Project options (File → Options)

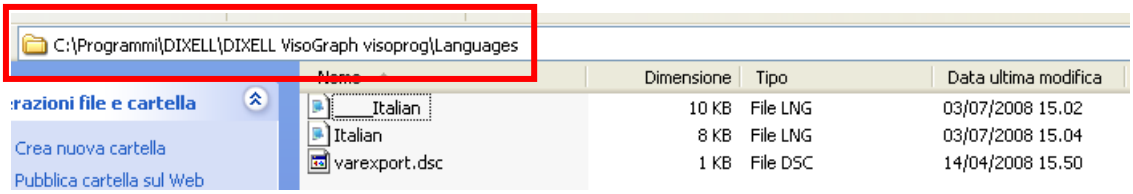
11.3.1 Environment Language

This set-up defines the language used in your environment.

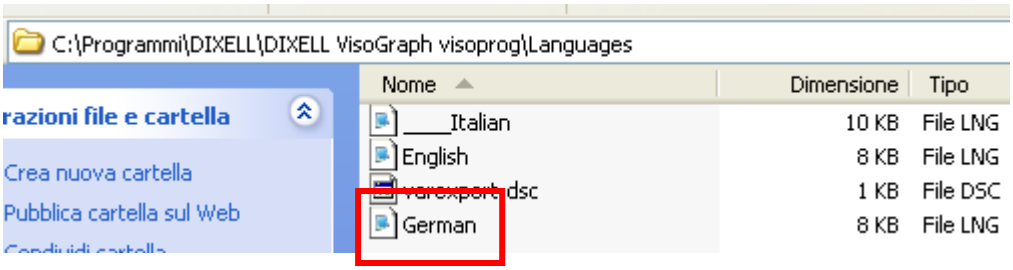
Select: Environment → Language and choose your preferred language.



Pay attention because if your language is not included in the standard languages, you can add it for yourself. Go inside the folder “Languages” that you can find in your default installation directory.



For example, starting from Italian file, we have copied and renamed it in German file.



At this point, you can edit and modify the file translating the text into your language. Save the file and, at the next starting of VISOPROG, you will be able to select your language.

11.3.2 Environment Connection

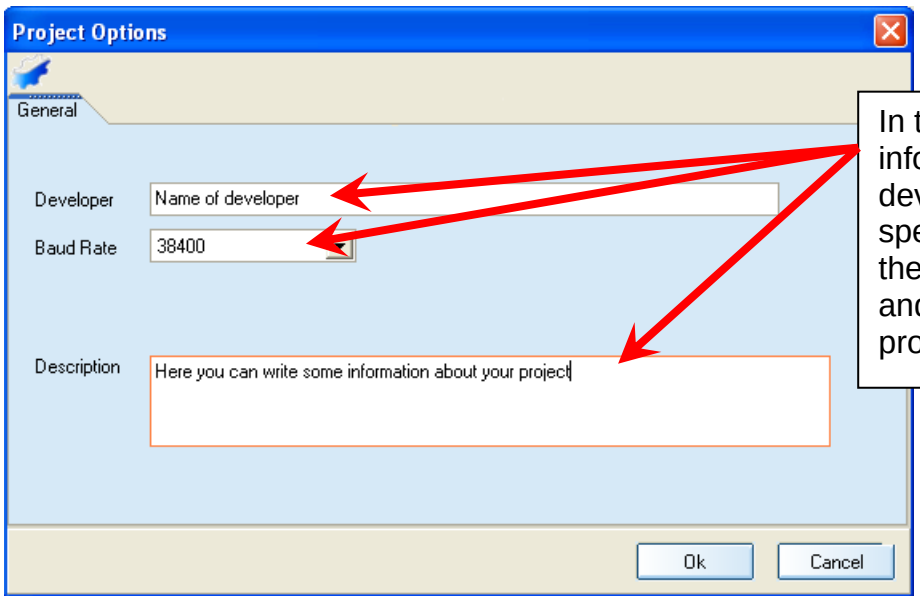
This set-up defines the connection between your personal computer and the iPRO.

Select: Environment → Instrument and choose the iPRO device.

11.3.3 Project Options

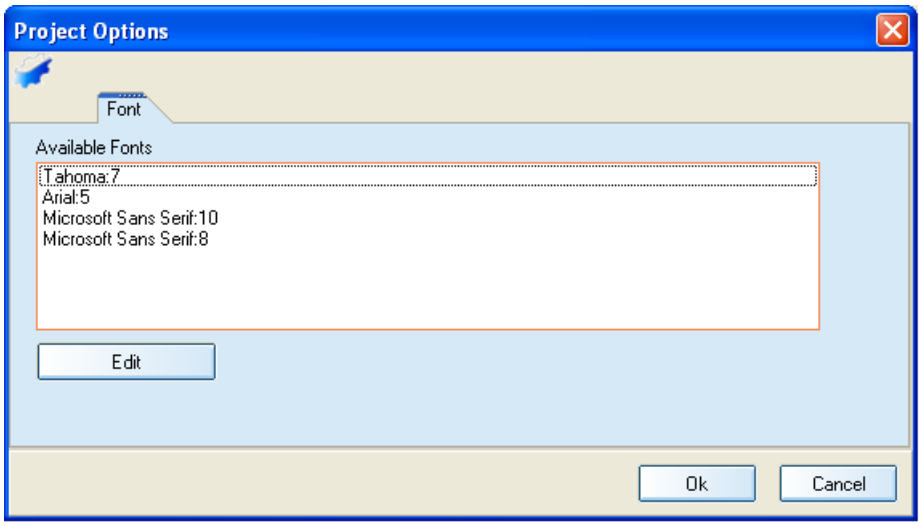
This set-up defines all the options of your project.

Select: File → Options.

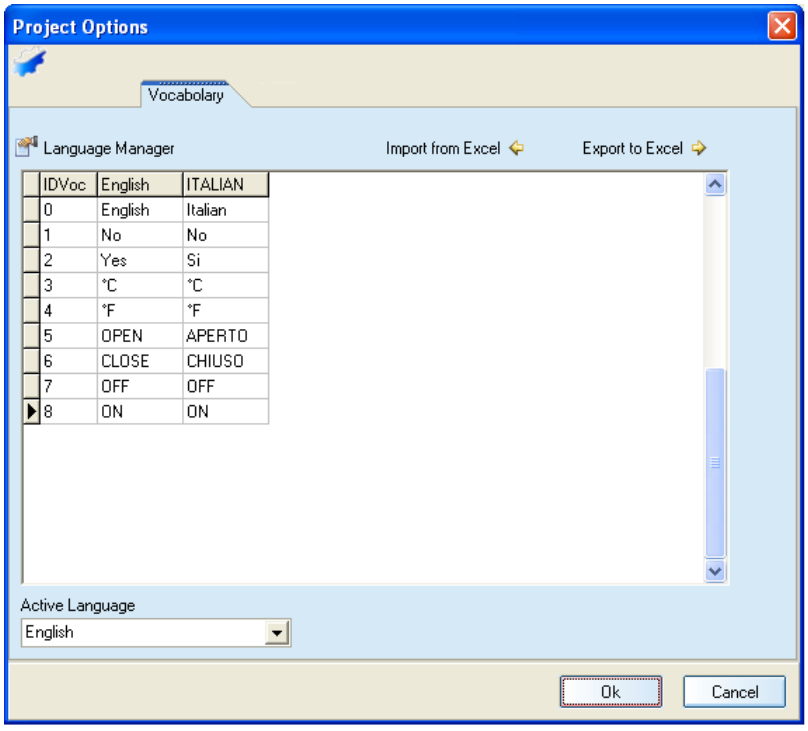


In these window there are the information about the name of developer, the baud rate (the speed communication between the VISOGRAPH and iPRO) and the description of your project.

In this window you can define the fonts of your project; for each project you can choose 4 fonts. In every moment you can change the fonts (click on Edit and choose the new one), but pay attention that in your project the previous font will be updated automatically with the new one.

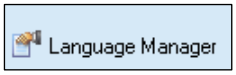


In this window you can define the languages to use in your user interface. For each project you can use up to 5 languages and this file can be manage as an excel file.



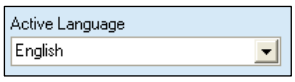
To create and manage your vocabulary in the best way please follows these suggestions:

- *Define the multi-languages to use in your project.*

Click this icon 

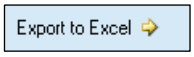
and choose the languages to add. 

- *Define the language to use* (this is the language that you will see in VISOPROG during the developing of your project); if you want, in every moment, it is possible to change it to check the others languages in your display.

Click this icon 

and choose the default language.

- *Export, modify and import the vocabulary file.*

Click this icon 

to export your vocabulary and save the file for example with the name: “Vocabulary.xls”..

Then the excel file has to be made in the following way:

	A	B	C	D	E	F
1	**IDVoc**	**English**	**Italian**	**French**	**German**	
2	**0**	**English**	**Italian**	**French**	**German**	
3	**1**	No	No	NON	NEIN	
4	**2**	Yes	Si	OUI	JA	
5	**3**	°C	°C	°C	°C	
6	**4**	°F	°F	°F	°F	
7	**5**	OPEN	APERTO	OUVERT	OFFNEN	
8	**6**	CLOSED	CHIUSO	FERME'	GESCHLOSSEN	
9	**7**	OFF	OFF	HORS TENSION	AUS	
10	**8**	ON	ON	TOURNE'	AUF	
11						

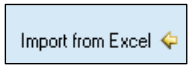
First row must have this kind of structure: IDVoc, Language1, Language2, etc....

Starting from the second row of the first column, we have to write the progressive index.

Then for each text inserted, you have to translate into the other languages you want.

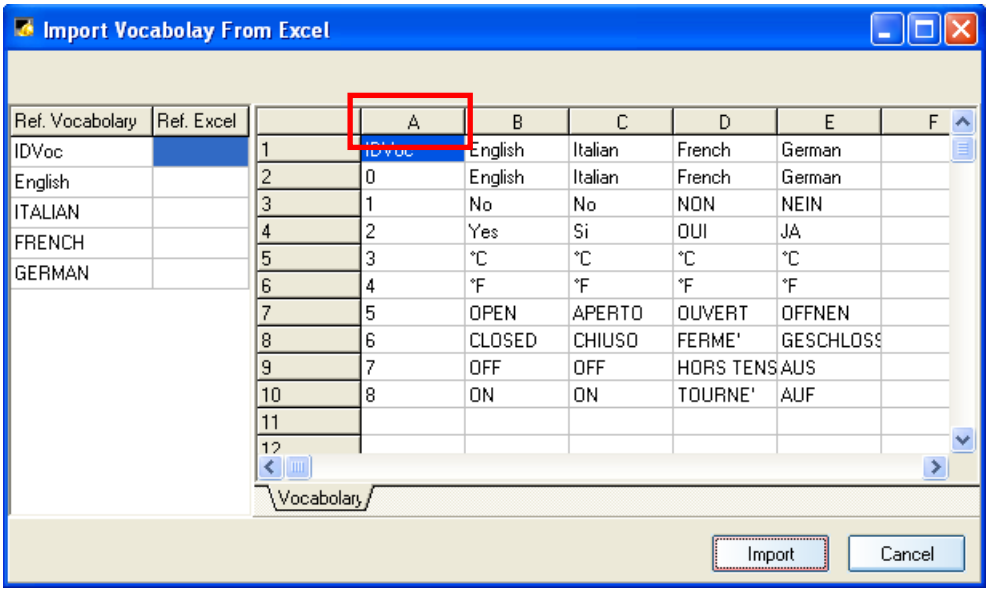
Summarizing: the structure of yellow rows and columns must be like the example here above while the structure of blue rows and columns is “free”.

- *Import the vocabulary.*

Click this icon 

to import in your project the file “Vocabulary.xls” modified.

It is very important to follow this procedure because we have to associate the Visoprog table with the excel table:



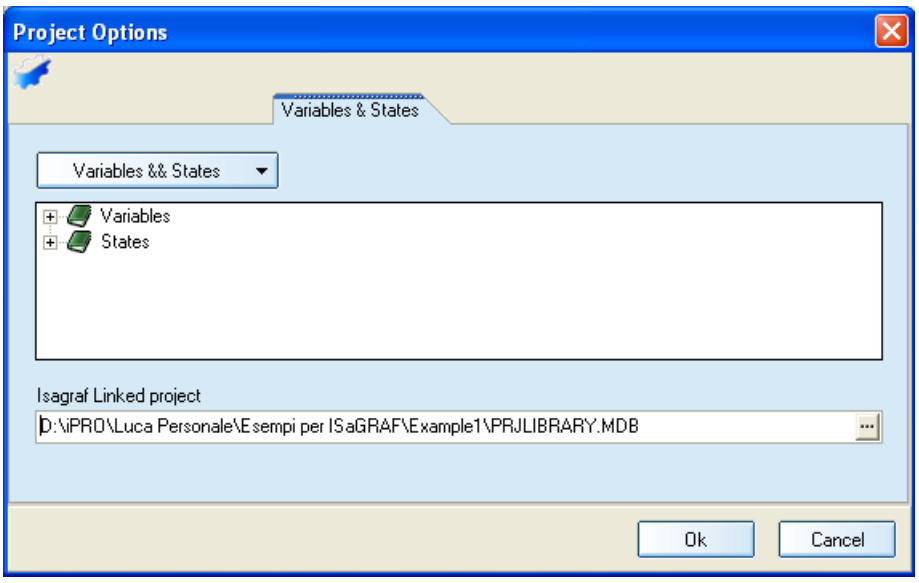
First click on “A” , then “B”, “C”, “D” and “E”; in the left table you will see the following structure:

Ref. Vocabolary	Ref. Excel
IDVoc	0::A
English	0::B
ITALIAN	0::C
FRENCH	0::D
GERMAN	0::E

Click Import and then OK to finish the procedure.

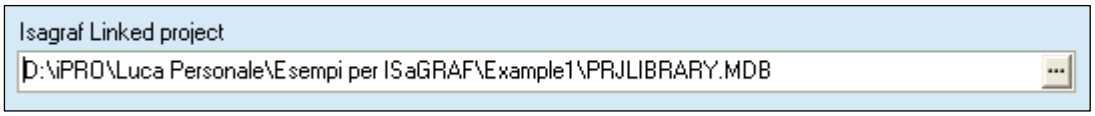
Now your vocabulary has been imported in your project.

In this window is possible to associate the variables between the ISaGRAF and VISOPROG projects; they can Import or Export the variables each other.

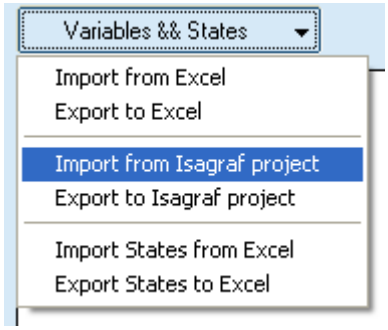


- *Define the ISaGRAF project to link in VISOGRAPH project.*

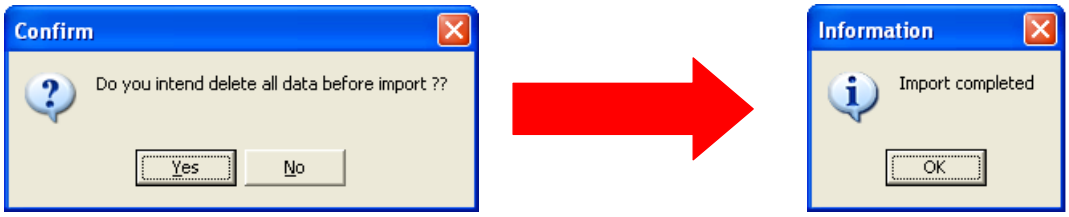
Select the ISaGRAF project where Import and Export the variables:



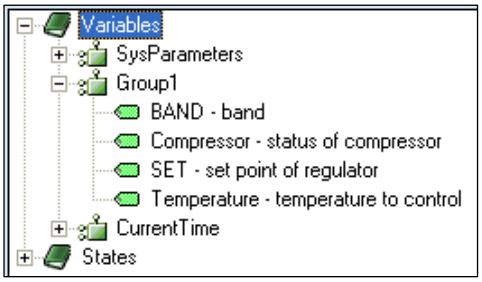
- *Import the Variables.*



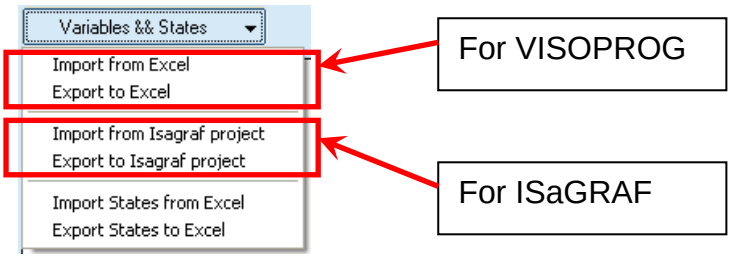
Confirm the operation.



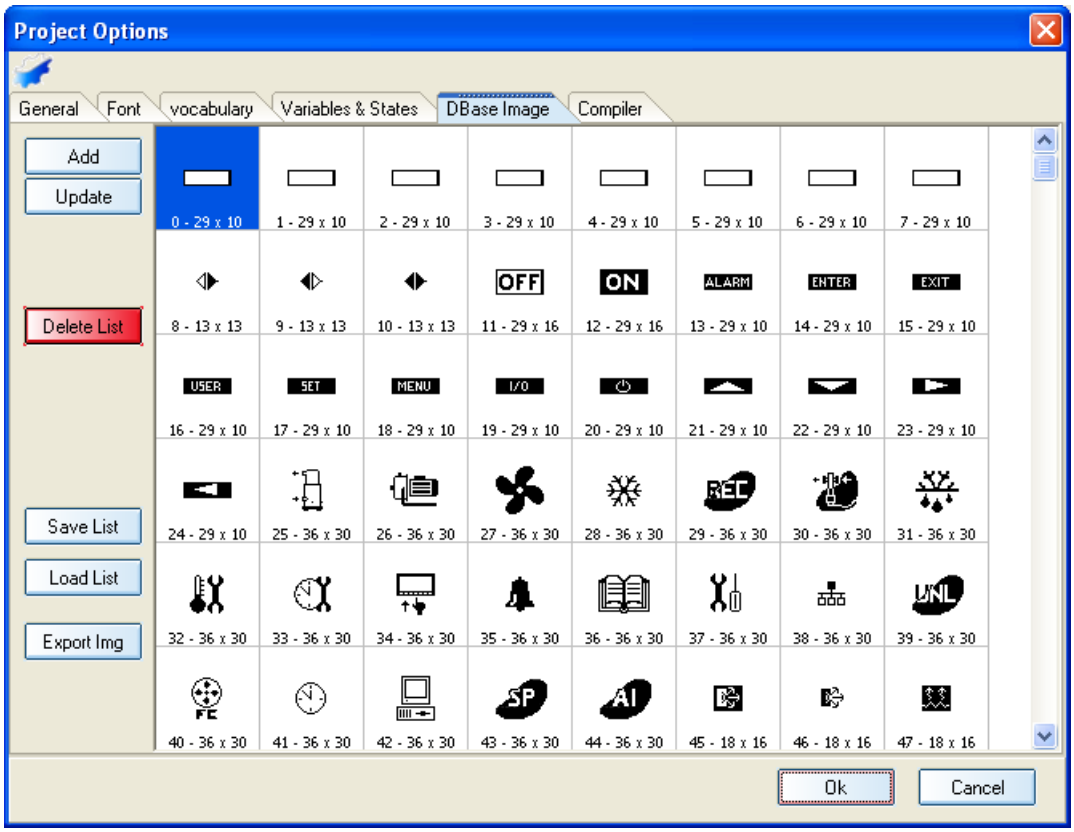
If you click on Variables you will find the variables defined in the project “Example1”.



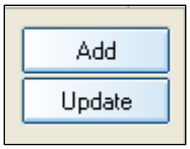
Now is possible to export the excel file, modify and then import the file again; in this way is not necessary to modify the variables two times.



In this window there are the images that is possible to use in your project.



With the buttons is possible:



Add or update the single image.

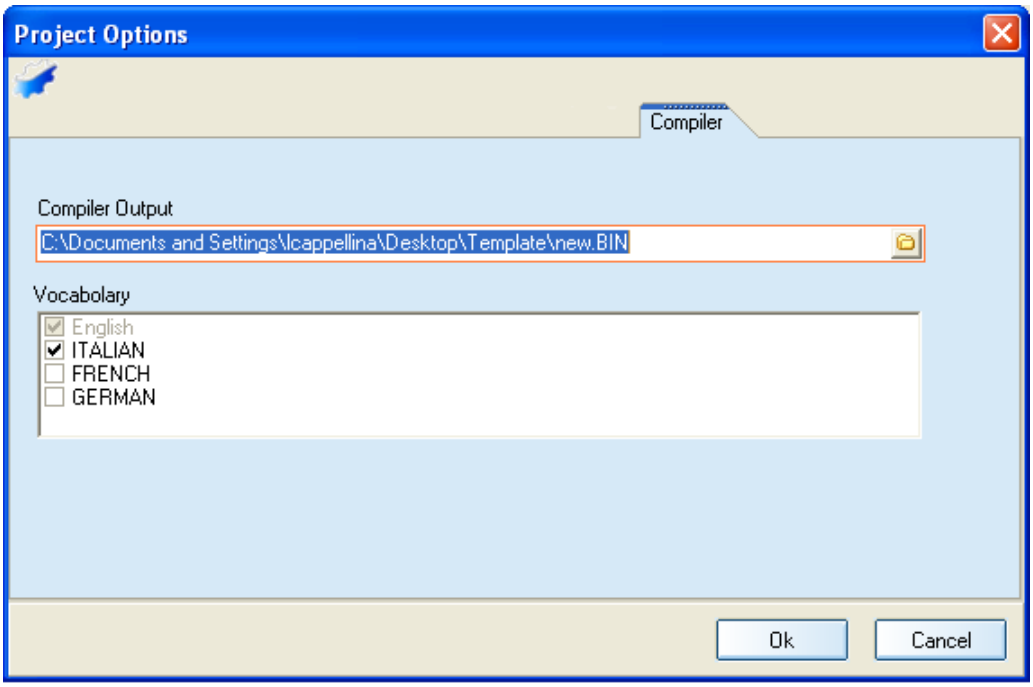
Delete, save and load the whole list of images.

Export the single image to modifies it.

The recognized formats for images are .gif, .jpg, .bmp, .ico, .emf and .wmf.

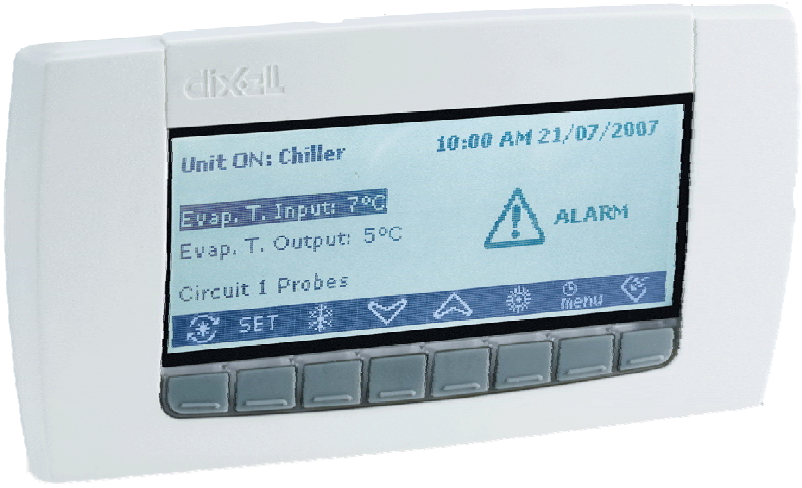
For each list is possible to manage up to 256 images.

In this window you can define the destination folder for your .bin file. The bin file is the compiled file of your project. This is the file to download in your VISOGRAPH interface. In this option is possible to decide which languages to add in the bin file.



12. VISOGRAPH

The VISOGRAPH Human Interface is a graphic lcd display necessary to visualize all the variables defined in the iPRO (remember that only the variables with an address defined in the ISaGRAF project can be visualized).



The main characteristics are:

- Graphic Lcd 240x96 pixel
- 8 full programmable keys
- Multi-languages
- Processor 32bit
- 3 wires bus
- Panel and wall mounting
- Optional NTC probe on board
- Software updating from USB (through the iPRO)

The Graphic Lcd and the Keys are programmable by the user; this is possible using the software tool VISOPROG made by Dixell.

13. THE VISOPROG WORKBENCH

13.1 Introduction

The VISOPROG workbench is the environment developed by Dixell to build the human interface in the VISOGRAPH graphic lcd.

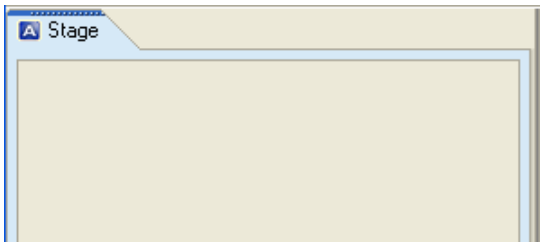
VISOPROG reads the ISaGRAF project from the iPRO and imports directly variables and function blocks to create automatically the basic interface; then the developer completes the interface adding functionality through the keys.

VISOPROG can import images and multi-languages dictionary.

13.2 The VISOPROG environment

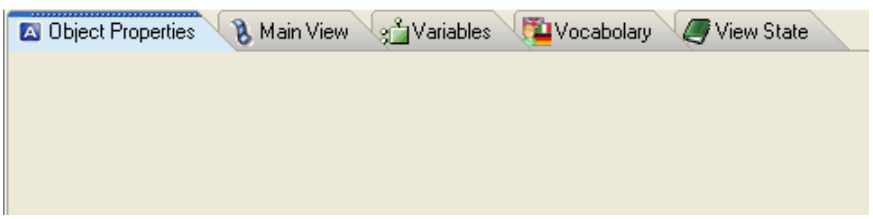
The VISOPROG environment is composed by three areas:

- The STAGE area:



- The STAGE EDITOR area:

- The INFORMATION area (Object Properties, Main View, ...):

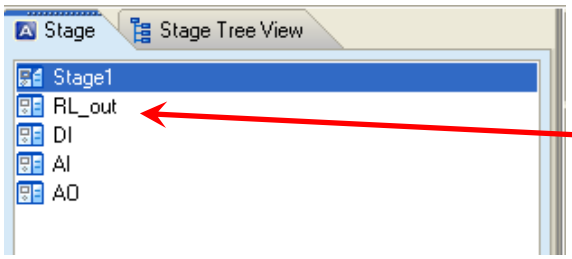


13.3 The STAGE area

The STAGE area is the structure of the project.

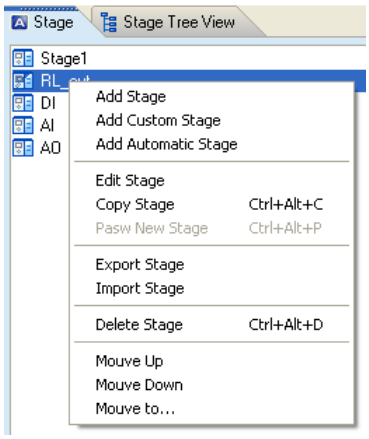
VISOGRAPH is organized as a sequence of menu called Stages; then, inside each stage, it is possible to create one (SINGLE PAGE) or more pages (MULTIPLE PAGES).

If you are inside the stage with multiple pages, it is possible to work in one page for time and the active page is in yellow colour. When the VISOGRAPH starts, the first stage showed in the display is the first stage defined in the VISOPROG project. Each stage is the container of the elements (controls) that you have decided to visualize.



In this picture we have 5 stages and when the VISOGRAPH starts, the first stage showed in the display will be “Stage1”.

With the right button of the mouse it is possible to:

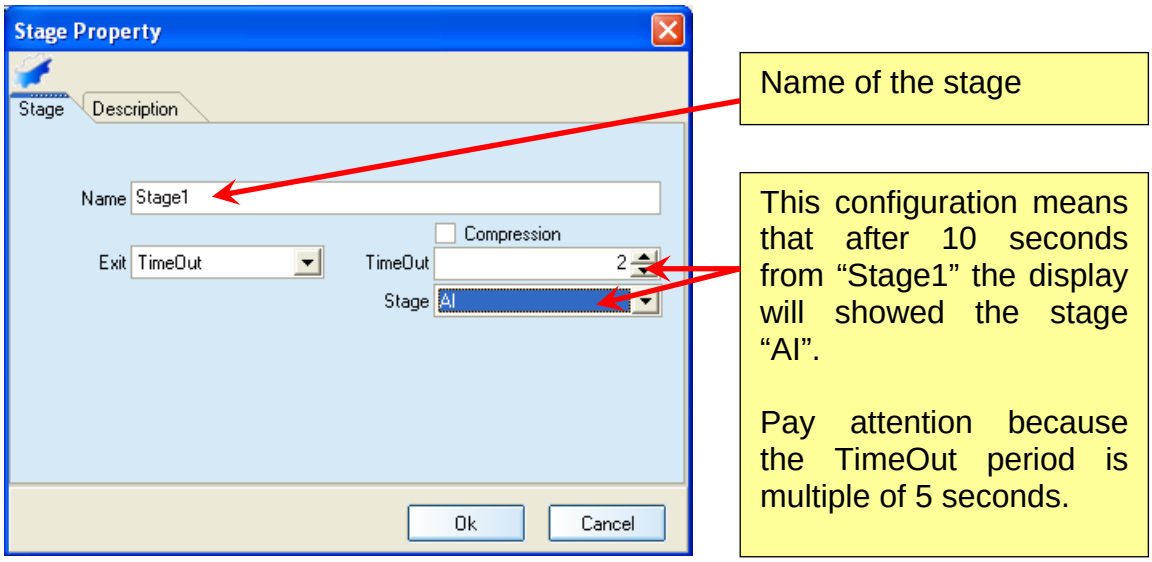


- Add a new stage
- Modify the properties of the stage
- Export and Import the stage
- Delete the stage
- Move the stage to change the sequence

When we add a new stage the information requested are:

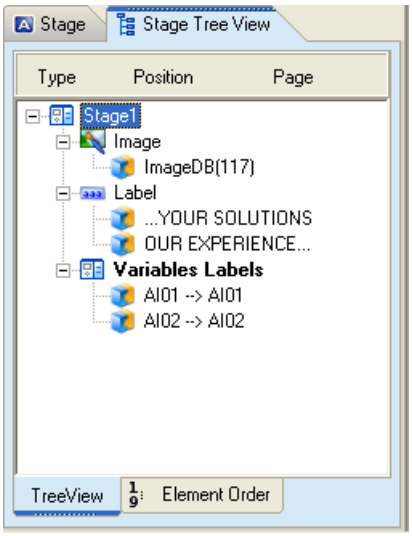
- The NAME of the stage visualized in the stages tree
- The EXIT mode of the stage; in this option we can choose:
  - Infinite → to exit from this stage it is necessary to press the key
  - TimeOut → after a period of time another stage will be showed (jump)
- The DESCRIPTION; this is a free field to write your comments.

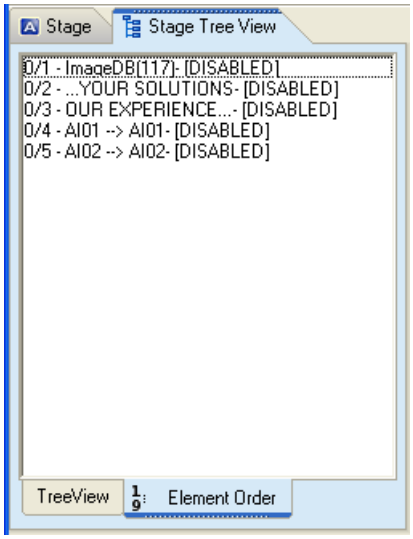
In the picture here below an example:



Other information available in this area are:

- Stage Tree View:
  - TreeView → all the Images, labels and variables used in the stage.
  - Element Order → the order of introduction of the elements.

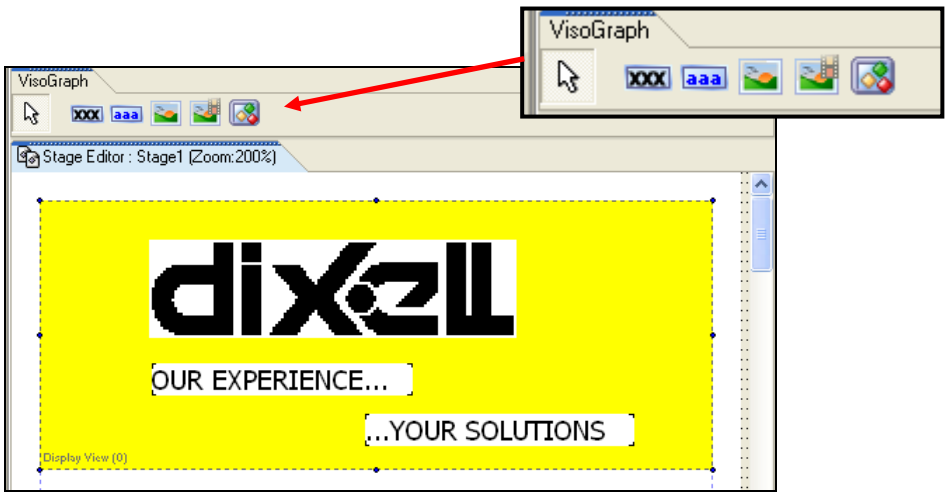




13.4 The STAGE EDITOR area

The STAGE EDITOR area is the area where to create the interface of the stage.

In this area through the control bar is possible to add labels, variables, Images and switch variables/labels.



Inside the control bar there are five options:

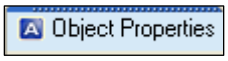
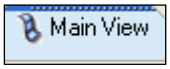
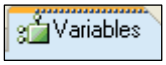
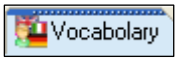
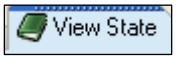
	**VarLabel**: With this control you can add the variables to visualize the value; these are the variables defined in the ISaGRAF project.
	**DXLabel**: With this control you can add a fixed string or value; this string can be associate with the vocabulary.
	**DxImage**: With this control you can add an image from the database.
	**DxAnimImage**: With this control you can add an animated image; this animation is made adding images from the database.
	**DxSwitchVarLabel**: With this control you can add an image or a label depending on the value of the variable.

For each stage it is possible to insert up to 128 controls.

To add some buttons, in this area it is enough to create the label or image; to add them in the project is explained in the next chapter.

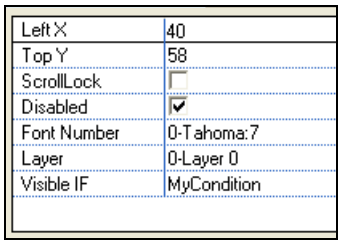
13.5 The INFORMATION AREA

The INFORMATION AREA is the area composed by:

	In this tab there are the properties of the controls, the layers of your stage and the buttons setting.
	In this tab there is the preview of your stage; the possibility to export the snapshot of your stage and it is possible to write the values of the variables to simulate the real functioning.
	In this tab there are the properties of the variables.
	In this tab there are all the words included in your vocabulary (if in your project there are more languages, here is visualized only the active language).
	In this tab we can see and manage the states used by human interface; it is possible to show in the display a label instead of the number of the variable.

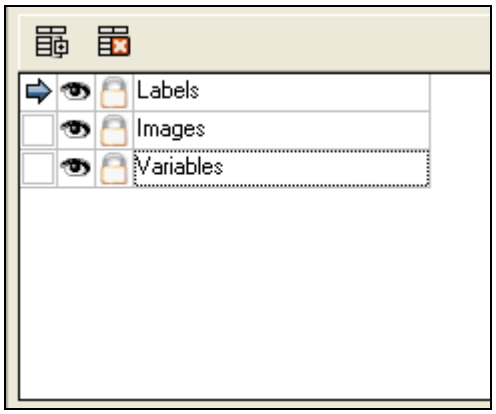
13.5.1 Object Properties

All the controls in VISOPROG have some properties. The properties can be modified thanks to the Object Properties tab. The properties for the control (for example the Dixell image) are:



- Left X — it is the top left corner value, in the X coordinate, of the control.
- Top Y — it is the top left corner value, in the Y coordinate, of the control.
- ScrollLock — it permits to show the control in all the pages of the stage.
- Disabled — if this control is enabled (property unchecked) the control has additional properties.
- Font Number — it permits to change the font.
- Layer — it permits to place the control in different layer
- Visible IF — it permits to change the visibility of control depending on variable value.

In the second window it is possible to put the controls in different layers.

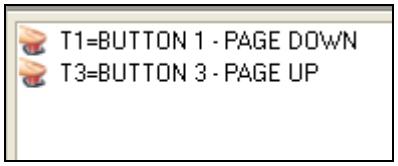


→ to add a new layer

→ to delete a layer

For each single layer it is possible to set the visibility, lock/unlock and name.

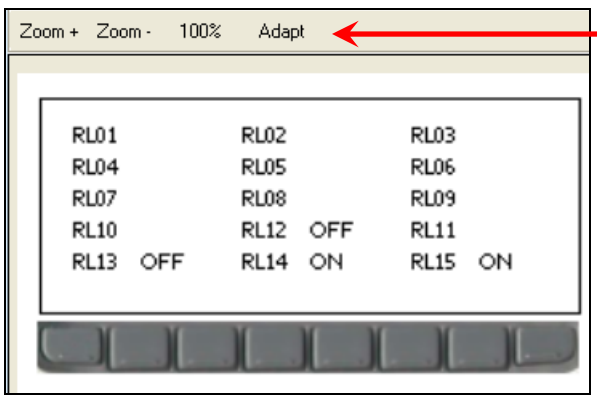
In the third window it is possible to manage the buttons for each stage; here you can add, edit and delete the buttons as well as the functionality.



Inside this windows with the right button of the mouse you can open the following menu:

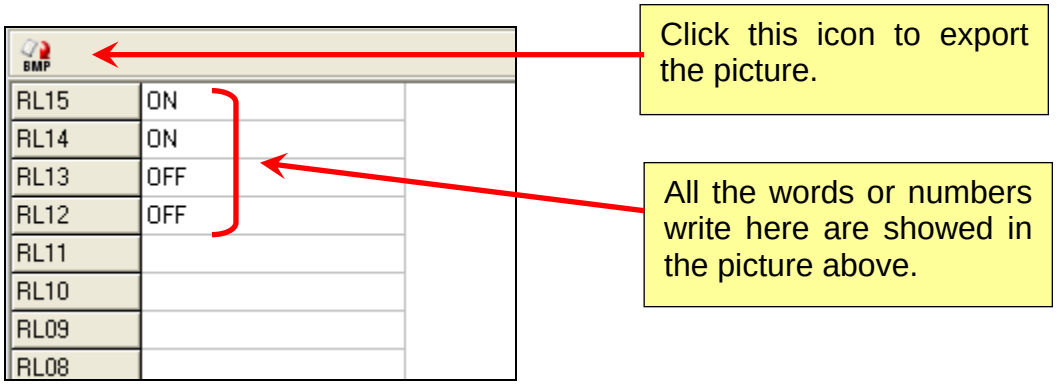
13.5.2 Main View

To check the status of your stage, in the Main View stage you can preview the stage; here you can see the result that will be showed in the display.



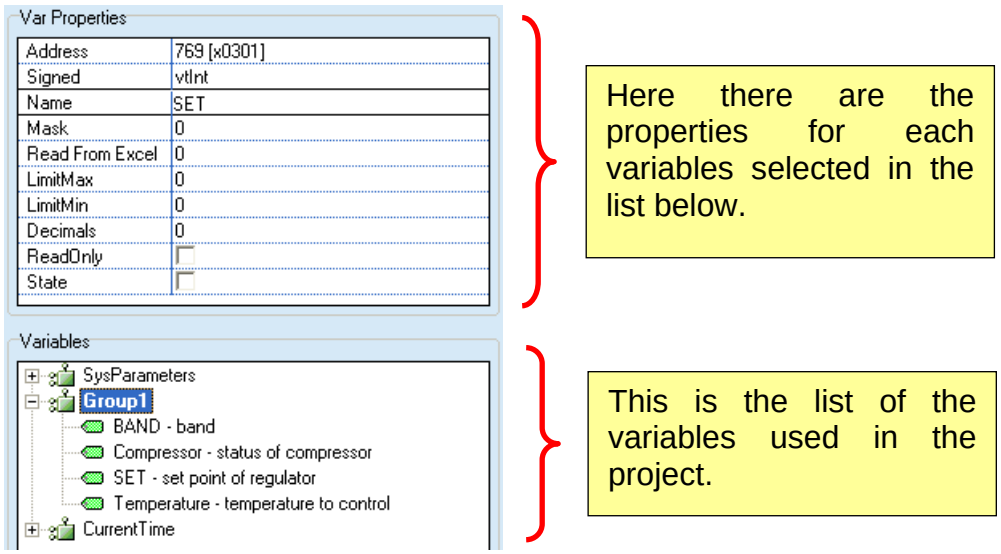
With these icons you can modify the dimension of the picture.

In the other window you can export the picture and also simulate the variables value; it is enough to write the word or the number inside the box.



13.5.3 Variables

In this tab there are the properties of the variables; here you can see and modify the variables used in the human interface project.



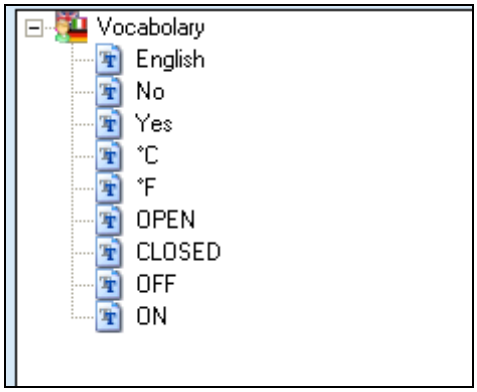
The properties of the variables are:

- Address — the address of the variable (defined in ISaGRAF project)
  769 → Hexadecimal
  0301 → Decimal
- Signed — define if the variable is with or without sign
  vtInt → signed
  vtUInt → unsigned

- Mask — pointer to state list is the variable is showed as state (active only with “State” checked)
- Read from Excel — if checked (= 1) means that previous properties cannot change. If unchecked (= 0) the application can change them.
- LimitMax — variable upper limit (only if Read from Excel = 1)
- LimitMin — variable lower limit (only if Read from Excel = 1)
- Decimals — number of decimals
- ReadOnly

13.5.4 Vocabulary

In this tab you can see all the words defined in your vocabulary.

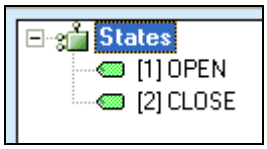


If in your project there are more languages, the vocabulary showed is the vocabulary defined in the “Project Options”. In this case the active language is English.

13.5.5 View State

In this tab you can see all the states used in the human interface; the syntax is:

- [number] label



When the value of your variable is 1, in the human interface will be visualized the label OPEN; when the value is 2 will be visualized CLOSE.

This is possible if your variable has been set with State checked and Mask = 1.

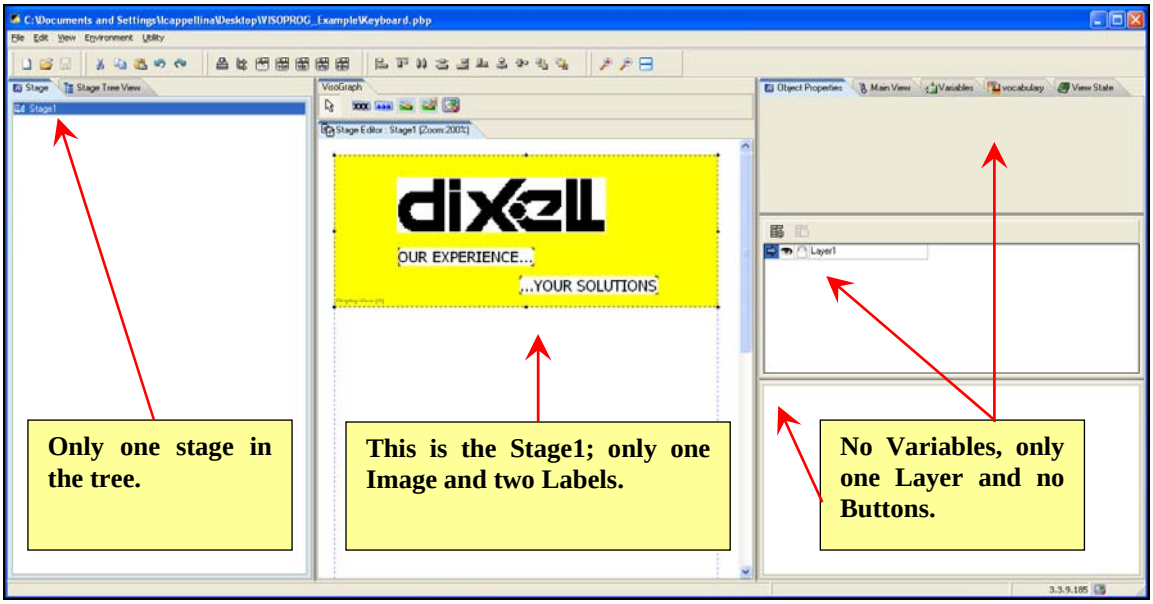
13.6 How to create a new project

When you start with a new project, there are some important suggestions to follow:

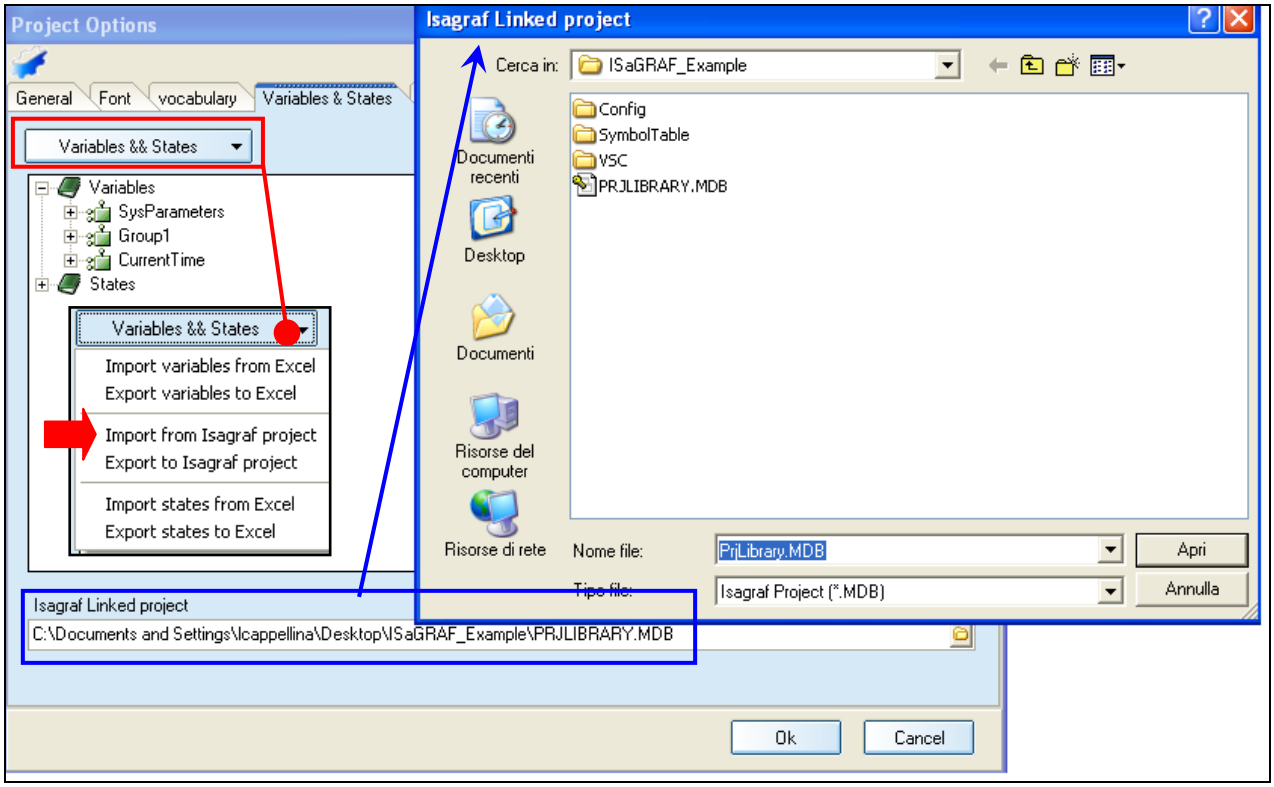
- Open VISOPROG and configure the environment:
  - Language
  - Connection
- Configure the PROJECT OPTIONS:
  - General
  - Font
  - Vocabulary
  - Variables
  - Database of images
  - Compiler file

In this way you have all the elements necessary to build your human interface for the iPRO. It is possible to change any element of the configuration during the developing of your project.

Now we can start to build the human interface starting from the ISaGRAF project developed before (Regulator ON-OFF for compressor).
Our starting point is like here below:



To import the variables used in ISaGRAF project choose: **FILE → OPTION →** and then Variables & States tab (or click the icon, in the menu bar,).



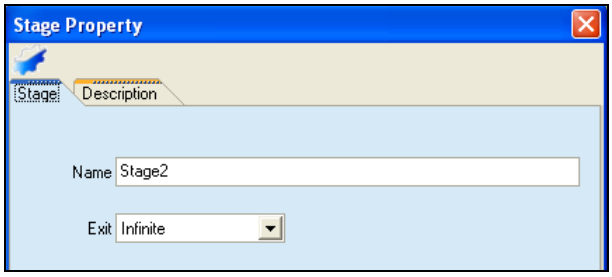
Operations to do in this section are:

- Link VISOPROG with the ISaGRAF project → **Isagraf Linked project**
- Click on Variables & States and choose → **Import from Isagraf project**

The controls to add in our new stage are:

- **AI01** → the analog input of temperature
- **SET** → set point of regulator (default value, defined in ISaGRAF, is 25°C)
- **BAND** → hysteresis of regulator (default value, defined in ISaGRAF, is 3°C)
- **RL01** → digital output of compressor (relay)

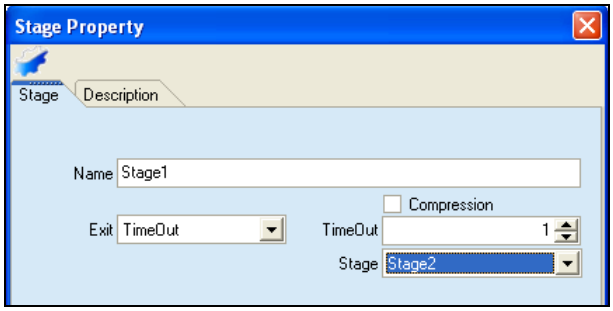
With these information we can start to create a new stage with the following characteristics:



The NAME of new stage is STAGE2

The EXIT mode is INFINITE; to change stage is necessary to add some button.

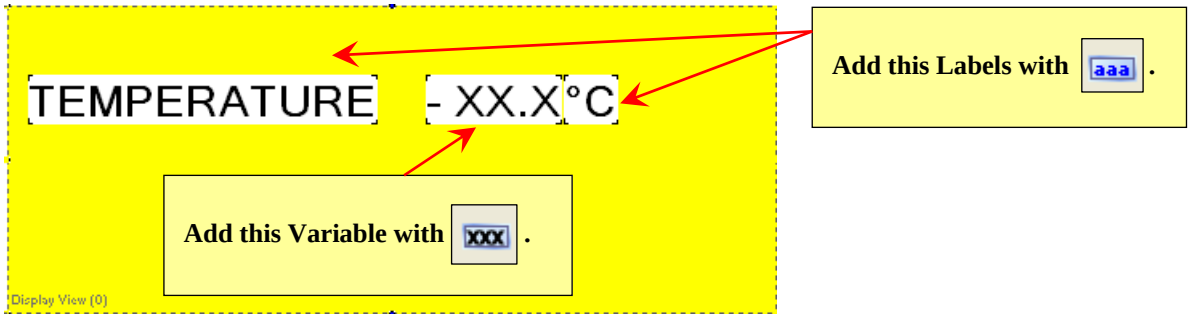
and we can also modify the characteristic of the stage1:



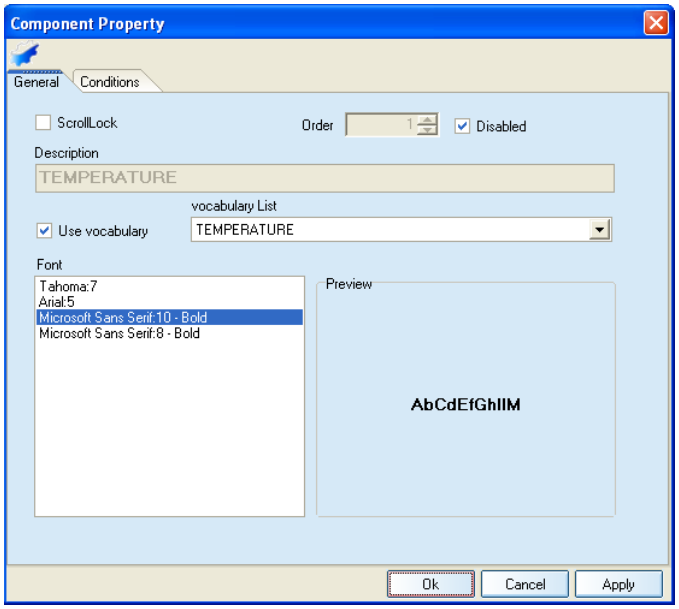
The EXIT mode is TIMEOUT:
- Timeout = 1 (is multiple of 5 seconds)
- Stage = Stage2 (after 5 second the display will jump to the Stage2)

In the Stage2 I want to visualize the temperature, the compressor status and add buttons to change page where I can verify the set-point and hysteresis.

To visualize the temperature we have to add two labels and one variable:



Double click on “TEMPERATURE” label to define the properties:



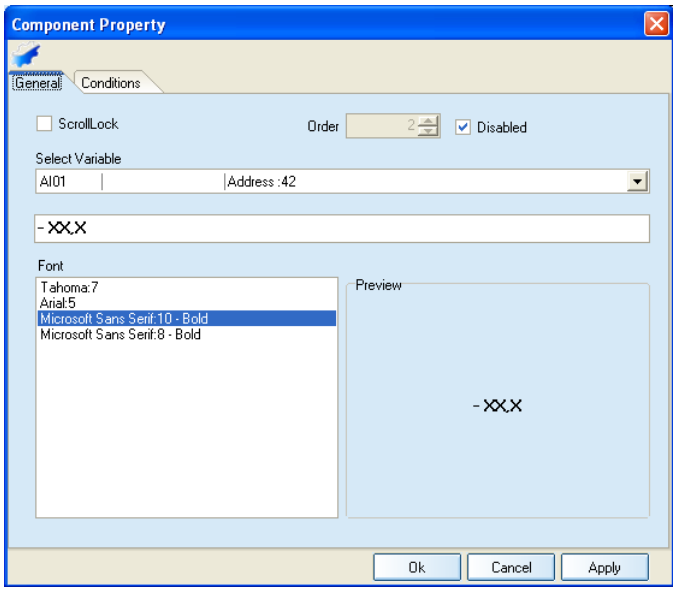
In this windows we have defined:

- the description, in this case linked with the vocabulary.

- the font.

Also for the “°C” label we have to do the same procedure.

Double click on “-XXXXXX” variable to define the properties:

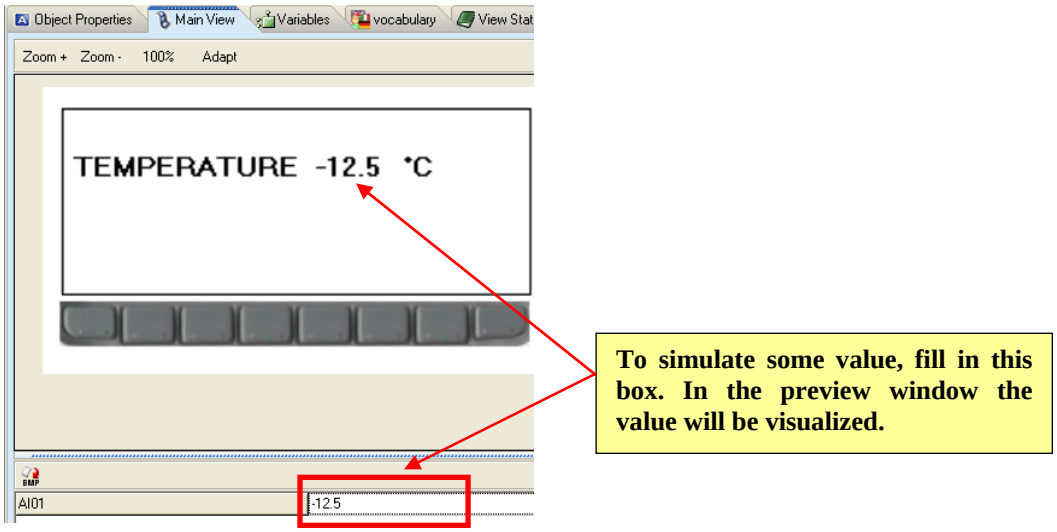


In this windows we have defined:

- which variable is visualized

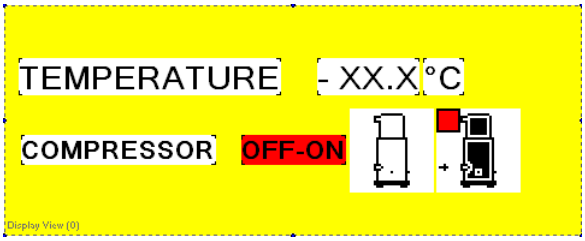
- the sign and how many digits are visualized

To preview the result of the stage, click on “Main View” tab:



To simulate some value, fill in this box. In the preview window the value will be visualized.

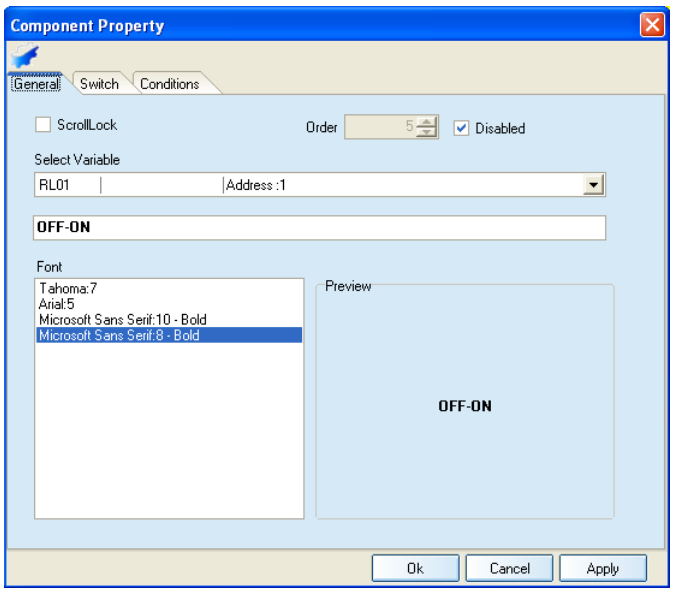
Now we have to add the compressor status; in the next example you can see how to do this with a different solutions.



We can show the same result with:

- a "DxSwitchVarLabel"
- a "DxImage"
- a "DxAnimImage"

To add the "DxSwitchVarLabel" we have to click the icon  and insert the control in the stage. Then double click in the control to define the properties:

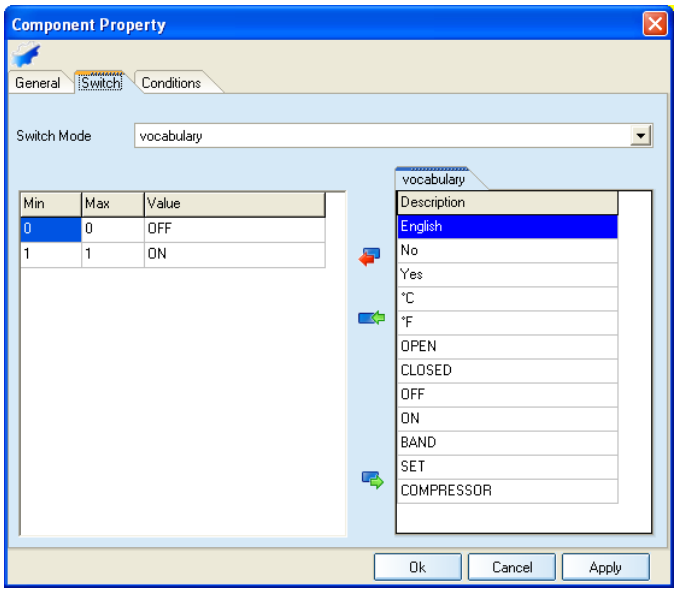


In the window "General" we have defined:

- which variable is visualized

- comment about the meaning of the variable

- font



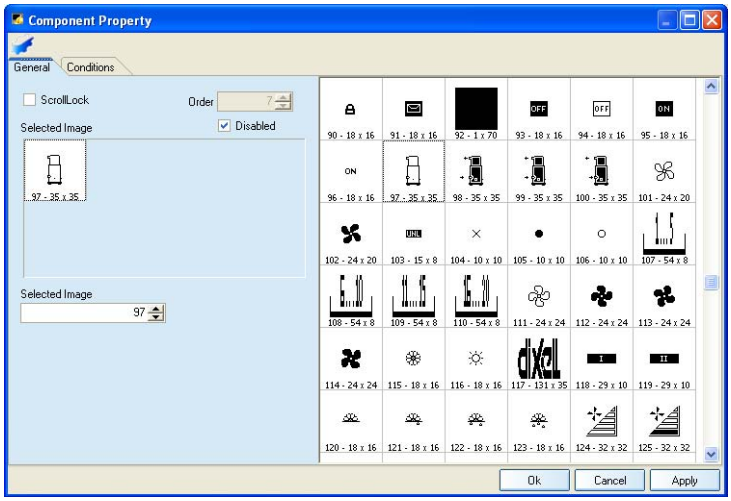
In the window "Switch" we have defined the following conditions:

- switch mode from vocabulary (see pag.92 how to manage the vocabulary)

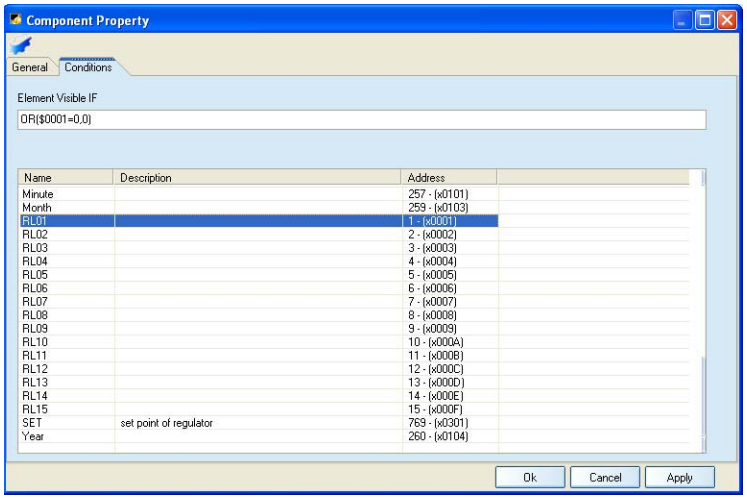
- the conditions:
If the value of the variable is = 0, the display will visualize "OFF"
If the value of the variable is = 1, the display will visualize "ON"

REMARK:
In any case the last condition is considered as default.

To add the “DxImage” we have to click the icon  and insert the control in the stage.
Then double click in the control to define the properties:



In the window “General” there is the Image database; you can choose the image that you want to visualize.



In the window “Conditions” we can define if the image is visible always or only in some condition that we can decide.
In this case the image will be visible only when the compress is OFF; the condition is:

OR($0001=0,0)

Other conditions can be, for example:

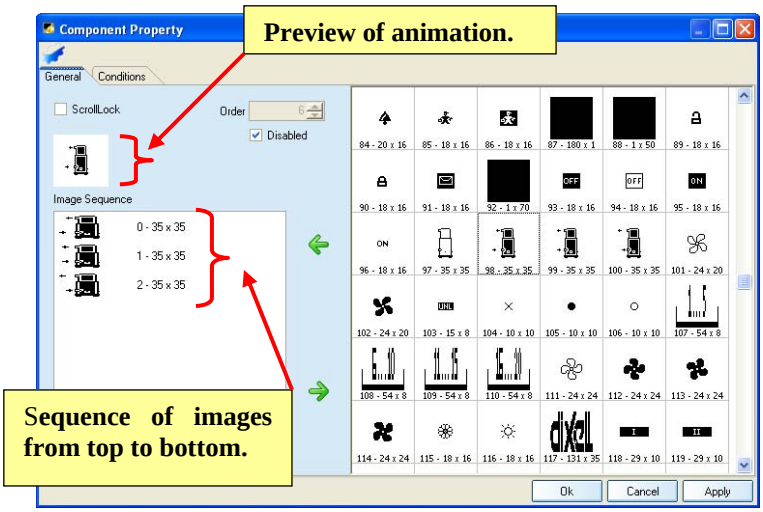
- OR($4387=1,0)

  If the variable $4387 is = 1, the image will be visible.

- AND($4387=1,OR($4366>0,$4370>0))

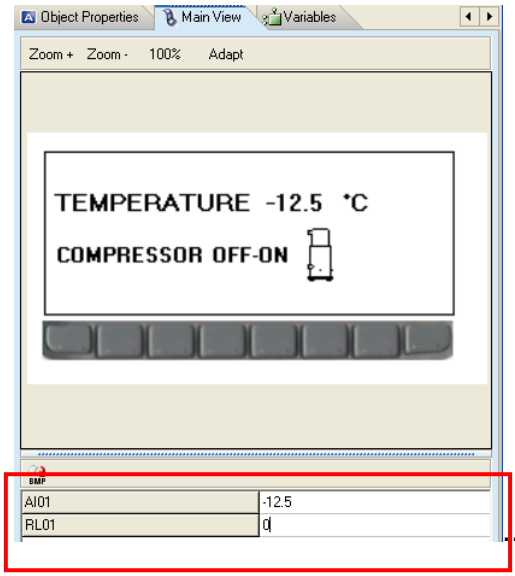
  If the variable $4387 is = 1 and one variable between $4366 and $4370 are greater than “0”, the image will be visible.

- To add the “DxAnimImage” we have to click the icon  and insert the control in the stage. Then double click in the control to define the properties:

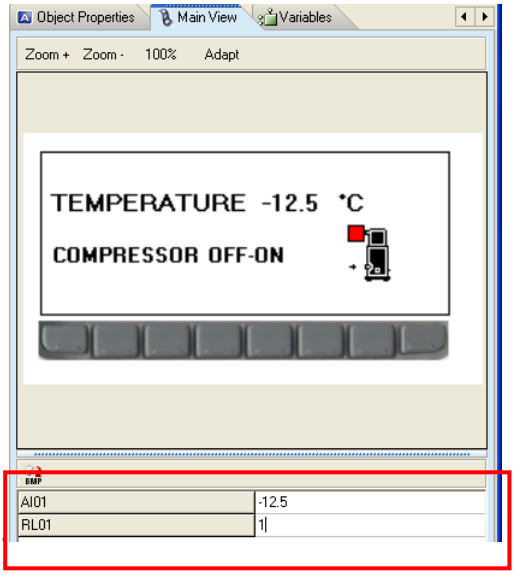


In the window “General” there is the Image database; you can choose the images that you want to visualize.
In this case your animated image is a sequence of images.

Now we can check our project with the “Main View”. If we can try to write the values in the boxes ”AI01 and RL01”, we can see the result in the display (except for the DxSwitchVarLabel).



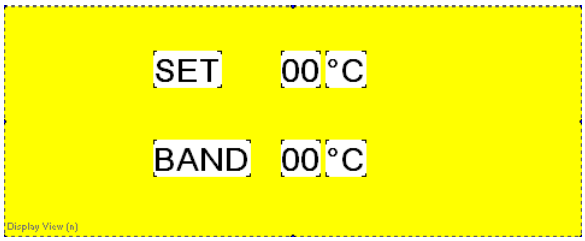
.....



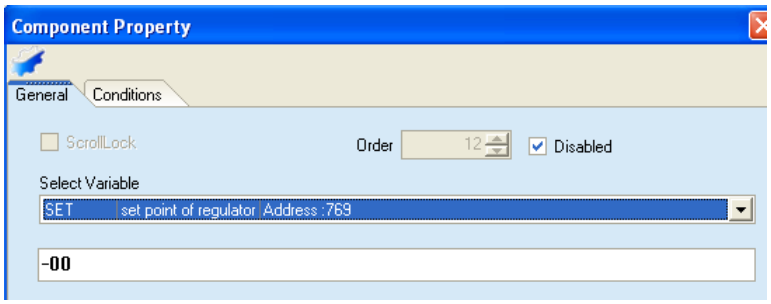
Preview with:
AI01 = -12.5
RL01 = 0

Preview with:
AI01 = -12.5
RL01 = 1

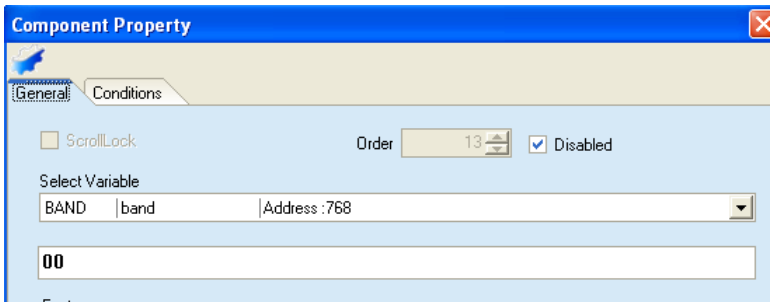
This stage is composed of a single page; to add another page click the icon  and the second page will appear. In this new page we will add the set-point and the hysteresis; it is clear that we have to add also some buttons to change the pages.



In the picture here above we have added four labels (SET, BAND and °C) and two variables. The labels and the variables have been defines as in the page before.
Practically:



Selected the address of variable SET.



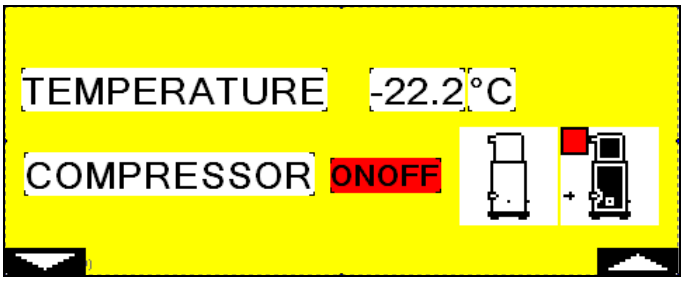
Selected the address of variable BAND.

It is very important to pay attention to the flag “Disabled”; if the flag is checked the value is non modifiable with the VISOGRAPH. If the flag is unchecked the value will be modifiable through the VISOPROG buttons.

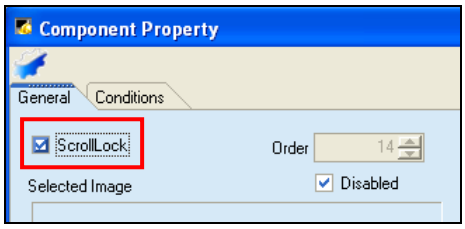
The buttons are completely programmable; in the pages of the stage we have to add some images and then define the buttons in the “Object Properties”.

In our project is enough to put two buttons with the function of page down and page up.

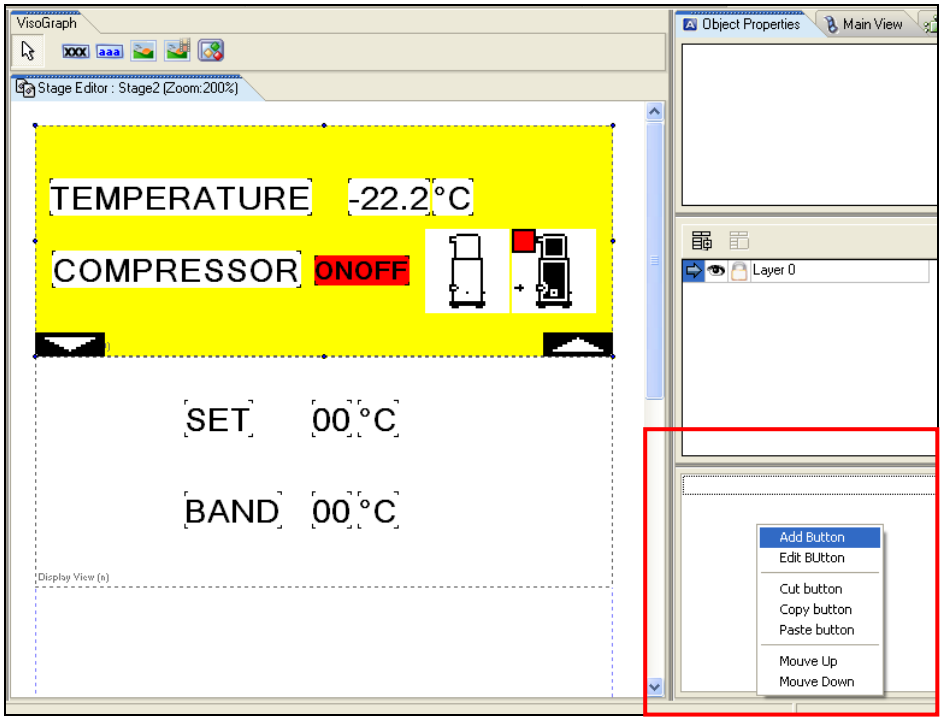
In the Stage 2 add two images:



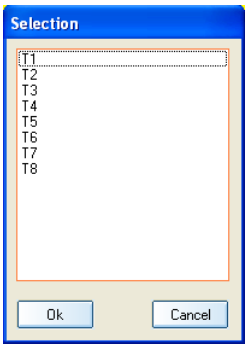
For these two images the flag “ScrollLock” have to be checked; in this way the images will be replicate automatically in all the pages of the stage (also the buttons control will be the same in all the pages).



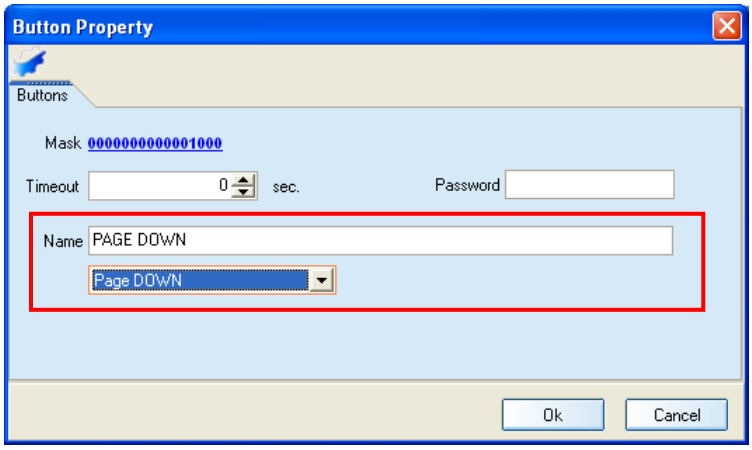
In the third window of Object Properties click with the right button of the mouse and choose “Add Button”:



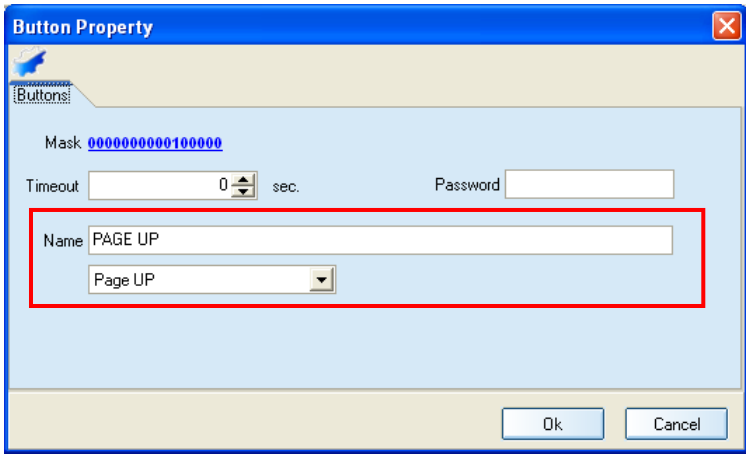
The first button to define is T1.



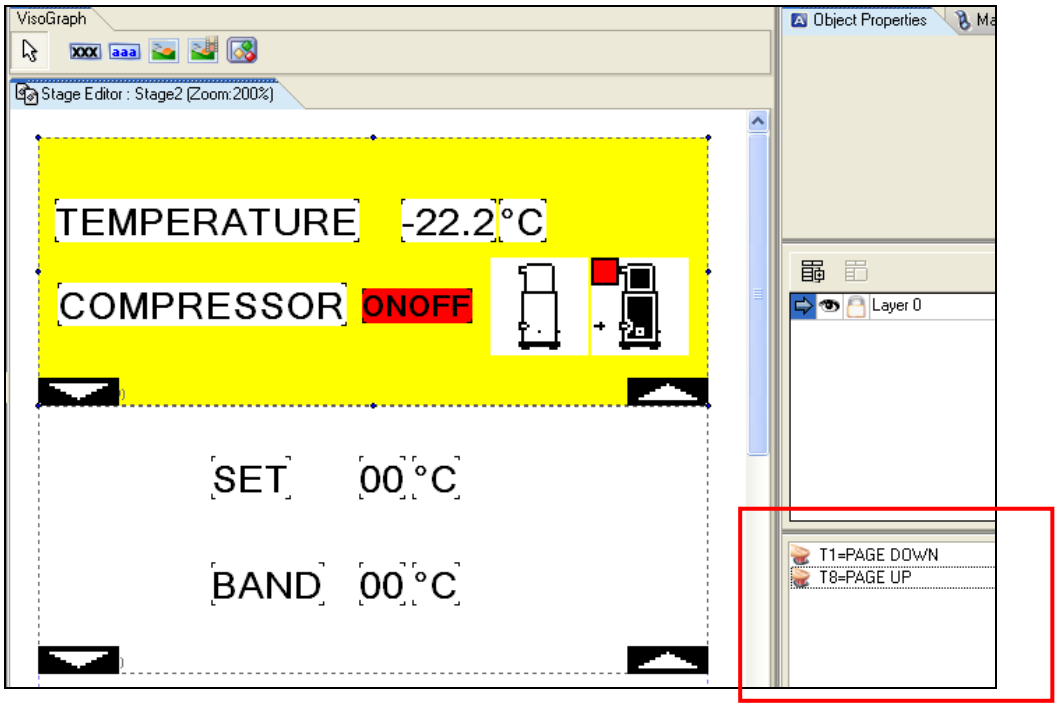
The window here below will appear automatically and we have to set it in the following way:



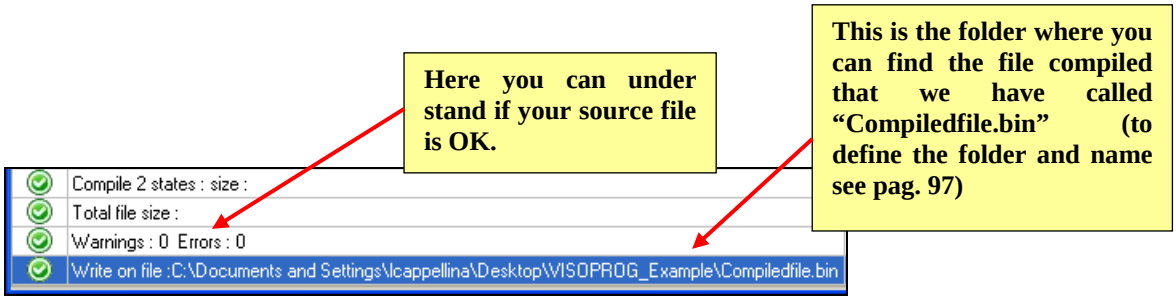
To add the buttons T8 the procedure is the same but the setting is different:



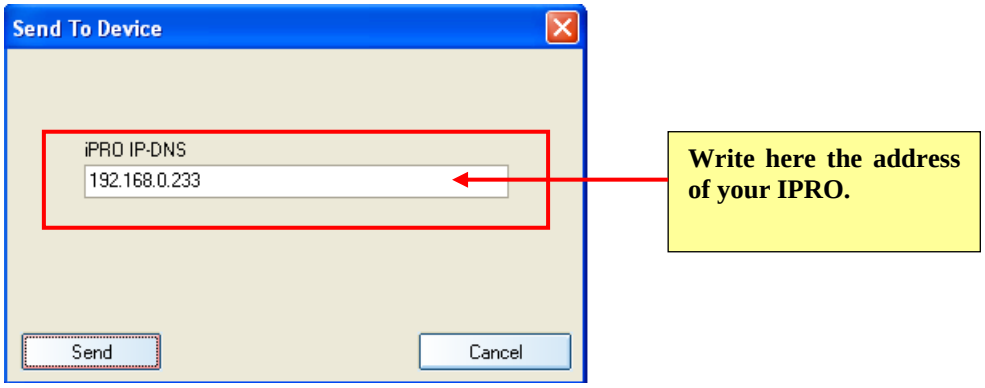
After this procedure in the Object Properties there are the two buttons just created.

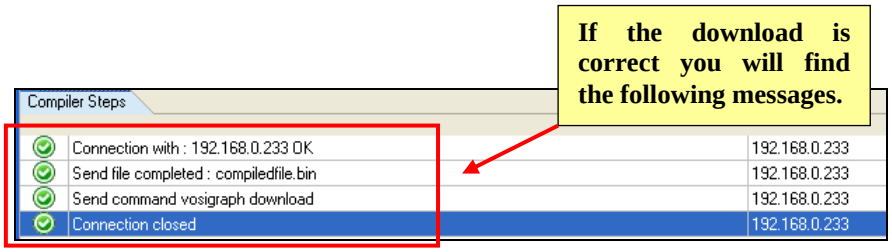


The project is completed so we can compile  the project:



With this file you can decide to download  it immediately in your VISOGRAPH (the IPRO and the VISOGRAPH have to be connected with your PC):





The other way is to copy this file in the USB key to download it inside the IPRO (in this second case it is necessary to use the function block “UPDATE_VISOGRAPH”).

13.6.1 Fine tuning of your project

After the download we can see in our VISOGRAPH that there are some things to modify.

The temperature value is without decimal point:

In the display is showed 265 °C instead of 26.5 °C.

The same problem there is for the SET and BAND.

The images for UP and DOWN page are not necessary in both pages (Stage2).

In the first page is enough the DOWN page.

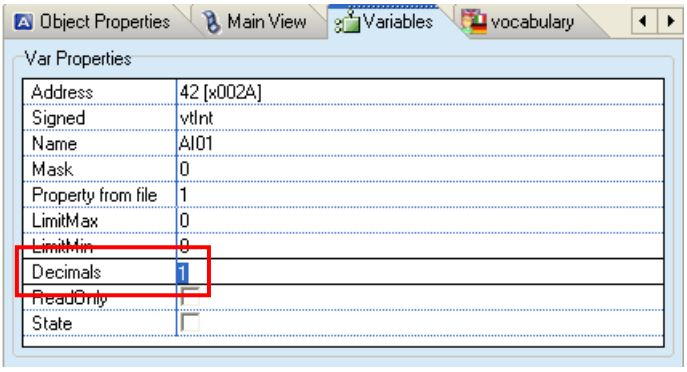
In the second page is enough the UP page.

The values of SET and BAND are not modifiable.

It is necessary to have the possibility to modify them.

- Decimal Point

Open your project and choose the Stage2; select the variable to modify in the page and, in the” Variables Properties” tab, write the number of decimals in the box “Decimals. In our case the value will be “1”. This procedure is the same for all the other variables with decimal point.



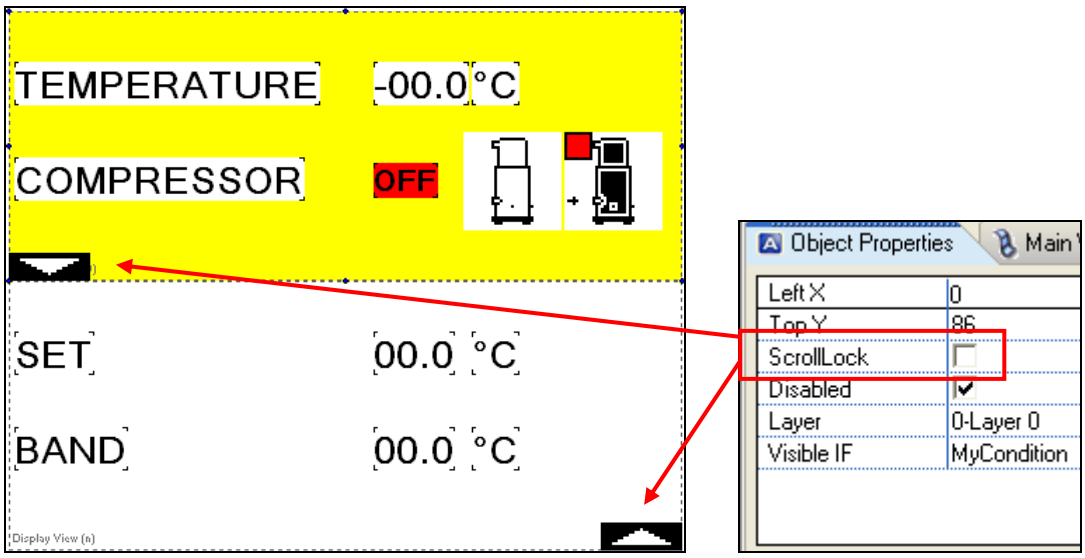
- ScrollLock Option

This option is available only for the images in the first page of the stages.

To modify our project it is necessary to select the icon “Down Page” and uncheck the option “ScrollLock” in the “Object Properties” tab.

For the “Up Page” the procedure is a little bit different; sure you have to uncheck the option “ScrollLock” but then it is necessary to “cut” and “copy” the images from the main page to the second page. To do this select the images in the first page.

The new layout of your pages will be the following:



- Modification of SET and BAND values

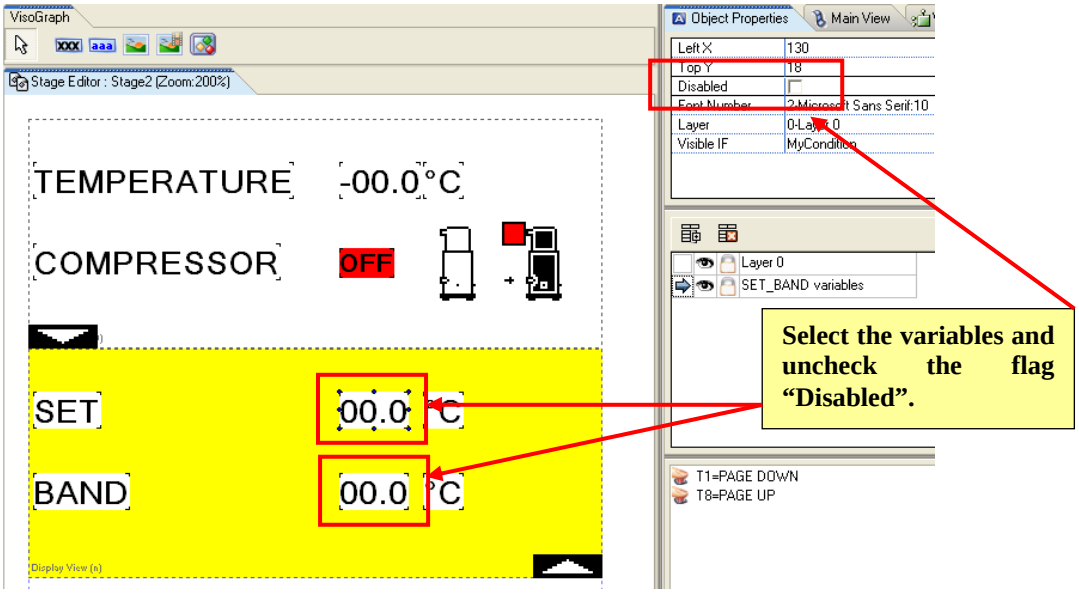
With this improvement will be possible to modify the value of the SET and BAND variables directly by the VISOGRAPH. Remember that this kind of variables have to be declared “RETAIN” in the ISaGRAF project if you want to save the value in not volatile memory.

The steps to do are:

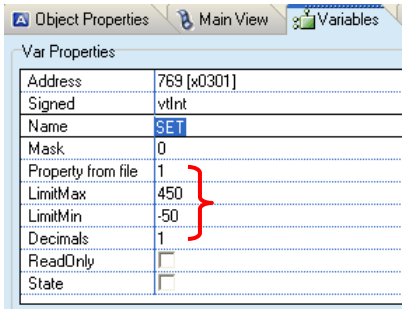
o Declare the two variables, in the page, modifiable.
  We have to uncheck the flag “Disabled” in the properties.

o Create three new buttons in the page.
  Will be necessary to add one button to select the variables and another two buttons to modify the value.

To declare the two variables as modifiable, select, one by one, the variables and in the Object Properties uncheck the flag “Disabled”.



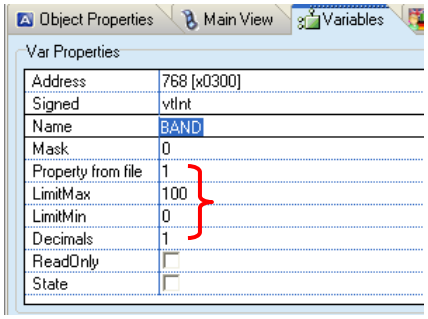
It is also possible to define the range limits; practically you can decide the range min and max of your variables. Then in the VISOGRAPH you can choose the value between min and max range. Select the variable in the page and, in the Variables properties, write the limits:



For the variableSET:

- LimitMax = 450
- LimitMin = -50

In this case is possible to choose the value between -5°C ÷ 45°C

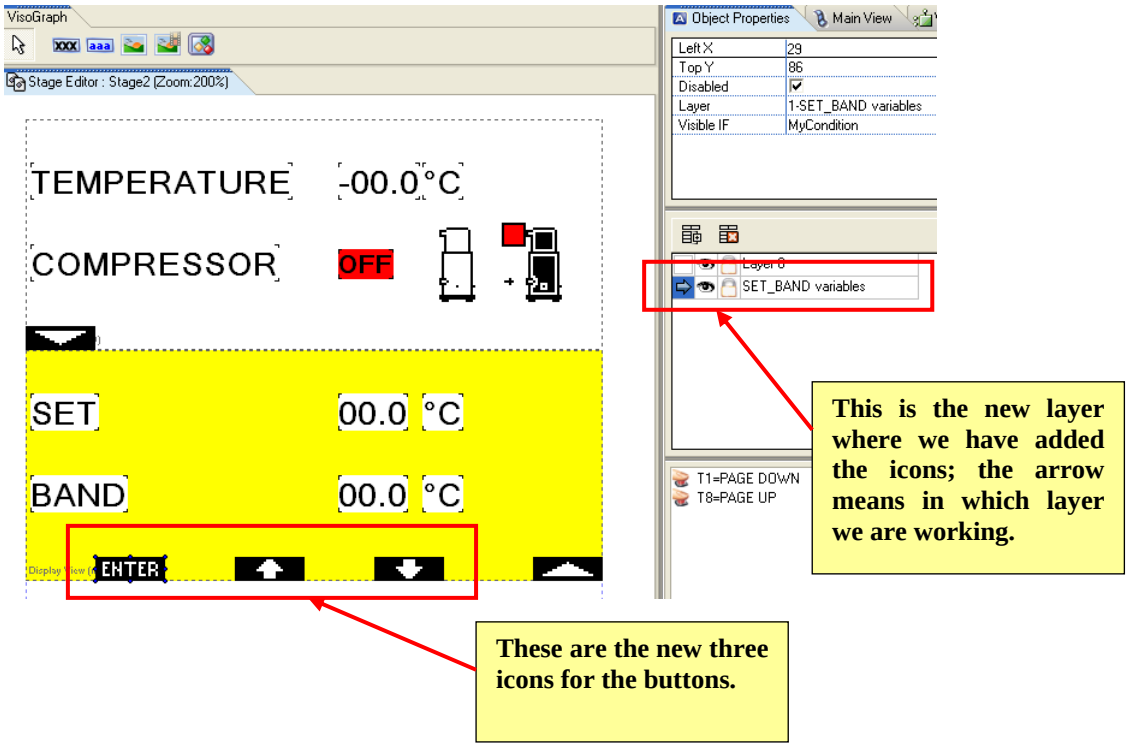


For the variableBAND:

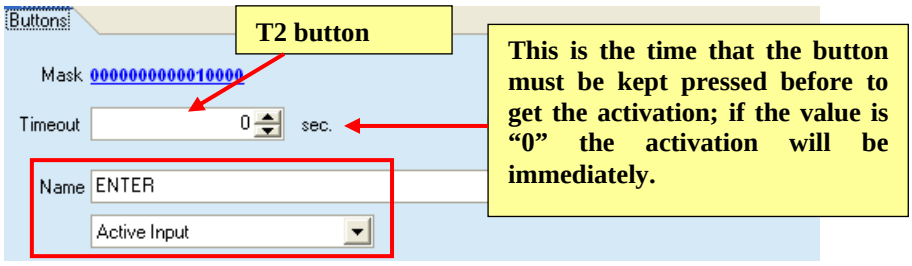
- LimitMax =100
- LimitMin = 0

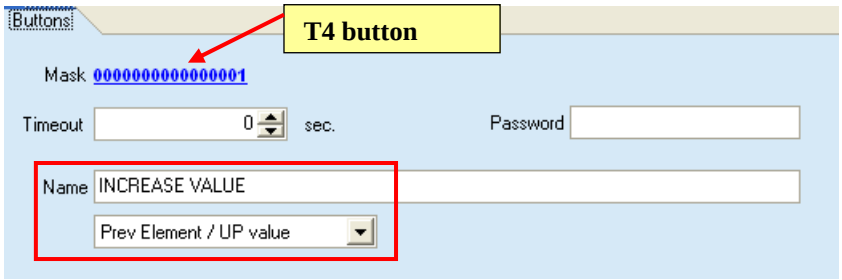
In this case is possible to choose the value between 0°C ÷ 10°C

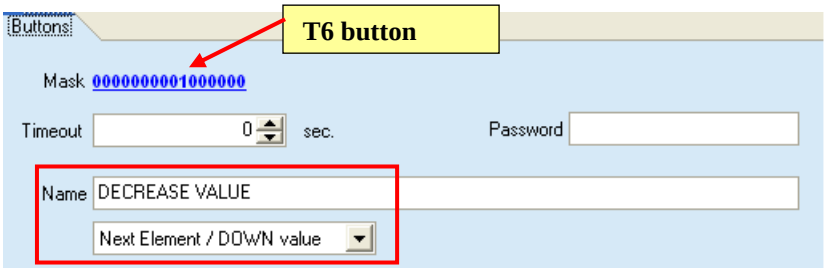
After this, add the new images in the page but in a new layer called “SET_BAND variables”:



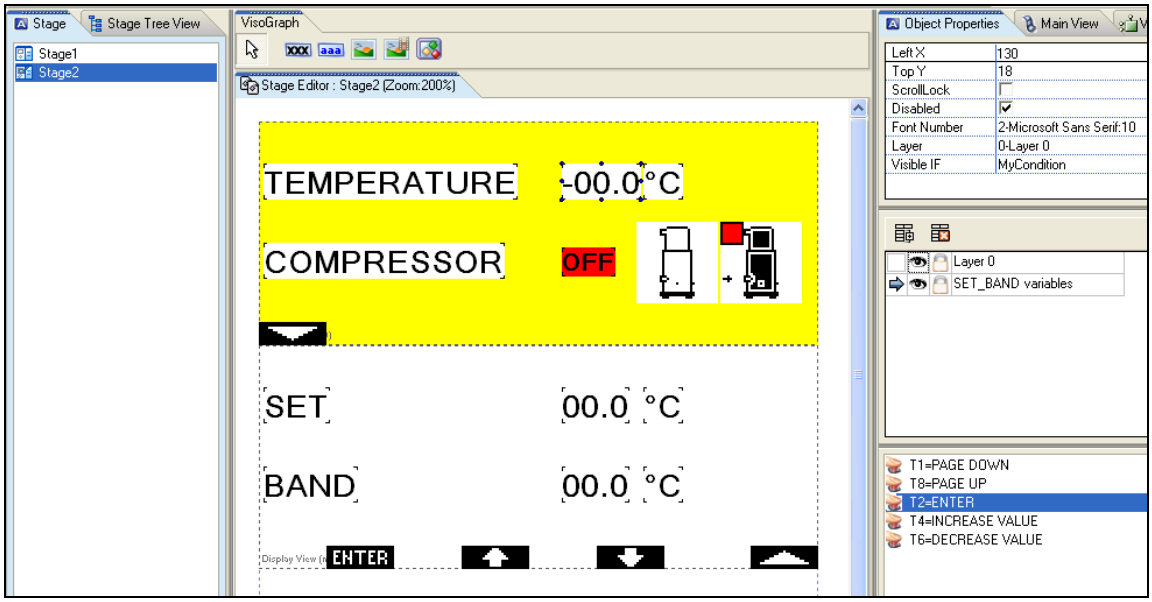
The new buttons to define are T2, T4 and T6 and the properties for each of them are:







Our project is completed and the final VISOPROG environment is like below:



Compile and download again the project in the VISOGRAPH graphic display to check the improvements.

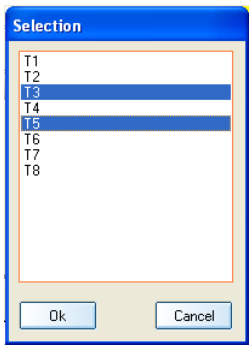
13.7 Features included

In the next chapters there are more information about the buttons, the disabled property, the controls visibility and how to create the stages automatically.

13.7.1 Buttons combination and actions

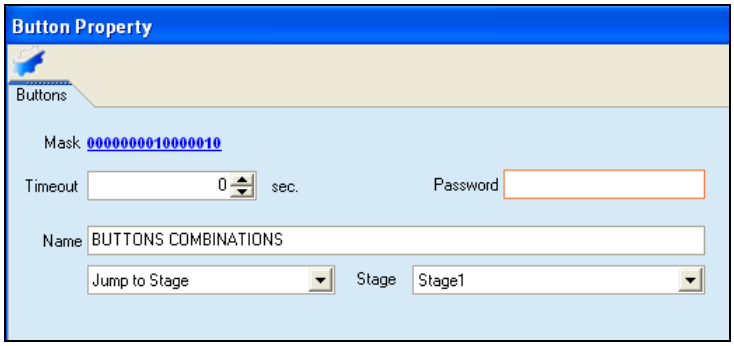
It is possible to activate a command only if two ore more buttons are kept pressed together.

If the buttons T3 and T5 are kept pressed together, from the Stage2 we will jump to the Stage1; here below the example:



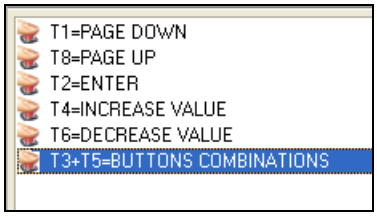
Add the buttons T3 and T5.

Choose, with the mouse, the buttons; the "ctrl" key of the keyboard must be kept pressed to select more buttons in one time.



Here define the button action:

- jump to Stage → Stage1



In the buttons area we have added the buttons combination.

In the button properties there are a lot of combination to choose:

- *Jump to Stage*: specify the stage to jump.

- *Active Input*: if the control is a variable → allow to change the value and confirm it. otherwise → allow to do “conditional jump”.
  REMARK: available only if the flag “Disabled” of the control is unchecked.

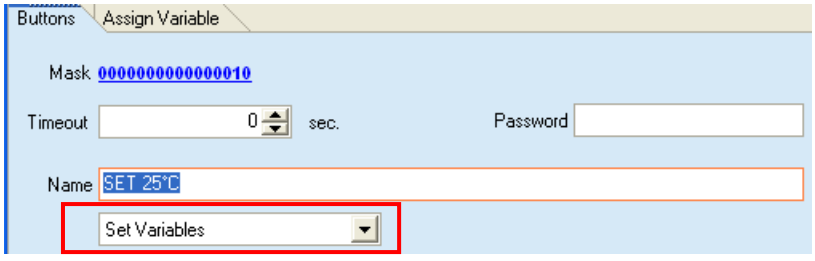
- *Page UP, Page Down*: in a multistage pages, change the current page.

- *Prev Element /UP Value*: select the previous active element / increase the value.
  REMARK: available only if the flag “Disabled” of the control is unchecked.

- *Next Element / DOWN Value*: select the next active elements / decrease the value
  REMARK: available only if the flag “Disabled” of the control is unchecked.

- *Conditional Jump to Stage*: jump to another stage according to the value of specified variable.

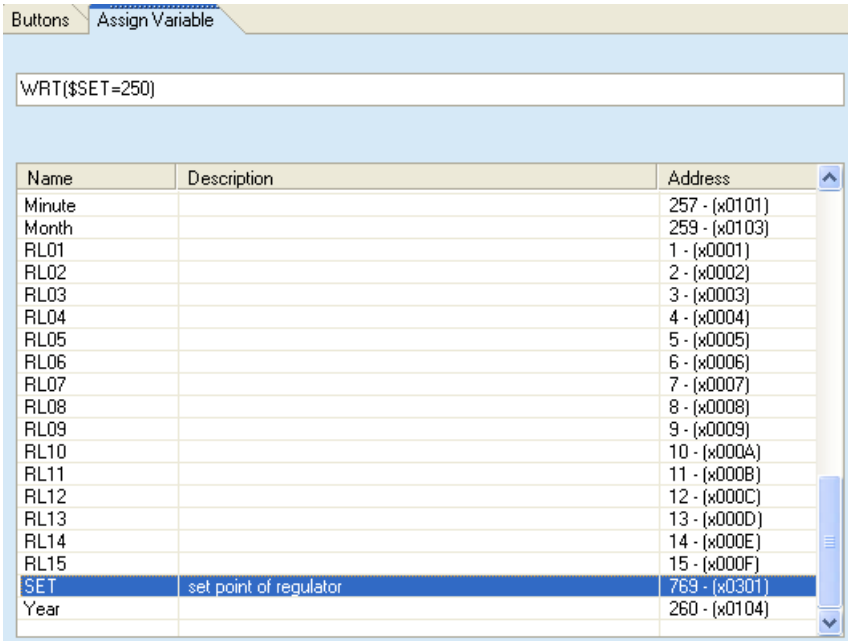
- *Set Variables*: allow to change the value of one variable.
  To write 25°C in the variable SET, add a new button (or a buttons combination) and configure it in the following way:



Select the action “Set Variables” and then the tab “Assign Variable”.

Choose in which variable you need to write the value (double click in the variable) and write the sentence that you prefer between these two structures:

- WRT($SET=250) → in this case we have used the label of the variable
- WRT($0769=250) → in this case we have used the address of the variable



If you want to change the status of the variable RL02 between “0” and “1” (0→1→0→1...) you have to use the following sentence:

- TOG($RL02) → in this case we have used the label of the variable
- TOG($0002) → in this case we have used the address of the variable

- *Fast increment value*: if the control is a variable → allow to increase the value without confirmation
  REMARK: available only if the flag “Disabled” of the control is unchecked.

- *Fast decrement value*: if the control is a variable → allow to decrease the value without confirmation
  REMARK: available only if the flag “Disabled” of the control is unchecked.

- *Jump to stage and back*: allow to come back to the previous stage.

13.7.2 Disabled property unchecked (active element)

As already seen in the previous example, if the flag “Disabled” is unchecked:

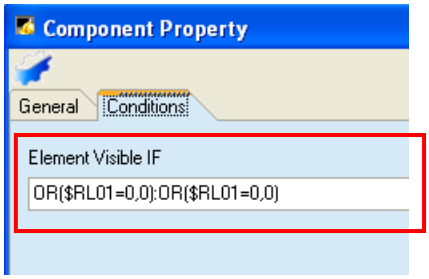
- for a VARIABLES: the value is modifiable.
  In the stage are necessary three buttons: Active Input, UP Value and DOWN value.

- for a LABEL and IMAGE: allow to do a conditional jump stage.
  In the stage are necessary three buttons: Active Input, Next Element and Prev Element.

- for a SWITCH VAR and LABEL: enable only if switch mode is different from variable.
  In this case the value of the variable is showed as images or vocabulary.
  In the stage are necessary three buttons: Active Input, UP Value and DOWN Value.

13.7.3 Controls visibility

VISOGRAPH has the possibility to display the information depending on the variable values. Each elements of the VISOGRAPH human interface has the property of visibility; this property can be filled with a mathematical (logical) condition in order to create a dependency on a variable.
For example if the compressor is “OFF”, the control  is blinking:



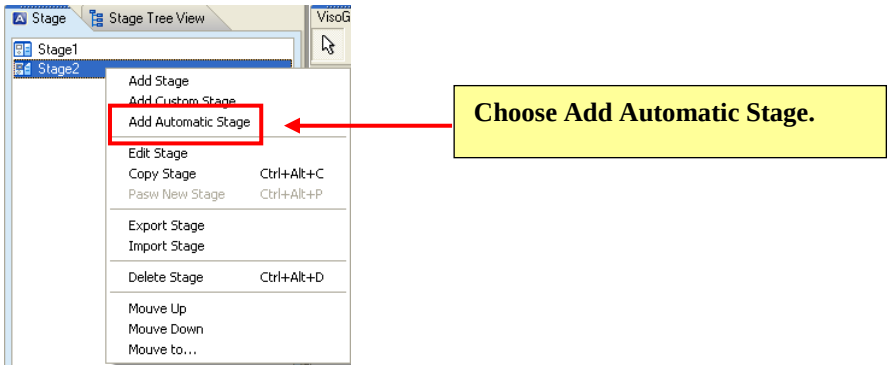
Inthe Component Property of the control, in the Conditions tab, the condition to write is:

OR($RL01=0,0):0R($RL01=0,0)

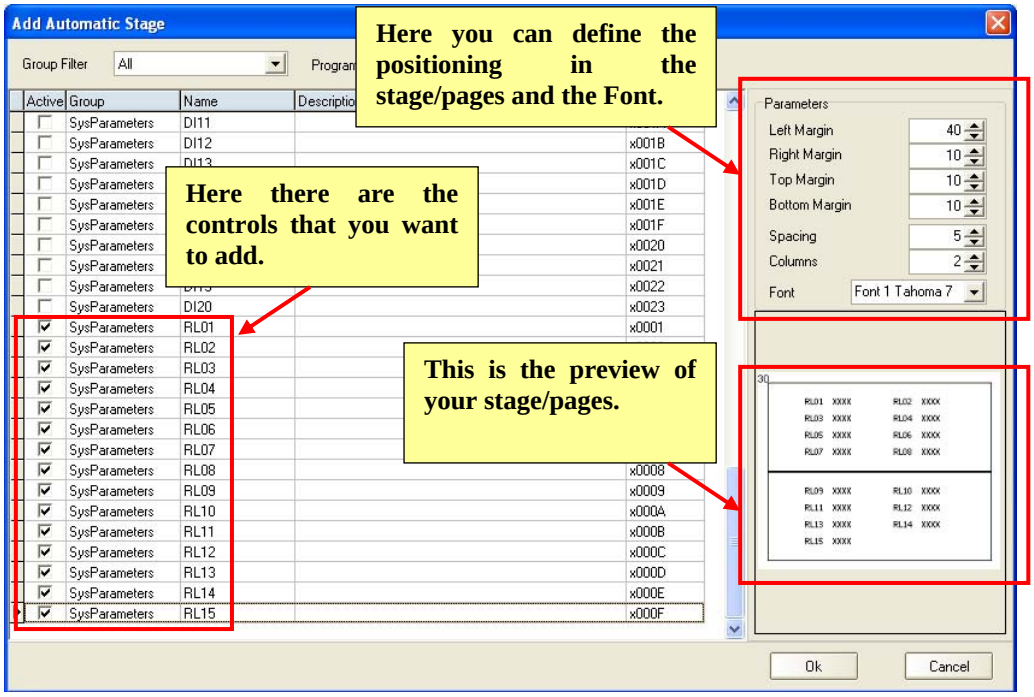
If the condition befor colon is true, the component will be visible; if the condition after the colon is true, the component, if visible, will blink.

13.7.4 Automatic Stages

The automatic stage is a procedure that will help you to create one or more stage quickly. It is no more necessary to add the controls one by one but all together in one time.

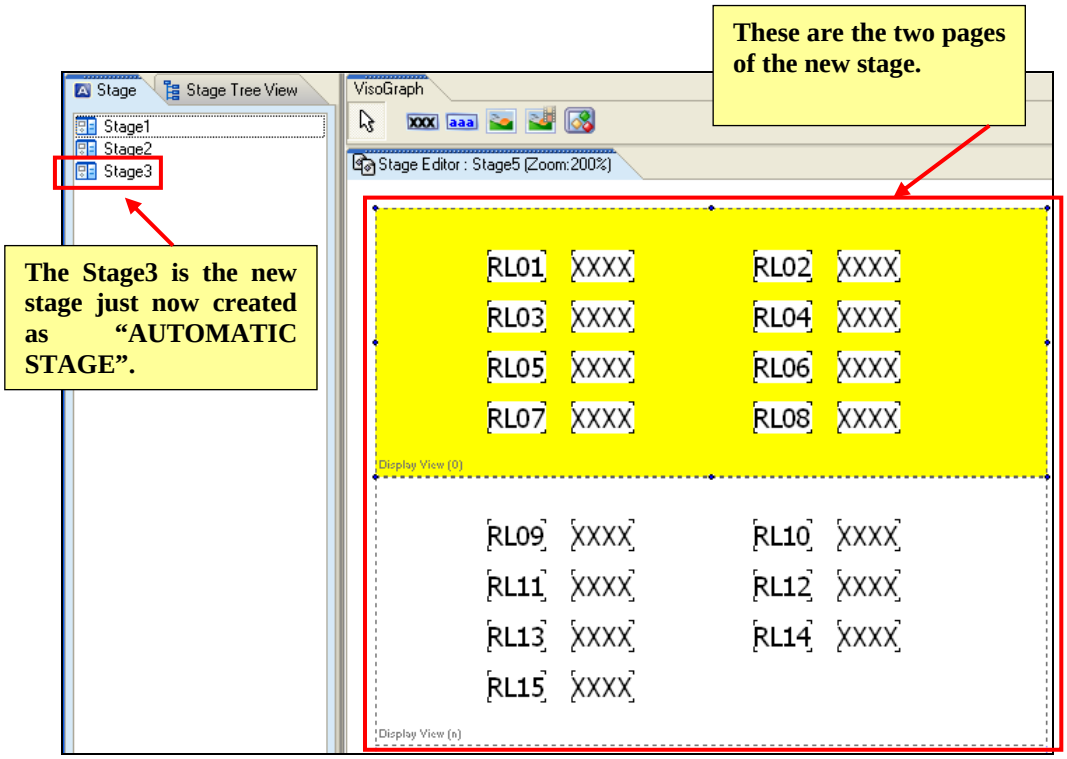


In this window you can decide which controls add in the stage, the positioning in the human interface and the preview of the stage.



When you confirm the setting, your stage will be created automatically.

Here below the example.


These are the two pages of the new stage.
Stage
Stage Tree View
Stage1
Stage2
Stage3
The Stage3 is the new stage just now created as "AUTOMATIC STAGE".
VisoGraph
Stage Editor : Stage5 (Zoom:200%)
RL01 XXXX
RL02 XXXX
RL03 XXXX
RL04 XXXX
RL05 XXXX
RL06 XXXX
RL07 XXXX
RL08 XXXX
Display View (0)
RL09 XXXX
RL10 XXXX
RL11 XXXX
RL12 XXXX
RL13 XXXX
RL14 XXXX
RL15 XXXX
Display View (n)

14. CONNECTIVITY

14.1 Ethernet 10/100 and Serial bus

In the table here below is summarizing the property for each kind of connections.

All these connections can be used all together but it is very important to understand which of them is better for your installation.

Your decisions have to be taken considering, at least, these elements:

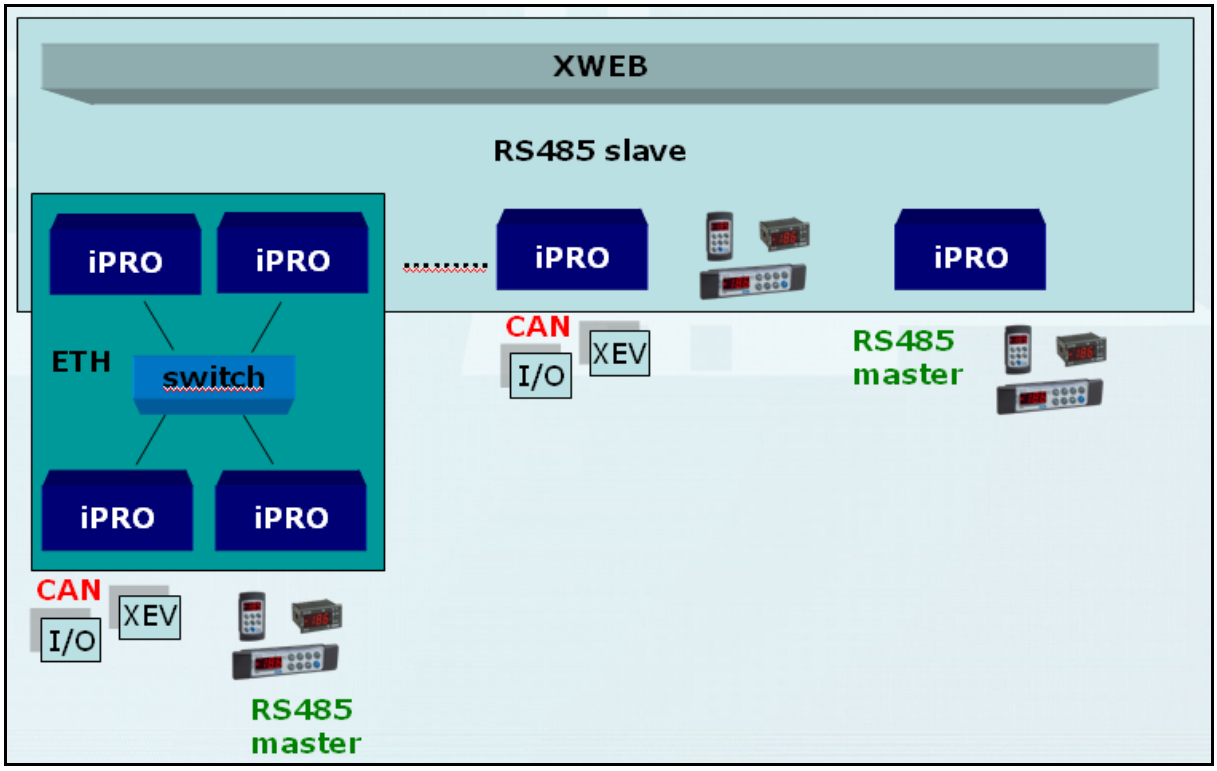
- Speed
- Number of nodes
- External hardware
- Protocol

BUS	RS485	ETHERNET	CAN BUS
Protocol	Modbus RTU (Master - Slave)	Modbus RTU TCP/IP (Multimaster)	Dixell (no CAN open) (Multimaster)
External HW	NO	SWITCH	NO
Nodes	iPRO Dixell controllers Modbus devices	iPRO Modbus TCP/IP Devices	iPRO Expansion Module (IPROEX60D)
Number	UP TO 100 NODES	SWITCH INPUTS	UP TO 4 NODES
Speed	9600-19200 bit/sec	100 Mbit	100 Kbit
Max distance	1 KM	50 mt	400 mt
Terminals	MASTER for master SLAVE for slave	ETH	CAN

The typical configuration is:

1. IPRO with XWEB → RS485 slave
2. IPRO with a network of Dixell devices → RS485 master

3. IPRO with I/O expansion and/or electronic valve modules → CAN
4. IPRO with IPRO → Ethernet

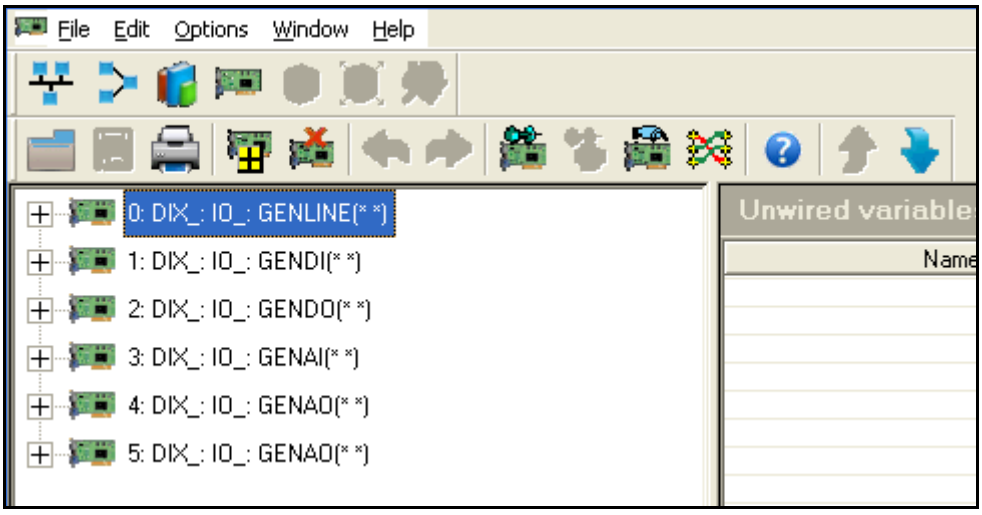


14.2 How to configure the bus and variables

Before to start with the configuration, there are some information to take in consideration:

- Only DINT and BOOL variables can be read and write through the bus.
- The total number of variables that iPRO can exchange through the buses depends on ISaGRAF USB Key (128, 256 or unlimited I/O).
- An external gateway (for example “anybus communicator”) can be used for different protocols from Modbus (LonWorks, BACNet and Profibus).

To configure the bus, click the icon I/O Wiring  ; at the first time the situation of the I/O Wiring is the following (default configuration for iPRO):



The meaning of these I/O is:

- DIX_IO_GENLINE → boards to configure the bus (MDB, ETH, CAN)
- DIX_IO_GENDI → boards to configure Digital Inputs
- DIX_IO_GENDO → boards to configure Digital Outputs
- DIX_IO_GENAI → boards to configure Analogs Inputs
- DIX_IO_GENAO → boards to configure Analogs Outputs

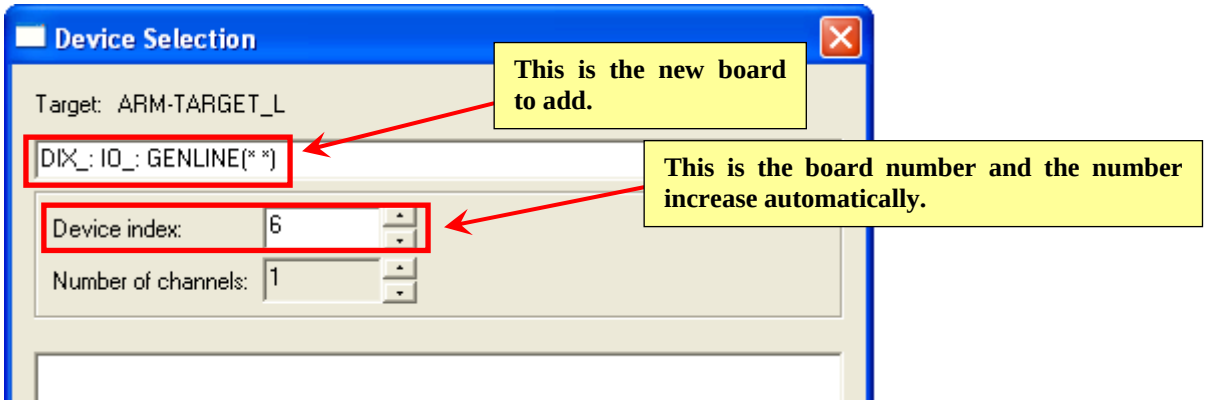
For example, I need to connect (through the RS485 Master) the iPRO with the Dixell device “XT” to control the temperature of its probe.

The steps, necessary to do this are:

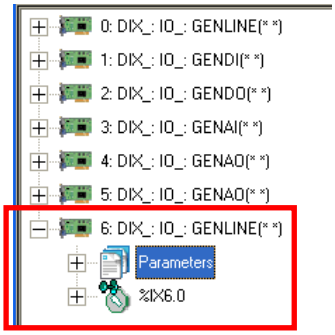
1. define the BUS (declare the GENLINE and its properties)
2. define the new board (declare the GENDI or GENDO or GENAI or GENAO)
3. define the new variables in the dictionary
4. assign the link between the variables and boards

14.2.1 Define the BUS (GENLINE board)

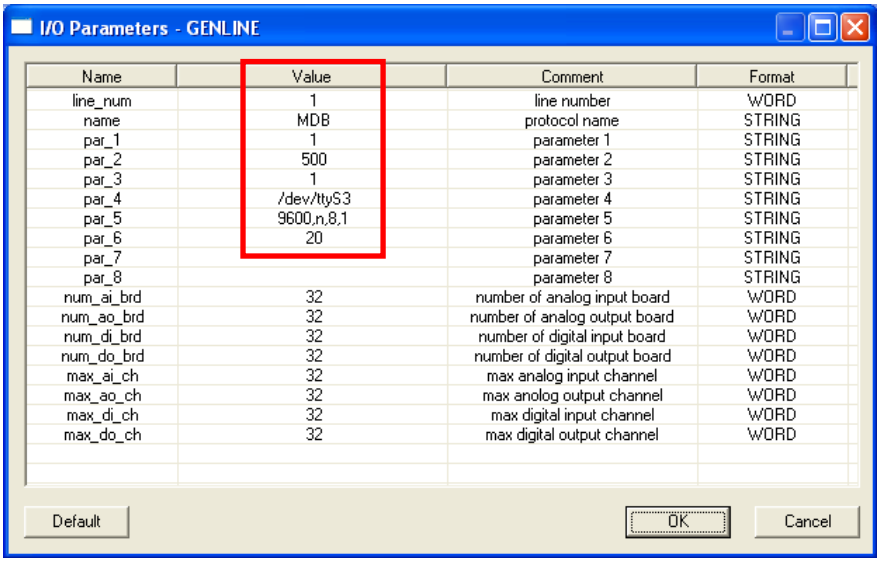
To add a new board GENLINE, click the icon  and fill in the following table:



Then confirm and the new board will be added in your project.



Double click on “Parameters” to configure the GENLINE board.



To complete the configuration, confirm with “OK” and save  .

The meaning of these parameters is:

GENLINE	RS485 (Modbus RTU)	Comment
line_num	1	progressive number of bus (from 1 to 10)
name	MDB	fixed string - to define the kind of BUS -
par_1	1	same value of "line_num"
par_2	500	timeout of answer (ms) - usually it dipend of characteristics of the device; for Dixell this value is 500ms -
par_3	1	number of retry before detect an error
par_4	/dev/ttyS3	fixed string - kind of serial for communication -
par_5	9600,n,8,1	serial configuration - usually it dipend of characteristics of the device; for Dixell this value is 9600,n,8,1 -
par_6	20	sleep time between rx and tx (ms) - for iPRO is "0ms" - for Dixell devices is "20ms" - for all the others "20÷30ms"
par_7		- free -
par_8		- free -

Some information about the GENLINE board:

- it is possible to define only one GENLINE with name MDB.
- max baud-rate is 19200 (par_5).
- do not change the “fixed strings” (name and par_4).
- the iPRO with GENLINE MDB is MASTER.
  It can read and write variables from slaves.

The other Buses are the ETHERNET and CAN; the configurable tables for these buses are:

GENLINE	ETH	Comment
line_num	1	progressive number of bus (from 1 to 10)
name	ETH	fixed string - to define the kind of BUS -
par_1	1	same value of "line_num"
par_2	2000	timeout of answer (ms) - usually it dipend of characteristics of the device; for Dixell this value is 2000ms -
par_3	1	number of retry before detect an error
par_4	192.168.0.198	IP node address - IP address of your device; example 192.168.0.198
par_5		- free -
par_6		- free -
par_7		- free -
par_8		- free -

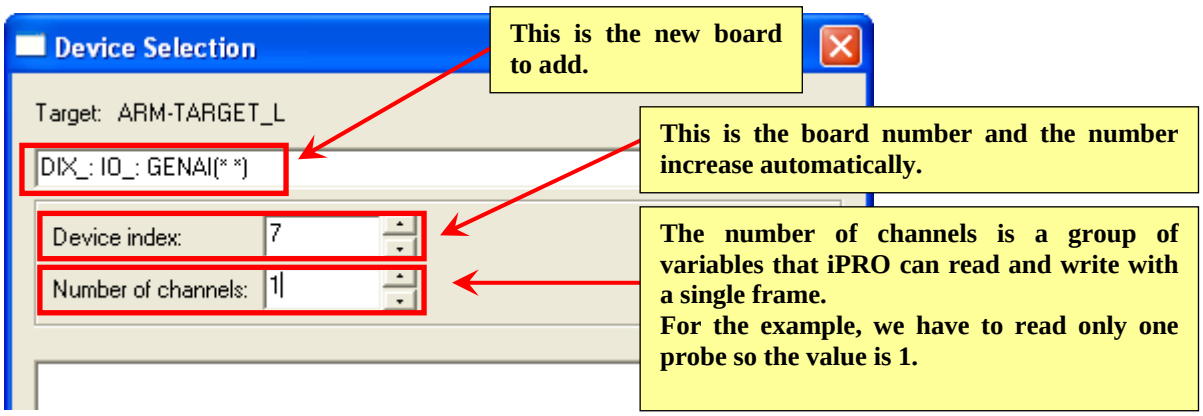
GENLINE	CAN	Comment
line_num	1	progressive number of bus (from 1 to 10)
name	CAN	fixed string - to define the kind of BUS -
par_1	1	same value of "line_num"
par_2	5	CAN node address - address of your node
par_3	100	write cycle refresh (ms) - from 10 to 10000ms (Dixell default 100ms)
par_4		- free -
par_5		- free -
par_6		- free -
par_7		- free -
par_8		- free -

Some information about the ETH and CAN boards:

- it is possible to define more than one GENLINE with name ETH and CAN.
- do not change the “fixed string” (name).

14.2.2 Define the I/O (GENAI, GENAO, GENDI, GENDO boards)

To add a new I/O board, click the icon  and fill in the following table:



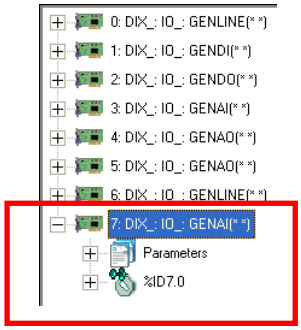
Regarding the number of channels pay attention because:

- if the number of channels is > 1, variables needs to have a consecutive addresses.
  This is the situation when your iPRO has to read 10 variables with address from 100 to 109; in this case declare one GENAI board with Number of Channels = 10.

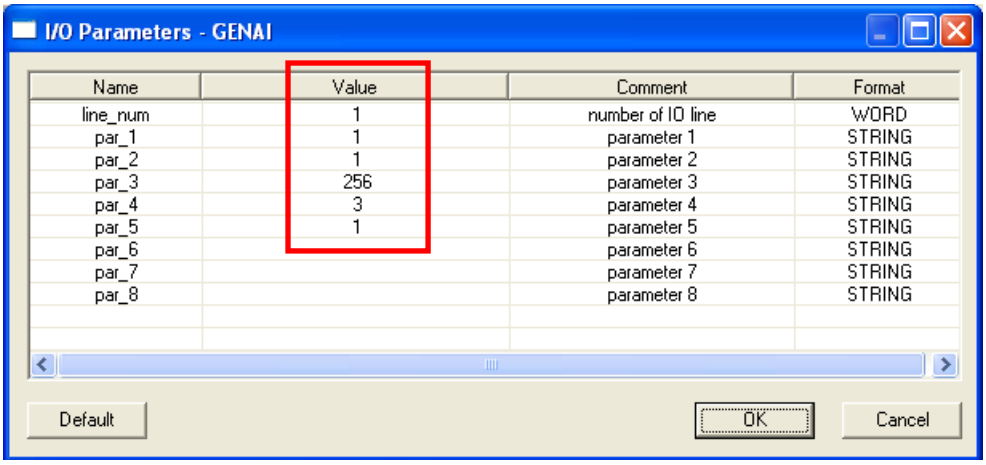
- If the number of channels is > 1 but the addresses are not consecutive, will be necessary to define different boards.

  This is the situation when your iPRO has to read 3 variables with address 100, 101 and 104; in this case declare two GENAI: the first to read the variables with address 100 and 101 (the Number of Channels = 2), the second to read the variable with address 104 (Number of Channels = 1).

Then confirm and the new board will be added in your project.



Double click on “Parameters” to configure the GENAI board.



To complete the configuration, confirm with “OK” and save  .

The meaning of these parameters is:

	GENAI, GENAO, GENDI, GENDO
line_num	number of GENLINE that define the properties of MDB
par_1	same value of "line_num"
par_2	Modbus node address
par_3	variable address
par_4	Modbus command: - if AI ----> 3 or 4 - if AO ----> 6 or 16 - if DI ----> 1 or 2 - if DO ----> 5 or 15
par_5	rate of refresh
par_6	- free -
par_7	- free -
par_8	Only for AO and DO: name of variable. If FALSE, no write active.

Some information about the GENAI, GENAO, GENDI and GENDO boards of MDB:

- if par_2 and/or par_3 are names of variables, ISaGRAF application can change node and variable address to read and write.

	GENAI, GENAO, GENDI, GENDO
line_num	number of GENLINE that define the properties of ETH
par_1	same value of "line_num"
par_2	- free -
par_3	variable address
par_4	Modbus command: - if AI ----> 3 or 4 - if AO ----> 6 or 16 - if DI ----> 1 or 2 - if DO ----> 5 or 15
par_5	rate of refresh
par_6	- free -
par_7	- free -
par_8	Only for AO and DO: name of variable. If FALSE, no write active.

Some information about the GENAI, GENAO, GENDI and GENDO boards of ETH:

- if par_3 is a name of variable, ISaGRAF application can change node and variable address to read and write 0x var hex.

	GENAI, GENAO, GENDI, GENDO
line_num	number of GENLINE that define the properties of CAN
par_1	same value of "line_num"
par_2	command code: - range 1-10: Analog Inputs 16 bit (board with max 4 Number of Channels) - range 11-15: Analog Inputs 8 bit (board with max 8 Number of Channels) - range 1-10/16-25: Analog Outputs 16 bit (board with max 4 Number of Channels) - range 11-15/26-30: Analog Outputs 8 bit (board with max 8 Number of Channels) - range 31: Digital Inputs (board with max 32 Number of Channels) - range 31/32: Digital Outputs (board with max 32 Number of Channels)
par_3	- free -
par_4	- free -
par_5	- free -
par_6	- free -
par_7	- free -
par_8	- free -

14.2.3 Define the new variable(s) in the dictionary

The new I/O has to be defined in the dictionary; it is necessary to add the new variable(s) in a new or existing group of variables.

In our example we have to add the variable AI11; for this variable (and in any case for each variable), it is important to declare:

- Name
- Type
- Direction
- Attribute

Name	Type	Direction	Attribute
AI11	DINT	Input	Read

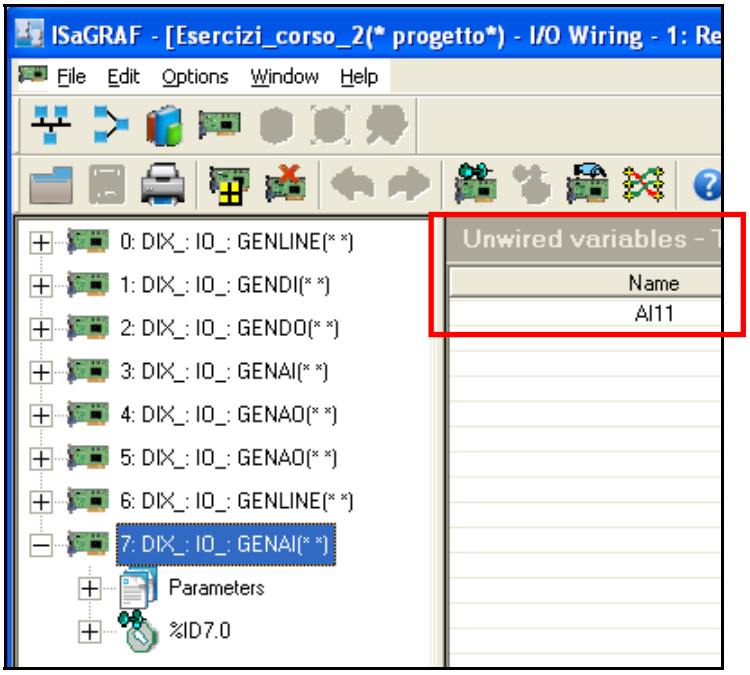
14.2.4 Link between variables and boards

The last operation to do is link the new variable(s) with the new boards.

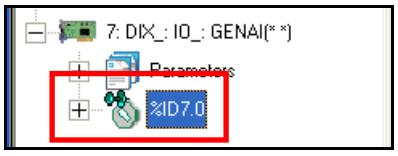
To complete our example, it is clear that we have to link the variable AI11 with the GENAI board.

Click the icon  to open the I/O window.

Click on the last GENAI board; in the Unwired variables (in the right side of the window) is visible the variable AI11.

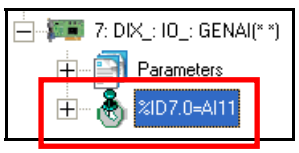


To link the variable with the board, select the “ID point” in the board:



and then double click on the variable AI11.

From the unwired variables the AI11 will disappear and the description in the GENAI ID point will become:



Now save, compile and download the application in your iPRO.

15. ADMINISTRATOR SITE

Inside the iPRO, as default, there is a Website where is possible to get some information about the configuration, the working status and the variables value.

To see the website launch, in your browser, the command:

- http://192.168.0.250/panel (if your IP is different, write the correct one)

The “HOME” window will appear:

The command that you can use in this first page are:

- To see and delete the Doglog.

  You can check if there have been failures or reboots of the system; here below an example of reboot message:

```
Forced reboot at Mon Nov 17 08:37:54 2008, reason: process </usr/sbin/boa> died
Forced reboot at Mon Nov 17 10:34:36 2008, reason: process </usr/sbin/boa> died
```

- Disable the Watchdog.

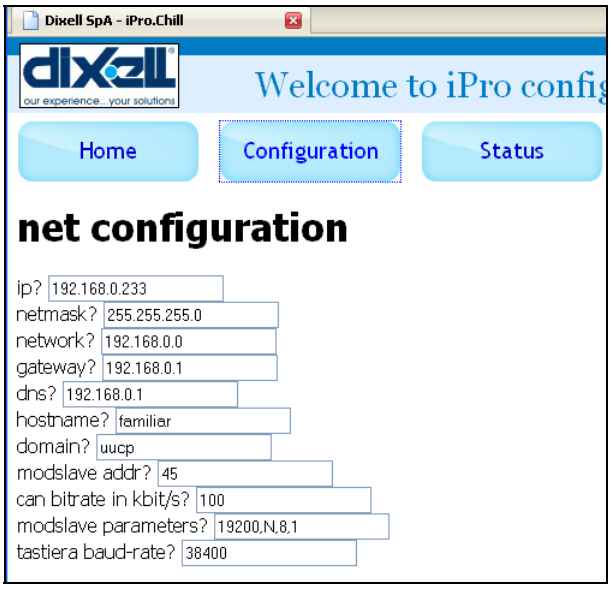
  The default status of Watchdog is enable; this control reboot automatically the system when some malfunction happens.

  BE AWARE: this control has to be disable “manually” only during the test or debug of your application. To enable the control reboot the iPRO.

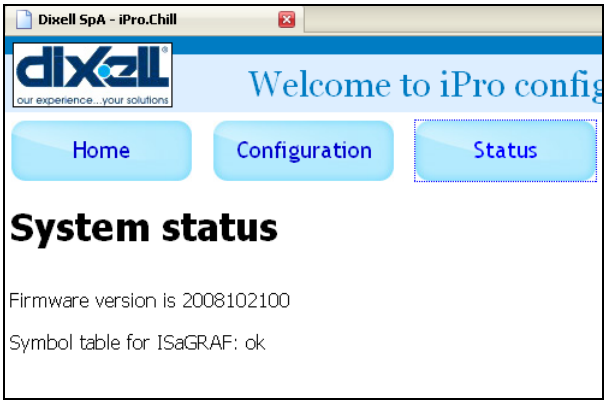
- Reboot the machine.

  This command restart the iPRO.

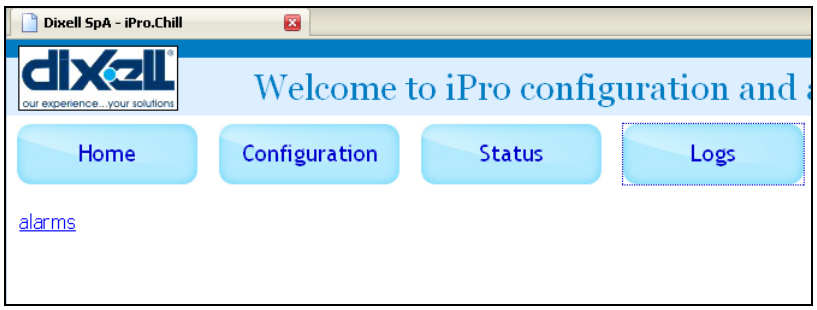
Click on “CONFIGURATION” to check and change the net configuration.



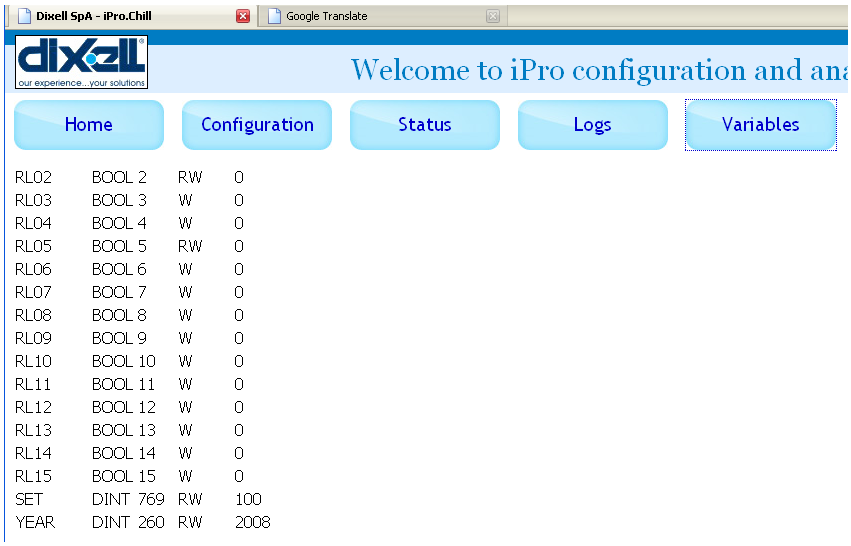
Click on “STATUS” to check the system status.



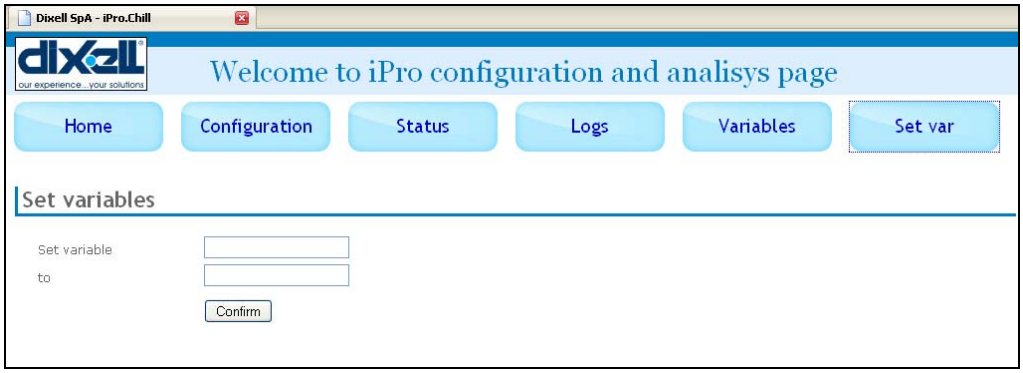
Click on “LOGS” to check and download the log files (for example the alarms file).



Click on “VARIABLES” to check the information about the variables used in your application.



Click on “SET VAR” to change the value of the variables.



If you want to change the value of the variable “SET” from 100 to 150, write the name of the variable, the new value and then confirm.