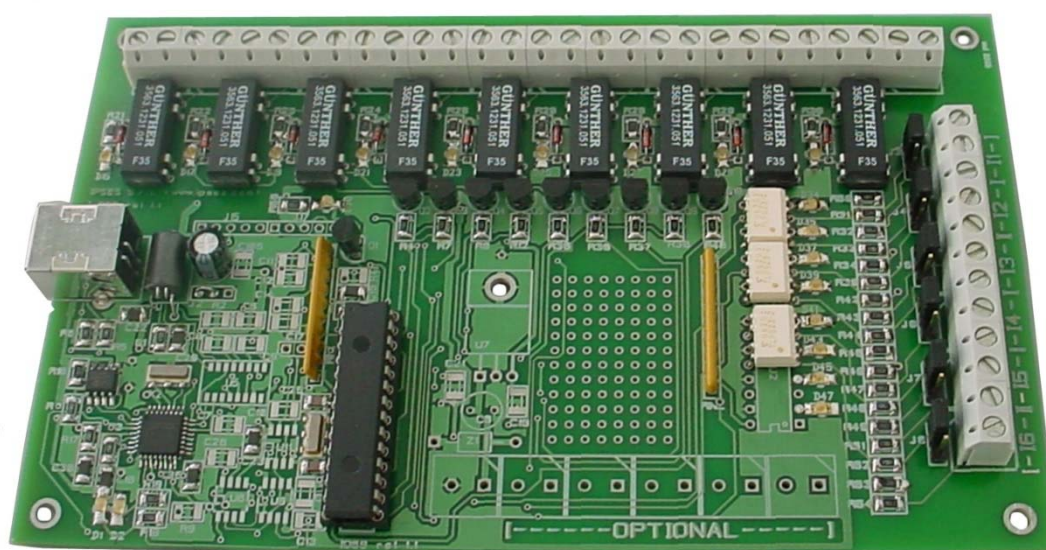


CONTROL UNIT IO-69

USER MANUAL

Rel. 01.05.0000

(Hardware code: IO-69-U)



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This guide contains instructions and technical features of the IO-69 CONTROL UNIT.

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It is the responsibility of the technician to undertake all the safety rules provided by law and standard practice during the installation and the use of this device.

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REVISION HISTORY

Manual revision history

Revisione/ Data	Descrizione modifica	Autore
01.00.0000 October, 2006	First version Released	Dugato S.
01.02.0000 January, 2009	Minor editorial corrections	Liguori C., Rivolta A.
01.03.0000 June, 2009	Added an example of use DLL D2XX and other minor editorial corrections. Minor editorial corrections	Zancanato A., Mancuso C.
01.04.0000 October, 2010	Updated <i>Driver Installation</i> chapter, specified full buffer error condition, added WEB-ADIO description	Zancanato A.
01.05.0000 January, 2012	Updated technical data, added picture for polarization of the inputs. Minor editorial corrections.	Rivolta A.
01.05.0001 March, 2015	Updated contacts data, minor changes	Mancuso

GENERAL FEATURES



IO-69 is a digital input/output control unit with an USB interface, implemented on an European Card Format (160 x 100 mm).

IO-69 can read six independent input lines and control nine independent output lines. All the digital lines are electrically unconnected and can be referenced to a separate ground return. Input lines are galvanically insulated by using optocouplers, while output lines are controlled by relays (ST is standard delivery, DT option is available on demand). Each

input line can be individually configured for a different input mode and voltage range, from 5 to 24 Vdc. The reference voltages for the input and output sections are independent. A safety feature can be programmatically implemented to ensure protection and safety to the instruments wired to the IO-69: when no command is sent to the device within a settable time interval, the unit will enter an idle condition and deactivate all the output lines.

An output line is defined active when the relay controlling it is energized.

Furthermore, it is possible to configure each individual output line to become active only when predefined input lines reach assigned conditions: in this case, the IO-69 unit becomes a simple programmable logic controller.

The device can be completely configured through the USB interface by a *Windows* based PC using the software configuration tool distributed with the unit.

DRIVER INSTALLATION

We recommend to execute the automatic software installation from CD before connecting the device to PC. By this way software and USB driver are both installed, allowing the PC to automatically identify the device once you connect it.

If you use the recommend automatic software installation from CD, you do not need to follow indications contained in this chapter.

If you do not use the recommend automatic software installation from CD, to connect IO-69 to your PC you need to install only the USB IPSES driver that is certified for the most recent Microsoft operating systems:

- Microsoft Windows 2000 family
- Microsoft Windows XP family, x86
- Microsoft Windows Server 2003 family, x86
- Microsoft Windows Server 2003 family, x64
- Microsoft Windows XP family, x64
- Microsoft Windows Vista family, x86
- Microsoft Windows Vista family, x64
- Windows Server 2008 family, x86
- Windows Server 2008 family, x64
- Windows 7
- Windows 7 x64
- Windows 8 and 8.1 family
- Windows Server 2008 Release 2 family, x64



If your PC has an Internet connection, you should follow the automatic Windows Update procedure; otherwise follow the manual installation procedure from CD.

Automatic Windows Update procedure

- 1) Connect the IO-69 board to PC using a USB cable. *Windows* operating system will detect a new device, showing a message similar to:



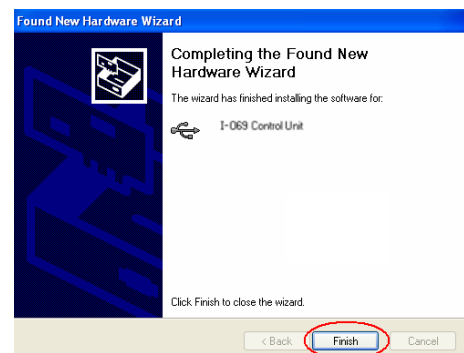
- 2) In the following windows "found new hardware wizard" chose "Yes, this time only" and then "Next".



driver and its installation.

- 3) Then choose "install the software automatically (Recommended)" and then "Next". Wait for downloading of the

- 4) Installation is completed when the window on the left is displayed. Choose "Finish" to exit.



- 5) After a window with the message "Found New Hardware. USB Serial Port" is displayed. Follow again instruction from point 2)

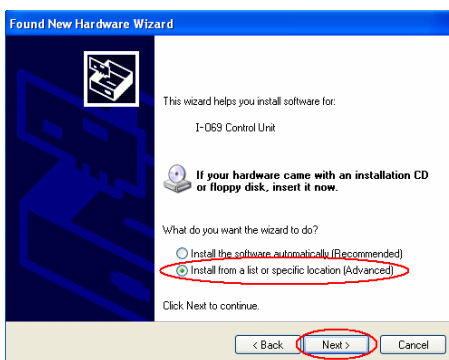
Manual driver installation procedure

- 1) Connect the IO-69 board to the PC using a USB cable. *Windows* operating system will detect a new device, showing the message:



- 2) In the following windows "found new hardware wizard" "No, not this time" and then "Next".

chose



- 3) Then choose "install from a list or specific location (Advanced)" and "Next". Then Set the driver folder path on the CD.





4) The Successful of the installation is indicated by the message of completing the found new hardware wizard. To end, click "Finish".



5) After installation of the hardware described above, the new device "USB Serial Port" is detected. Follow again instruction from point 2).

REMOTE CONTROL COMMUNICATION PROTOCOL

The IO-69 unit is completely controlled through a USB port by using a simple proprietary communication protocol. The commands are text strings in ASCII code, terminated with the <CR> character. The protocol is case insensitive.

If you send ten characters without termination <CR>, the device sends the error string "E " and ignores the last ten characters.

IO-69 unit can be controlled using any serial communication client (like *Windows HyperTerminal*): to do this, use the com port number assigned to your virtual com.

Application programs may be developed using the standard serial communication device driver functions. In this case, use the following communication settings:

- Bits per second: 9600 baud
- Data bits: 8
- Parity: none
- Stop bit: 1
- Flow control: hardware (CTS, RTS)

Alternatively, application programs may be developed using the low level communication library "FT2XX.dll". In this case, please refer to the manual "FTD2XX.DLL DYNAMIC LIBRARY" by IPSES which is available in the documentation CD provided with the card or can be downloaded from the website at the following link: <http://www.ipses.com/PDF/IPSES-D2XX-en.pdf>.

The following commands are recognized by the IO-69 unit:

U	Requests the current global status of the unit (See below how the status is coded).
?	Requests the version firmware and the <i>serial number</i> of the device. The response is a string in ASCII code similar to "IO-69 USB - vx.x - S/Nyyyyy - www.ipses.com", where <i>x.x</i> represents the <i>firmware</i> version and <i>yyyyy</i> the <i>serial number of the unit</i> .
Ax	Activates the output line x. <ul style="list-style-type: none"> ➤ x is a number between 1 and 9: output x is activated; ➤ let x = A to activate all outputs at the same time. This command overrides and disables, if active, any logical x output setting (see the command Ln1,1,1,1,1,1 below).
Sx	Disables the output line x. <ul style="list-style-type: none"> ➤ x is a number between 1 and 9: output x is disabled; ➤ let x = A to deactivate all outputs at the same time. This command overrides and disables, if active, any logical x output setting (see the command Ln1,1,1,1,1,1 below).
Cxx	Sets simultaneously outputs 2 to 9 to the status defined by xx. xx is a two digit number representing the desired output lines status in hexadecimal notation, where bit 0, 1, .. correspond to the output line 2, 3, ... For example, C01 activates output 2 and deactivates all the other lines, C80 activates output 9; C81 activates both output 2 and 9. This command forces the status of any logical output line (2 to 9) to the value selected, overriding any other setting by different commands (see following Ln1,1,1,1,1,1 command). The status of the output line 1 is unaffected by this command.
Ln1,1,1,1,1,1	Logical output line setting. Activates the n output only when logical I _i conditions are verified at the same time. I _i can be a value between 1 and 6. and identifies the correspondent input. I _i can be 1 (logical true, V _{cc}), 0 (logical false, V _{ref}), or X (logical <i>don't care</i>).
LnC	Deactivates logical n output setting (see Ln1,1,1,1,1,1 command).
LC	Deactivates each logical output setting (see Ln1,1,1,1,1,1 command).
L?	Requests the logical output setting. The response is a string in ASCII code similar to "1-111001;2-00XXX1;3-----;4-000000;5-111111;6-----;7-----;8-----; 9-----;". For each output, numbered from 1 to 9, logical I _i input conditions are displayed (see Ln1,1,1,1,1,1 command).

Tt	Sets the timeout interval: if no command is received within the set interval, all the output lines are deactivated. The timeout is set with t. <ul style="list-style-type: none"> ➤ t = 0: no timeout – feature not active; ➤ t = 1: 3 seconds timeout. ➤ t = 2: 5 seconds timeout. ➤ t = 3: 10 seconds timeout. ➤ t = 4: 30 seconds timeout. ➤ t = 5: 1 minute timeout. ➤ t = 6: 5 minutes timeout. ➤ t = 7: 10 minutes timeout. ➤ t = 8: 30 minutes timeout. ➤ t = 9: 1 hour timeout.
T?	Requests the timeout setting. The response is an ASCII char from 0 to 9 representing the current setting as per the command Tt.
M	Saves in memory the current configuration (timeout and logical output lines setting)
F	Loads from memory the saved configuration (timeout and logical output lines setting)

The status request message ("U") forces the device to return a 2-byte value (4 hex characters) representing the status of the unit according to the following table:

bit 15	Output 9 status
bit 14	Output 8 status
bit 13	Output 7 status
bit 12	Output 6 status
bit 11	Output 5 status
bit 10	Output 4 status
bit 9	Output 3 status
bit 8	Output 2 status
bit 7	Output 1 status
bit 6	Input 6 status
bit 5	Input 5 status
bit 4	Input 4 status
bit 3	Input 3 status
bit 2	Input 2 status
bit 1	Input 1 status
bit 0	Error

When the error bit (bit 0) is set, an error code follows the status value, separated by a comma (i.e. 8001,02); the error code is a 1-byte value (2 hex characters) representing the error condition(s) according to the following table:

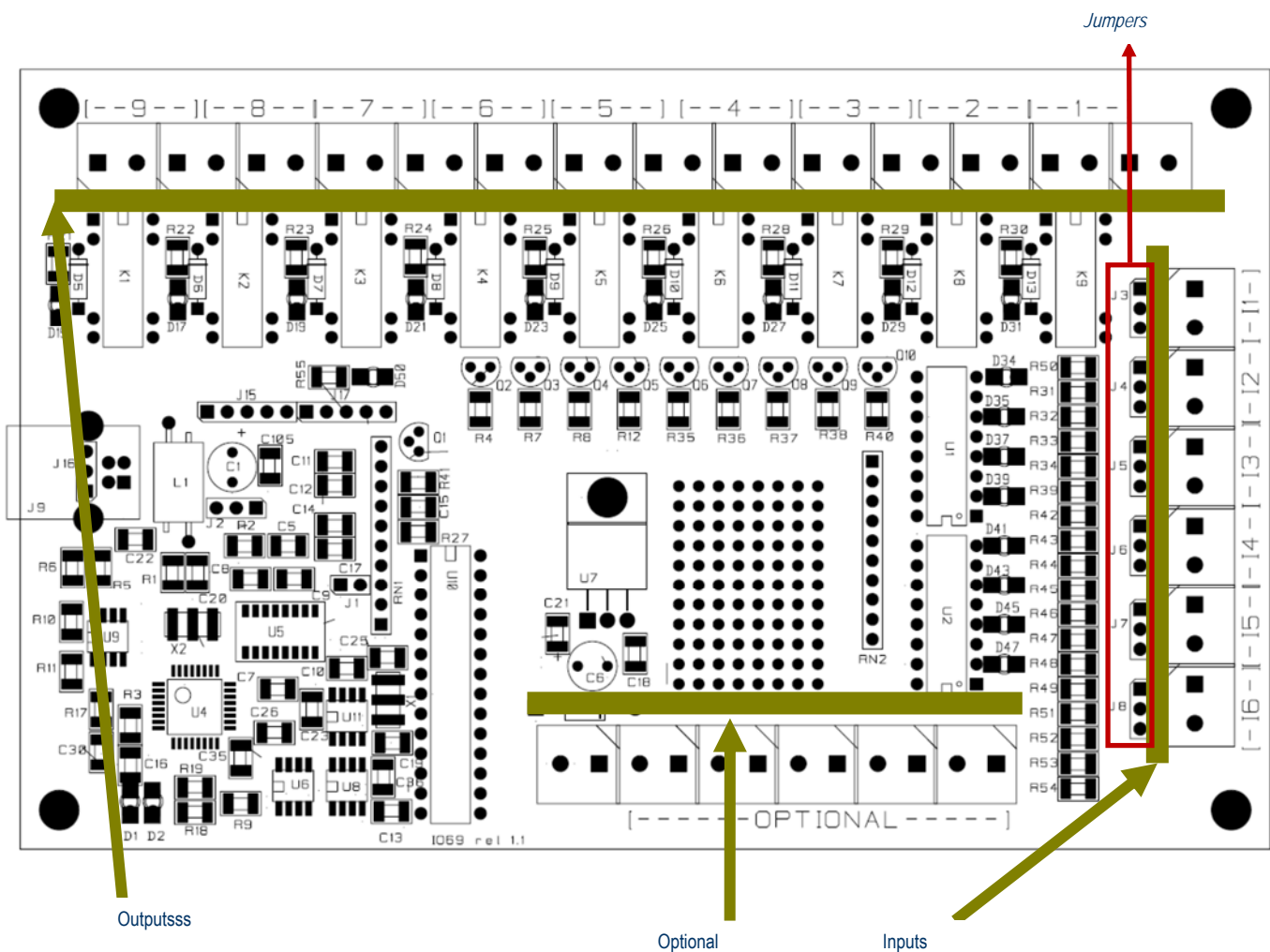
bit 7	Unused
bit 6	Unused
bit 5	Unused
bit 4	Saved configuration inconsistent: using factory default settings
bit 3	Internal EEPROM checksum error
bit 2	Timeout condition
bit 1	Illegal command
bit 0	Unrecognized command

A status request command (U) resets an error condition, if present.

If an external power supply is used, it is recommended to connect the USB cable only after providing the power to the unit.

LAYOUT

The following sketch shows the IO-69 layout: the nine outputs, numbered from 1 to 9, are in the upper part of the card; the six inputs, from 1 to 6, are in the right part of the card. Moreover, there is an area ("OPTIONAL" is clearly readable) on which further components, eventually requested, may be allocated in order to implement more functionalities.



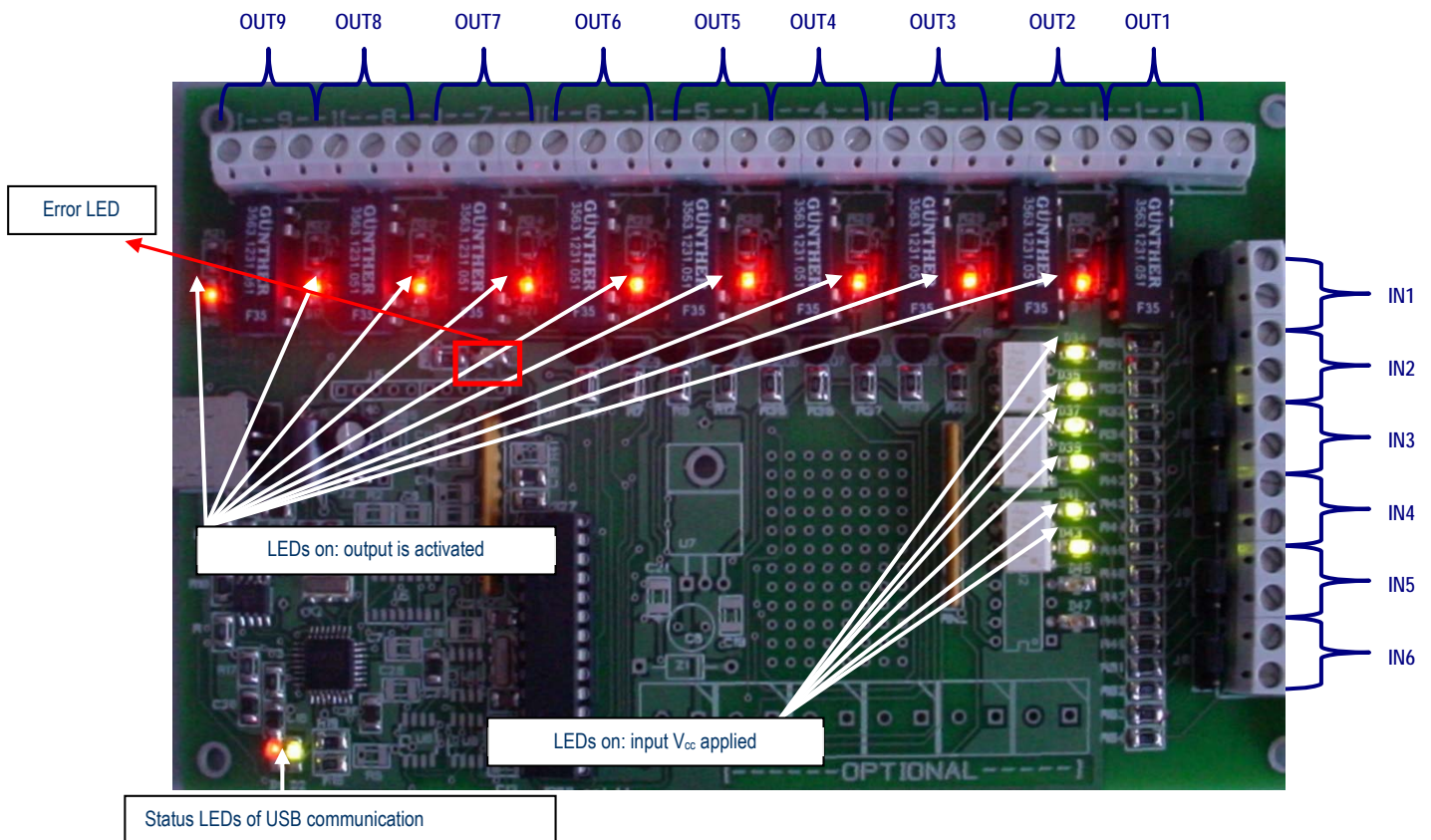
Picture 1: IO-69 layout.

Figure 1 shows also the input voltage jumper selectors (J3, J4, J5, J6, J7, J8) which allow to set the correct input voltage V_{cc} for each input line to 5 V, 12 V and 24 V.

The picture 2 displays input and output status leds. When leds are on, they indicate:

- D1 Red LED. Packet exchange on USB port
- D2 Green LED. Connection to PC happened and driver correctly loaded

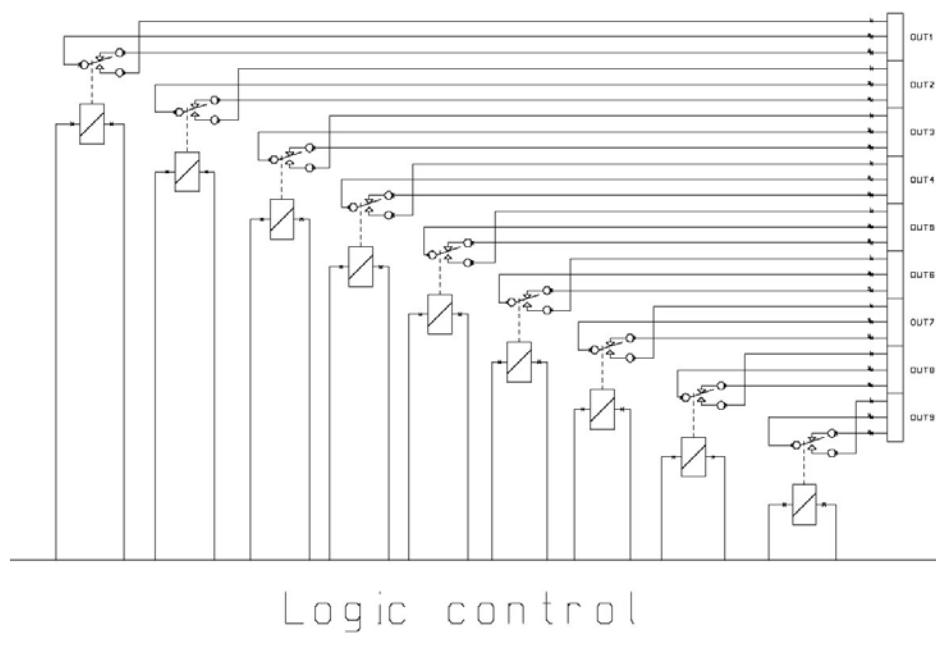
D50	Red LED show an error state
D34	LED on, V_{cc} applied at IN 1
D35	LED on, V_{cc} applied at IN 2
D37	LED on, V_{cc} applied at IN 3
D39	LED on, V_{cc} applied at IN 4
D41	LED on, V_{cc} applied at IN 5
D43	LED on, V_{cc} applied at IN 6
D13	LED on, OUT 1 is active
D12	LED on, OUT 2 is active
D11	LED on, OUT 3 is active
D10	LED on, OUT 4 is active
D9	LED on, OUT 5 is active
D8	LED on, OUT 6 is active
D7	LED on, OUT 7 is active
D6	LED on, OUT 8 is active
D5	LED on, OUT 9 is active



Picture 2: LEDs.

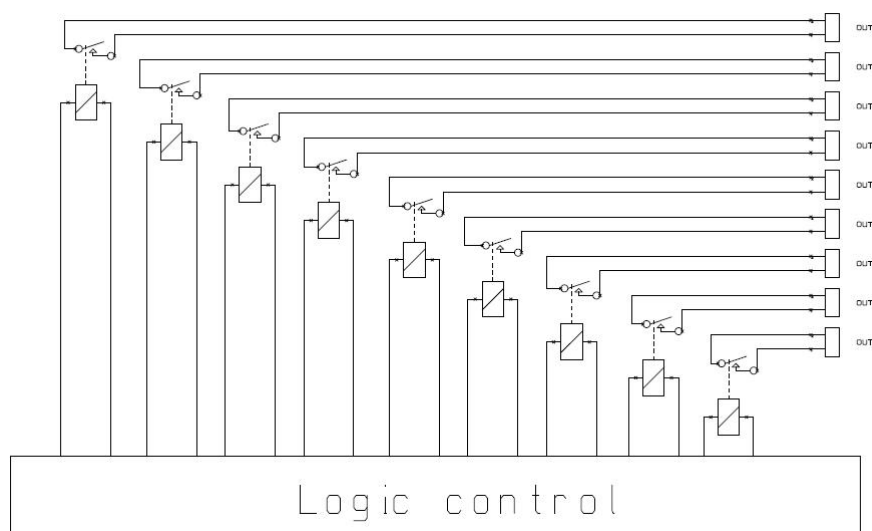
OUTPUT LINES

The nine output lines are completely insulated, both between them and with other electrical components of the device. In fact, each output is constituted by a double-throw relay (unit code IO69-USB-SPDT), as indicated here below:



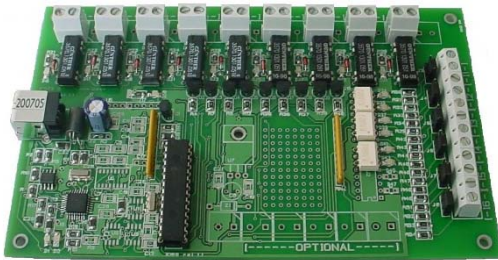
Picture 3: electric diagram of the output section for the double-throw output model.

Alternatively, each output is constituted by a single-throw relay (unit code IO69-USB-SPST), as indicated here below:

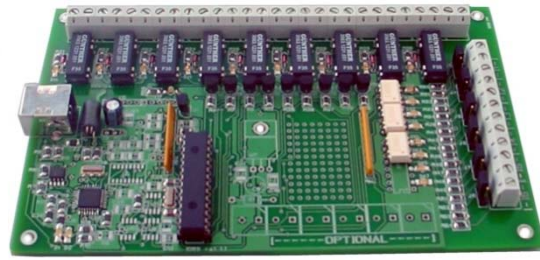


Picture 4: electric diagram of the output section for the single-throw output model.

Here below there are the pictures of the two different models: figure 5a shows model with SPST relays, while figure 5b shows model with SPDT relays.

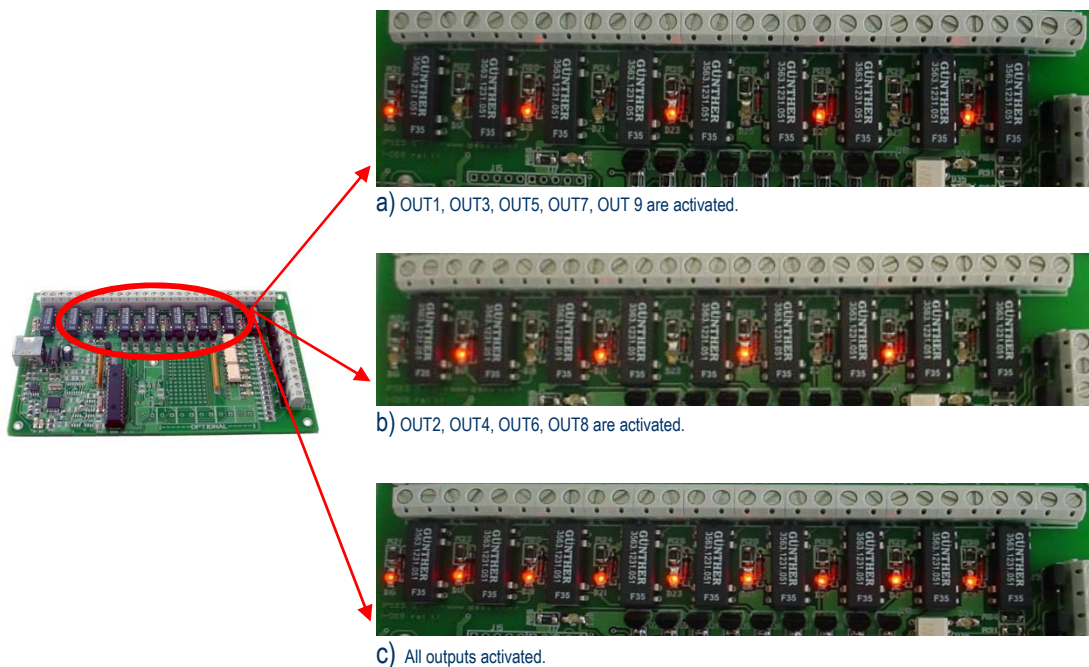


Picture 5a: IO69-USB-SPST.



Picture 5b: IO69-USB-SPDT.

The status of each output line is displayed by a LED located near its respective output connector.



Picture 6: different output lines configuration.

The electrical specifications of the output lines are :

- Maximum current: 0,5 A (IO69-USB-SPDT)
- Maximum current: 1 A (IO69-USB-SPST)
- Maximum voltage: 100 V_{DC}.
- Minimum insulation between reel and contacts: 1000 V_{DC}.

The output line average life time, in worst case (always using nominal switching current), is between 100.000 and 1.000.000 switches.

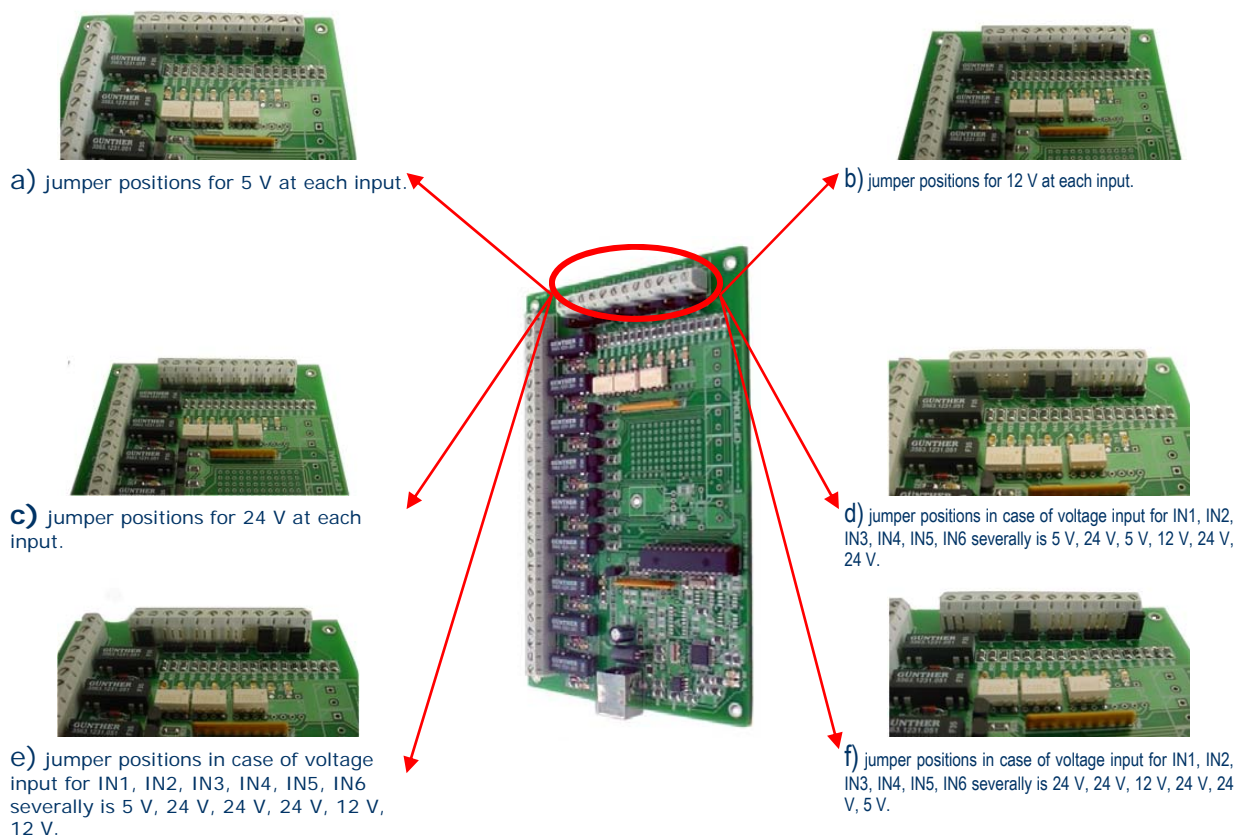
Using current lower than the nominal one, the guaranteed cycles are more than 500.000.000.

Using loads with high capacity or inductance, with peak current over the nominal value, the outputs line life time may reduce considerably.

INPUT LINES

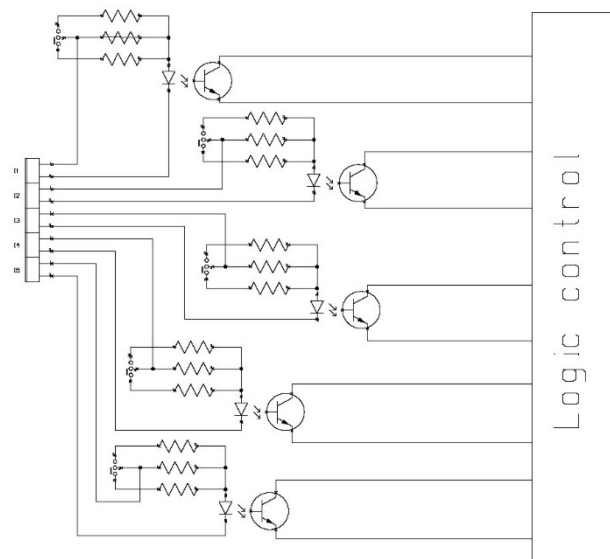
All input lines are galvanically insulated, both between them and from other electrical components of the device. The minimum insulation voltage is 500 V.

The input voltage range is set independently for each input line by means of the jumper selectors (J3, J4, J5, J6, J7, J8). Possible choices are 5 V_{DC}, 12 V_{DC} and 24 V_{DC}. The following picture shows different examples of jumper position.

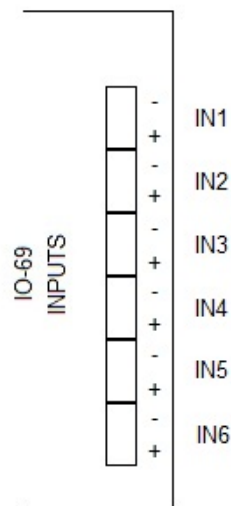


Picture 7: different jumper position examples; all inputs are galvanic insulated and not correlated.

The input line circuitry is shown by the electrical diagram in picture 8a here below, while in picture 8b is shown the correct polarization scheme for the inputs.

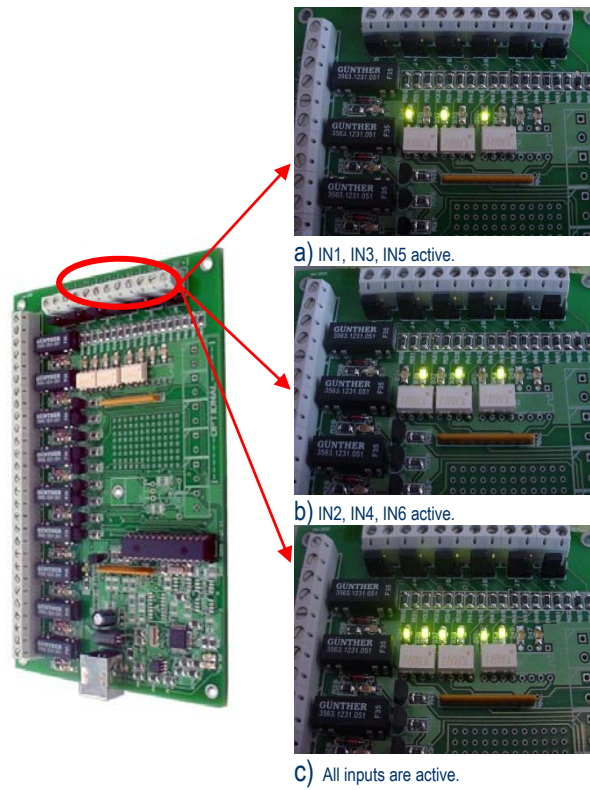


Picture 8a: electrical diagram of a logical input.



Picture 8b: polarization scheme for the inputs.

Each input line status is displayed by a LED located near each input connector.



Picture 9: example of different input conditions.

The electrical specifications of the input lines are:

- Input voltage jumper-settable to 5, 12, or 24V_{DC}.
- Minimum operating insulation: 2500V_{RMS}.

DEMO SOFTWARE



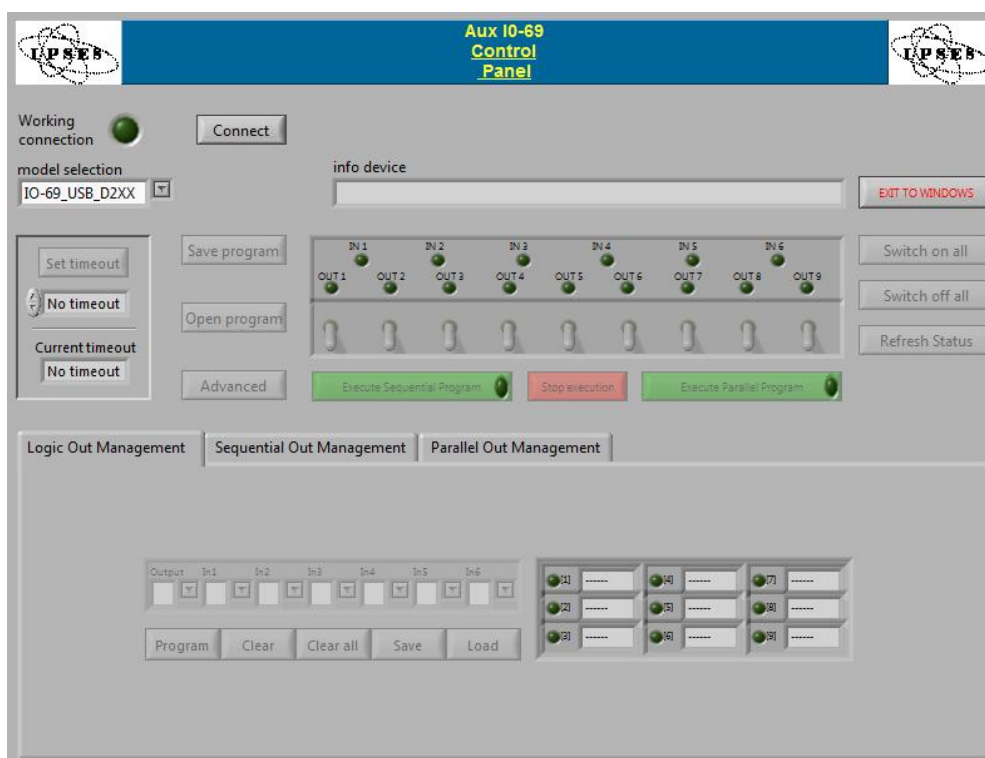
IO-69_Demo is a demo application allowing full remote control and testing of IO-69 unit. The virtual instrument panel offers intuitive functions, which allow the user to quickly and easily understand the unit's operation.

INSTALLATION

The demo application can be installed on your PC by double-clicking on "Installer_IO-69_Demo.exe" and following the instructions displayed. The executable file "IO-69_Demo.exe" will be installed in the default program files directory, in the folder "IO-69_Demo".

EXECUTION

Execute "IO-69_Demo.exe". A control panel is displayed as shown in picture 10.



Picture 10: virtual control panel.

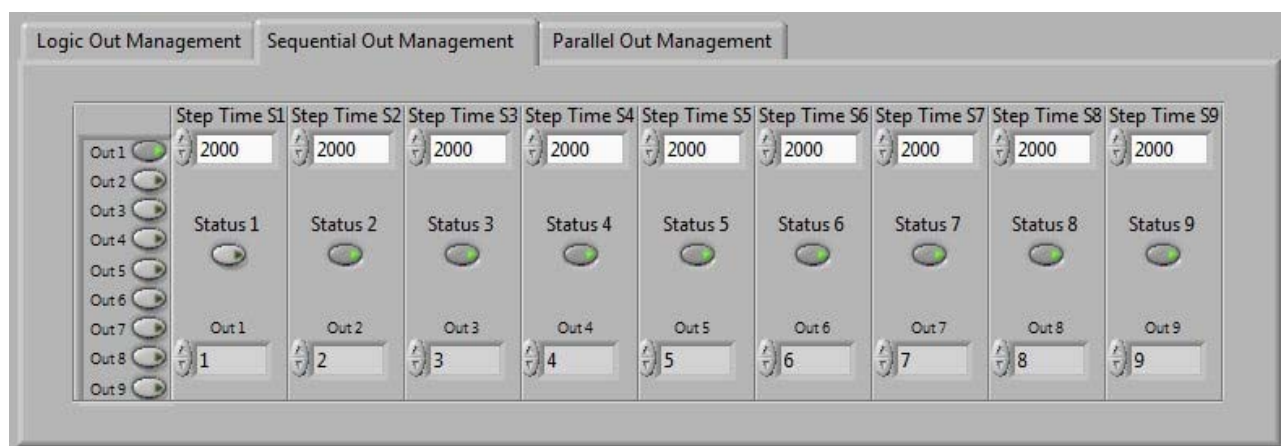
FUNCTIONS

The graphical interface is structured to allow user an easy understanding of the different implemented functions. The upper area of the panel allows the selection of the mode and the monitoring of the connection by visualizing status and/or error messages.

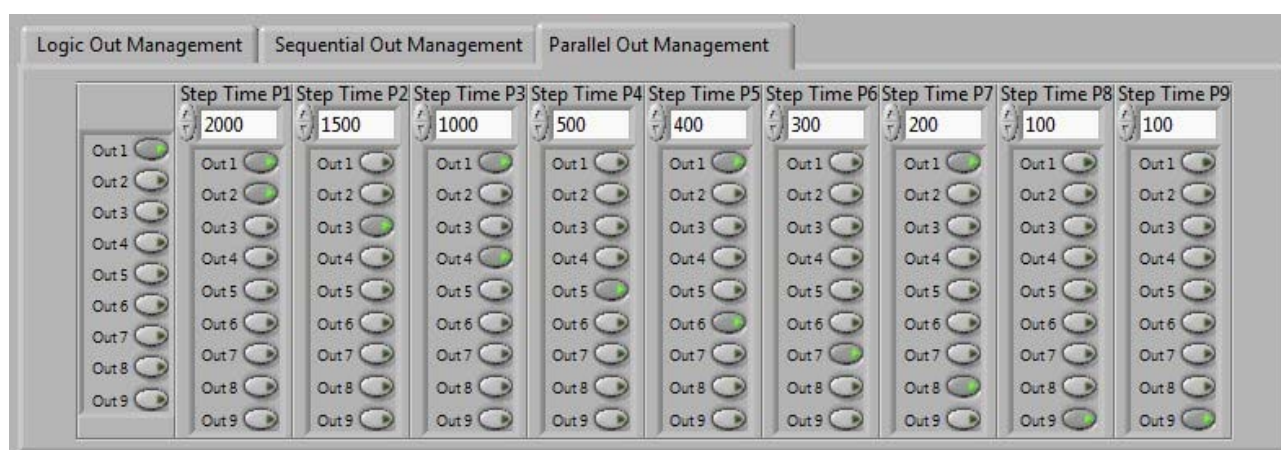
The central section of the virtual panel allows the direct monitoring and control of the IO-69 lines: the row of LEDs labelled as IN1, ..., IN6 shows the current status of the input lines, while the line of LEDs labelled as OUT1, OUT2, ..., OUT9 shows the nine output lines status.

The two pushbuttons Switch on all and Switch off all allow respectively to activate or to deactivate all the nine output lines of the device at the same time. The pushbutton Refresh Status updates the indicators and selectors status presented on the panel. The Set Timeout pushbutton allows the user to set for each board the respective communication timeout. When its timeout expires without receiving any command, the unit resets to the power-on status until a new command is received.

The bottom part of the virtual panel is reserved to the sequential and parallel programming of the output lines. (Sequential Out Management and Parallel Out Management, respectively) as displayed by pictures 11 and 12, as well as the set up of the programmable logic that control the output lines status as a function of the input line status (Logic Out Management).



Picture 11: setup tab for the Sequential Programming of the output lines



Picture 12: setup tab for the Parallel Programming of the output lines

In the Logic Out Management tab shown in picture 13 (see here below), Output represents the id 1, ..., 9 of the output line to be activated when the values of the six input lines match the pattern (0, 1, or X (don't care)). Each single output line can be programmed by clicking on the button Program. Its existing program can be cleared by clicking on the button Clear, while pressing the button Clear All any programming present on the device will remove. The current program settings can be saved in the non-volatile memory by clicking on the button Save, while clicking on Load any program previously saved will be reload from the memory.



Picture 13: panel for the logical programming of the outputs.

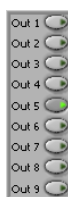
The following section of the control panel represents the logical output programming status.



Picture 14: output programming status; green light indicates which one of the output lines is active.

The Sequential Out Management allows to setup an initial configuration of the nine output lines – see picture 15. After a cycle time equal to Step Time S1, ..., Step Time S9 expressed in milliseconds, the status of the output line identified in the field Out1, ..., Out 9 will change.

Similarly, the program Parallel Out Management allows to configure the simultaneous activation or deactivation of the nine output lines when the respective cycle time is elapsed.



Picture 15: output settings; green light indicates which one of the outputs is activated.

The program settings in the tabs Sequential Out Management and Parallel Out Management can be saved in the non-volatile memory and reloaded by using the buttons Save program and Open program, respectively.

CONNECTION TO IO-69 DEVICE

In the field Model selection, located in the upper left side of the virtual control panel, it is possible to select the desired communication interface.

Model selection	Working mode
IO-69_USB_VCP	Uses a virtual serial port allowed by the driver
IO-69_USB_D2XX	Uses directly the USB communication

Once the desired communication mode is selected, through the Connect button is possible to start a communication session (the status is shown by the LED Working connection). Through Info device, the IO-69 returns information about its firmware version and *serial number*.

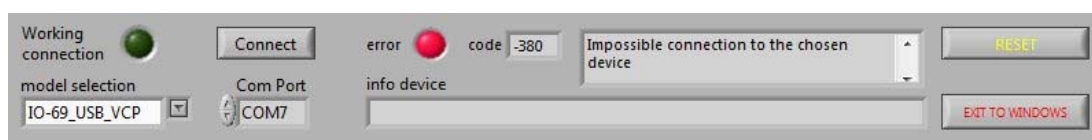


Picture 16: output selectors.

Once the communication is active, output selectors (see picture 16), output lines programming panel (figure 9) and the following commands will be enabled:

Switch on all	Switchs on all output selectors at the same time
Switch off all	Switchs off all output selectors at the same time
Execute Sequential Program	Executes the program as set in the Sequential Out Management tab
Execute Parallel Programming	Executes the program as set in the Parallel Out Management tab
Stop execution	Stops program execution
Save program	Saves in non-volatile memory the current program settings
Open program	Loads from non-volatile memory the program settings previously stored
Advanced	Advanced subroutine execution
Set timeout	Sets the timeout


All possible error conditions are displayed. For example, picture 17 shows the displayed message when the communication with an IO-69 unit is not established.



Picture 17: error event example.

To come back to application operation, it is necessary Click on RESET.

Advanced runs homonym subroutine, as shown in picture18.



Picture 18: Advanced subroutine.

The Advanced subroutine allows user a lower level management of the IO-69 unit, both to send commands and to query card for.

To send commands the following fields are available:

Command: allows the selection of the command to be sent.

par: allows to set the parameter of the command to be sent.

Run Send: sends the command

To query the card, the following fields are available:

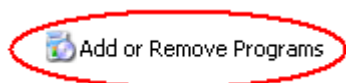
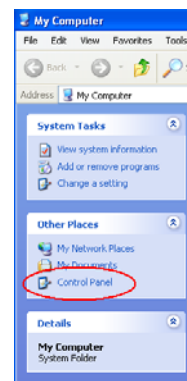
Question: allows the selection of the query to be sent

Run Read: allows to get answers to the previous selected queries by *Question*.

UNINSTALLATION

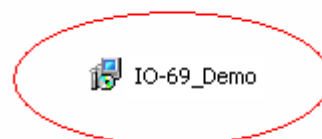
To correctly uninstall the software, follow the instructions listed below.

- 1) From the Start menu, click "Control Panel".



- 2) Click "Add or Remove Programs" from the resource list displayed.

- 3) From the list of installed programs select "IO-69_Demo" and proceed to removal by clicking "Change/Remove".



EXAMPLE USING THE *DLL*

The following example allows to open the communication (to the indexed device by device_index=0), to read the firmware and serial number ("?" command), to set all outputs ("AA" command), to get the system status ("U" command) and to close the communication.

// Variables definition

```
unsigned long ftStatus = 0, ftHandle = 0;
unsigned long TxBytes = 0, RxBytes = 0, EventNode = 0, BytesWritten = 0, BytesReceived = 0;
char TxBuffer [16] = " ";
char RxBuffer [256] = " ";
UCHAR p1,p2;
```

```
p1=0;
```

```
p2=0;
```

// Open Device Communication to 0 indexed device and sets its communication parameters

```
ftStatus = FT_Open (0, &ftHandle);
if (ftStatus != FT_OK)
{
    //Error on opening procedure
}
else
{
    ftStatus = FT_SetBaudRate (ftHandle, 9600);
    if (ftStatus != FT_OK)
    {
        //Error on setting baud rate procedure
    }
    else
    {
        ftStatus = FT_SetDataCharacteristics (ftHandle, FT_BITS_8, FT_STOP_BITS_1,
            FT_PARITY_NONE );
        if (ftStatus != FT_OK)
        {
            //Error on setting data characteristics procedure
        }
        else
        {
            ftStatus = FT_SetFlowControl (ftHandle, FT_FLOW_RTS_CTS,p1, p2);
            if (ftStatus != FT_OK)
            {
                //Error on setting flow control procedure
            }
            else
            {
                ftStatus = FT_SetTimeouts (ftHandle, 500, 300);
                if (ftStatus != FT_OK)
```



```

        {
            //Error on setting timeout procedure
        }
        else
        {
            //Opening procedure successfully completed
        }
    }
}

//Get Info device
TxBuffer = "?/r";
ftStatus = FT_Write (ftHandle, TxBuffer, 2, &BytesWritten);
if (ftStatus != FT_OK){
{
    //Write error
}
else
{
    FT_GetStatus(ftHandle, &RxBytes);
    if (RxBytes >0 )
    {
        ftStatus = FT_Read(ftHandle, RxBuffer, RxBytes, &BytesReceived);
        if (ftStatus == FT_OK)
        {
            // successfully reading
        }
        else
        {
            // Error reading
        }
    }
}
}

//Send command: AA
TxBuffer = "AA/r";
ftStatus = FT_Write (ftHandle, TxBuffer, sizeof(TxBuffer), &BytesWritten);
if (ftStatus != FT_OK){
{
    //Write error
}
else
{
    //Command sent
}
}

```


//Get status

```

TxBuffer = "u/r";
ftStatus = FT_Write (ftHandle, TxBuffer, 2, &BytesWritten);
if (ftStatus != FT_OK){
{
    //Write error
}
else
{
    FT_GetStatus(ftHandle, &RxBytes);
    if (RxBytes >0 )
    {
        ftStatus = FT_Read(ftHandle, RxBuffer, RxBytes, &BytesReceived);
        if (ftStatus == FT_OK)
        {
            // Status successfully reading
        }
        else
        {
            // Error reading
        }
    }
}
}

```

//Close device

```

FT_Close (ftHandle);

```

The CD attached to the board includes the source code of an example project for the communication with the DLL, developed for both LabWindows/CVI (National Instruments) and Visual C#.

LabVIEW LIBRARY

The module LabView_IO-69_Library is available on demand.




For users desiring to realize their application for IO-69 card remote control through *LabVIEW*, IPSES developed a specific library fully compatible with *LabVIEW 7.1* and all the following versions. To use the LabView_IO-69_Library it is necessary to install the LabVIEW RunTime Engine 7.1(or later) and, in case of use of the serial communication protocol (VCP) too, the NI VISA RunTime 4.20 (or later).

The library make available to user nine functions through with it is possible to implement any application software in *LabVIEW* in a quick and easy way, because it will be not necessary to know all the detail of the communication protocol.

The library functions are divided into two levels:


- *IO-69_Low_Level_Communication.llb* contains the four functions through which it is possible to manage the connection with the IO-69 card.
- *IO-69_Application.llb* contains the five higher level functions (based on the low level functions), which allow the commands assignment accepted from the device.

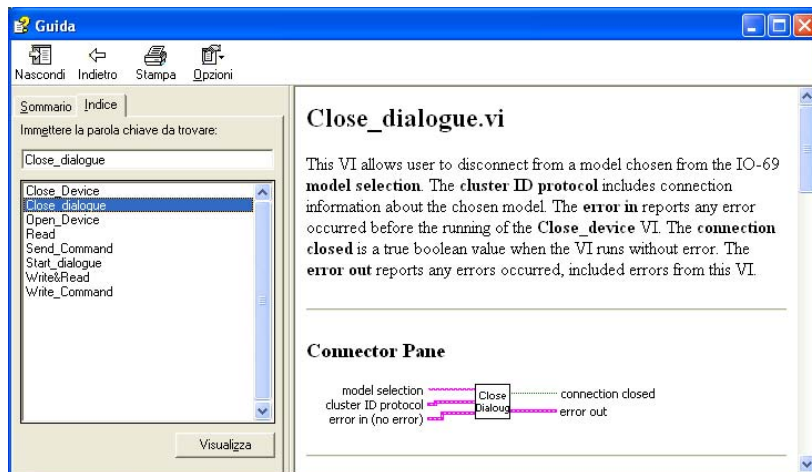
 *IO-69_Application.llb*
 *IO-69_Low_Level_Communication.llb*

The use of the *IO-69_Application.llb* is deemed enough for most application development, while *IO-69_Low_Level_Communication* is to be used to maximize performances.

	Function	Properties
<i>IO-69_Low_Level_Communication.llb</i>	<i>Close_Device.vi</i>	Closes the connection established with one of the available protocols.
	<i>Open_Device.vi</i>	Opens the connection with one of the available protocols.
	<i>Write&Read.vi</i>	Sends and receives ASCII characters.
	<i>Write_Command.vi</i>	Sends ASCII characters.
<i>IO-69_Application.llb</i>	<i>Close_dialogue.VI</i>	Ends the communication with the IO-69 card.
	<i>Read.vi</i>	Interprets characters sent by the device.
	<i>Return_Info.vi</i>	Drafts the S/N list of connected devices.
	<i>Send_Command.vi</i>	Imparts the commands implemented on the device.
	<i>Start_dialogue.vi</i>	Starts dialogue session with the IO-69 card.

LabView_IO-69_Library comes with an help file, *IO-69_Help.chm*. The help file provides a detailed explanation and a structural description of all the nine functions contained in the library. Graphical representations are included, so that the user may easily understand how they work in the tool in which they are built. Next figure displays the help of the library.

 *IO-69_Help.chm*



Picture 19: LabView functions help.

You can find more information at www.ipses.com .

TECHNICAL SPECIFICATIONS

Power supply: control logic directly powered through the computer USB port

Operating temperature range: 0°C ~ +60°C.

Non-operating temperature range: -40°C ~ +85°C.

Input lines: six optocoupled input lines with input voltage range individually selectable among 5/12/24 V_{DC}.

Average reading time ("U" command): 12ms

Input lines insulation voltage: 2500V_{RMS}.

Output lines (SPDT): nine output lines with single pole – double throw contact

Max switching current: 0,25A

Max carrying current: 0,5A

Max switching voltage: 70Vac/100Vdc, potential free

Max contact resistance: 200mΩ

Output lines (SPST): nine output lines with single pole – single throw contact

Max switching current: 0,5A

Max carrying current: 1A

Max switching voltage: 100Vac/dc, potential free

Max contact resistance: 150 mΩ

Reel to contact insulation: 1000 V_{DC}

Insulation resistance (coil/contact): 10Gohm

USB interface: USB port type B, USB2.0 compatible

Board dimensions: 100 x 160 mm (3,94 x 6,30 inches)

Thickness (included components): 15 mm (0.59 inches)

Spacing of the mounting holes: 90 mm x 150 mm (3,55 x 5,91 inches)

Diameter holes for M3 screw

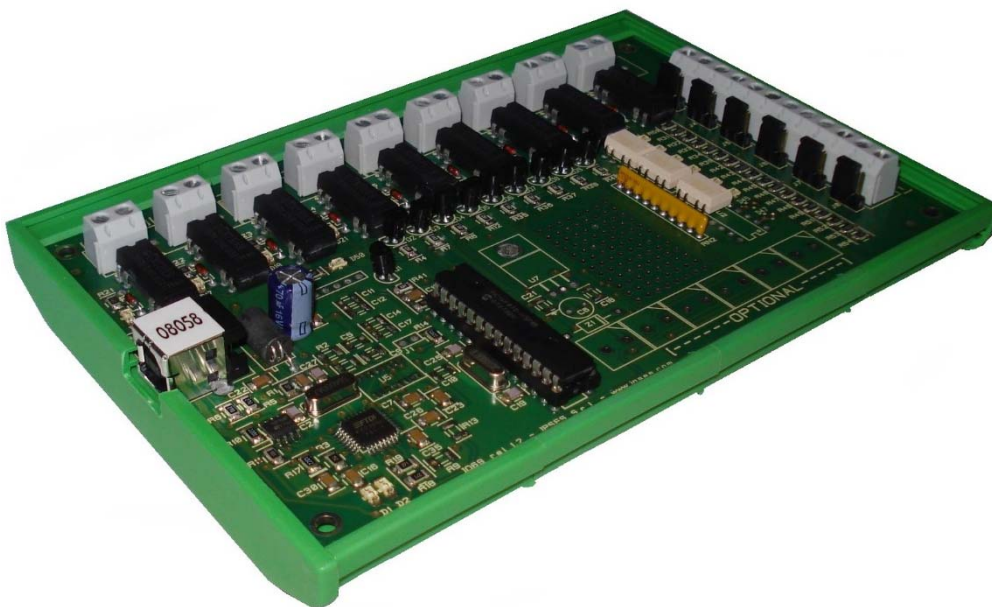
The outputs line average life time, in worst case (always using nominal switching current), is between 100.000 and 1.000.000 switch.

Using current lower than the nominal, the guaranteed cycles are more than 500.000.000.

Using load with high capacity or inductance, with peak current over the nominal value, the outputs line life time may reduce considerably.

ORDERING INFORMATION

Code	Description
IO69-USB-SPST	Control board with SPST relay output
IO69-USB-SPDT	Control board with SPDT relay output
IO69-USB-SPST-DIN	Control board with SPST relay output, board mounted on DIN rail support
IO69-USB-SPDT-DIN	Control board with SPDT relay output, board mounted on DIN rail support
IO69Library	LabView 7.1 (and following versions) Library for IO-69-USB cards
USB-A-B	USB connection cable
USB-A-B-ill	USB connection cable, with light on termination



OTHER AVAILABLE I/O CARDS

IO-1616: Input/output Card with 16 inputs and 16 outputs and USB interface



General

Power supply: self-powered through USB
 Working temperature: from 0°C up to + 60°C
 Storage temperature: from -40°C up to + 85°C
 Size: European format card (100 x 160 mm - 3,94 x 6,30 inches)

USB port technical features:

1 type B port, compatible with USB 2.0, autonomously powered for the host connection

- Possibility to connect directly to an host port up to 128 cards, cards for a maximum of 2.048 inputs and 2.048 outputs

Temperature sensor technical features:

Resolution: 0,0625°C
 Accuracy: from $\pm 1^\circ\text{C}$ to $\pm 3^\circ\text{C}$, depending on temperature range.

Timeout control to turn off all the outputs if it does not receive commands from the host within a time configurable through software.

IO1616 is a self powered card to manage sixteen optoisolated inputs and sixteen optoisolated outputs with USB interface.

IO1616 can be directly connected to PLC, to input devices from operator and to other I/O systems.

On request, an integrated temperature sensor allows to know in real time the temperature of the system IO1616 is placed in.

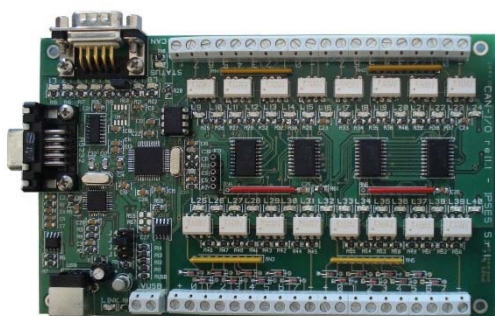
Technical features of inputs:

Number of inputs: sixteen
 Operative voltage: from 3,3V_{DC} up to 36V_{DC}
 Max current absorbed: 10mA (on each input)
 Input impedance: $\approx 2.5\text{K}\Omega$
 Logic low level: < 1V
 Logic high level: > 2.5V
 Port read average time execution: 15 ms
 Protection: optocouplers with 2.500V_{RMS} maximum operative voltage
 Connectors: pitch terminal block

Technical features of outputs:

Number of outputs: sixteen
 Operative voltage: from 3,3V_{DC} up to 36V_{DC}
 Maximum current: 150 mA
 Protection: optocouplers with 2.500V_{RMS} maximum operative voltage
 Connectors: pitch terminal block

CAN-IO: Input/output Card with 16 inputs and 16 outputs with CAN, USB and RS232 interface



General technical features:

Power supply: self-powered through USB or +5V_{DC} in stand-alone mode
 Working temperature: from 0°C up to + 60°C
 Storage temperature: from -40°C up to + 85°C
 Size: European format card (100 x 160 mm - 3,94 x 6,30 inches)
 Interfaces toward PC: 1 USB port, 1 RS232 port

CAN-IO is a control unit equipped with CAN, USB and RS232 interfaces to manage sixteen optocoupled inputs and outputs. The card can work as standalone device on CAN BUS. Its configuration is achieved either through USB (in this case the board is self powered) or through RS232 interface. Easy to use and to configure, thanks to the provided *software*, CAN-IO is the right answer to the need to acquire and to drive digital signals through already existing CAN bus.

CAN-IO can be directly connected to PLC, to input devices by operator and to other I/O systems.


Each input and output status can be read by a field bus at any moment. Besides, thanks to LEDs fixed on, the status is shown directly on the board. An integrated temperature sensor allows to know in real time the temperature of the system CAN-IO is placed in.

Technical features of inputs:

Number of inputs: sixteen
 Operative voltage: 36V_{DC}
 Logic low level: < 1V
 Logic high level: > 2.5V
 Input impedance: $\approx 2.5\text{K}\Omega$
 Max absorbed current on each input: 10mA

<p>CAN port technical features:</p> <ul style="list-style-type: none"> - Configurable in high-speed or low-speed mode. - Customizable baudrate (up to 1MB/s). - Customizable address (standard or extended frame). - Consistent with standard CAN 2.0B Active Specification - DB9 male connector <p>USB port technical features: 1 type B port, compatible with USB 2.0, autonomously powered for the host connection</p>	<p>Protection: optocouplers with 2.500V_{RMS} maximum operative voltage Connectors: pitch terminal block</p> <p>Technical features of outputs: Number of outputs: sixteen Operative voltage: from 3,3V_{DC} to 36V_{DC} Max open collector current: 150mA Protection: optocouplers with 2.500V_{RMS} maximum operative voltage Connectors: pitch terminal block</p> <p>Temperature sensor technical features: Resolution: 0,0625°C Accuracy: from ±1°C to ±3°C, depending on temperature range.</p>
--	---

WEB-IO: Input/output Card with 16 inputs and 16 outputs, Ethernet interface, integrated web, telnet and SNMP servers and SMTP client

	<p>WEB-IO is a card to manage sixteen optocoupled inputs and sixteen optocoupled outputs with Ethernet interface, equipped with a web, a telnet and an SNMP servers, and an SMTP client. The web server allows to connect and to manage the card using any web browser (i. e. Internet Explorer or Firefox), with no needs to install a software on your PC. Beside, the card can be connected directly to a switch or to a router with no need to use a PC. It is also possible to develop a customized software managed by telnet service or SNMP client.</p> <p>WEB-IO can be directly connected to PLC, to input devices from operator and to other I/O systems. Each input and output status can be read by a web browser or a telnet client at any moment, besides it is shown directly on the board thanks to LEDs fixed on. On request, the card can be equipped with an integrated temperature sensor which allows to monitor in real time the temperature around the regulator voltage module. Through expansion connectors the card can be interfaced to a RTCLOG (Real Time Clock and Logger) optional module: by this way, it can perform a log of the I/O states on a dedicated memory. The card is available in two models: with power supply voltage from 5V up to 9V and with power supply voltage from 7V up to 30V. and in box version. WEB-IO is provided with a demo software for Windows environment, based on telnet service.</p>
<p>General technical features: Power supply: external, from 5V_{DC} to 9V_{DC} or from 7V_{DC} to 15V_{DC} Working temperature: from 0°C up to + 60°C Storage temperature: from -40°C up to + 85°C Size: European format card (100 x 160 mm - 3,94 x 6,30 inches) Max thickness: 20 mm (30 mm with RTCLOG module) RTCLOG module interface: 2 expansion dedicated connectors Ethernet interface: 1 Ethernet RJ45 port</p> <p>Supported protocols: Telnet: the card can work as telnet server HTTP: the card can work as WEB server SNMP: the card can work as SNMP server SMTP: the card can work as SMTP client</p> <p>Temperature sensor technical features: Resolution: 0,0625°C Accuracy: from ±1°C to ±3°C, depending on temperature range.</p>	<p>Technical features of inputs: Number of inputs: sixteen Operative voltage: from 3,3V_{DC} to 36V_{DC} Max absorbed current on each input: 10mA Logic low level: < 1V Logic high level: > 2.5V Input impedance: ≈ 2.5KΩ Protection: optocouplers with 2.500V_{RMS} maximum operative voltage Connectors: pitch terminal block</p> <p>Technical features of outputs: Number of outputs: sixteen Operative voltage: from 3,3V_{DC} to 36V_{DC} Max open collector current: 150mA Protection: optocouplers with 2.500V_{RMS} maximum operative voltage Connectors: pitch terminal block</p> <p>Timeout control to turn off all the outputs if it does not receive commands from the host within a time configurable through software.</p>

WEB-IO-WiFi: Input/output Card with 16 inputs and 16 outputs, Ethernet and WiFi interfaces, integrated web, telnet and SNMP servers



WEB-IO-WiFi is a card to manage sixteen optocoupled inputs and sixteen optocoupled outputs with Ethernet and WiFi interfaces, equipped with a web, a telnet and an SNMP servers. The web server allows to connect and to manage the card using any web browser (i. e. Internet Explorer or Firefox), with no needs to install a software on your PC. Beside, the card can be connected directly to a switch or to a router, by this way it can be accessed by any PC connected to Internet. It is also possible to develop a customized software managed by telnet service or SNMP client. The board is available with built-in antenna or with ultra miniature coaxial (U.FL) connector for external antenna connection.

WEB-IO-WiFi can be directly connected to PLC, to input devices from operator and to other I/O systems. Each input and output status can be read by a web browser or a telnet client at any moment, besides it is shown directly on the board thanks to LEDs fixed on. On request, the card can be equipped with an integrated temperature sensor which allows to monitor in real time the temperature around the regulator voltage module.

General technical features:

Power supply: external, from 5V_{DC} to 32V_{DC}
 Working temperature: from 0°C u to + 60°C
 Storage temperature: from -40°C up to + 85°C
 Size: European format card (100 x 160 mm - 3,94 x 6,30 inches)
 Max thickness: 20 mm
 Ethernet interface: 1 Ethernet RJ45 port

Supported protocols:

Telnet: the card can work as telnet server
 HTTP: the card can work as web server
 SNMP: the card can work as SNMP server

WiFi technical features:

- Compatibility: WiFi 802.11b (2,4GHz).
- Security: WEP, WPA and WPA2.
- Transmit power: 10dBm (10mW).
- Receiver sensitivity: -83dBm
- Built-in antenna or *ultra miniature coaxial* (U.FL) connector for external antenna connection
- Configurable to connect to any Access Point, with any channel and SSID.

Technical features of inputs:

Number of inputs: sixteen
 Operative voltage: from 3,3V_{DC} to 36V_{DC}
 Max absorbed current: 10mA (on each input)
 Logic low level: < 1V
 Logic high level: > 2.5V
 Input impedance: $\approx 2.5K\Omega$
 Protection: optocouplers with 2.500V_{RMS} maximum operative voltage
 Connectors: pitch terminal block

Technical features of outputs:

Number of outputs: sixteen
 Operative voltage: from 3,3V_{DC} to 36V_{DC}
 Max open collector current: 150mA
 Protection: optocouplers with 2.500V_{RMS} maximum operative voltage
 Connectors: pitch terminal block

Temperature sensor technical features:

Resolution: 0,0625°C
 Accuracy: from $\pm 1^\circ\text{C}$ to $\pm 3^\circ\text{C}$, depending on temperature range.

Timeout control to turn off all the outputs if it does not receive commands from the host within a time configurable through software.

WEB-ADIO: Input/output Card with 8 analogical inputs, 8 digital inputs, 8 analogical outputs and 8 digital outputs, Ethernet interface, integrated web, telnet and SNMP servers



WEB-ADIO is a card to manage 8 optocoupled digital inputs, 8 analogical inputs, 8 optocoupled digital outputs and 8 analogical outputs with Ethernet interface, equipped with a web, a telnet and an SNMP servers. The WEB server allows to connect and to manage the card using any web browser (i. e. Internet Explorer and Firefox), with no needs to install a software on your PC. Beside, the card can be connected directly to a switch or to a router with no need to use a PC.

It is also possible to develop a customized software managed by telnet service.

WEB-ADIO can be directly connected to PLC or to analogical transducer, to input devices from operator and to other I/O systems.

The analogical inputs and outputs have an operative voltage from 0V to 10V, with a resolution of 10mV and are calibrated one by one. Each input and output status can be read by a web browser or a telnet client at any moment, besides, the status of digital inputs and outputs it is shown directly on the board thanks to LEDs fixed on. On request, the card can be equipped with an integrated temperature sensor which allows to monitor in real time the temperature around the regulator voltage module.

General technical features:

Power supply: external, from 15_{DC} to 32V_{DC}
 Working temperature: from 0°C up to + 60°C
 Storage temperature: from -40°C up to + 85°C
 Size: European format card (100 x 160 mm - 3,94 x 6,30 inches)
 Max thickness: 20mm
 Ethernet interface: 1 Ethernet RJ45 port

Supported protocols:

Telnet: the card can work as telnet server
 HTTP: the card can work as web server
 SNMP: the card can work as SNMP server

Temperature sensor technical features:

Resolution: 0,0625°C
 Accuracy: from ±1°C to ±3°C, depending on temperature range.

Timeout control to turn off all the digital outputs if it does not receive commands from the host within a time configurable through software.

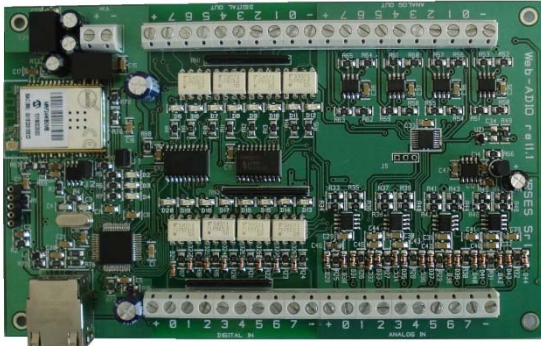
Technical features of inputs:

Number of inputs: sixteen: 8 analogical and 8 digital
 Operative voltage of digital inputs: from 3,3V_{DC} to 36V_{DC}
 Operative voltage of analogical inputs: from 0V to 10V (10 bit ADC).
 Max current absorbed on each input: Digital: 10mA. Analogical: 0.1mA.
 Input impedance: Digital: ≈2,5kΩ. Analogical: > 1MΩ.
 Logic low level: < 1V
 Logic high level: > 2.5V
 Protection: Digital: optocouplers with 2.500V_{RMS} maximum operative voltage.
 Analogical: overvoltage protection through calmp diodes.
 Connectors: pitch terminal block

Technical features of outputs:

Number of outputs: sixteen: 8 analogical and 8 digital
 Operative voltage of digital outputs: from 3,3V to 36V (DC).
 Operative voltage of analogical outputs: from 0V to 10V (10 bit DAC).
 Max current (on each output): Digital: 150mA. Analogical: ± 25mA.
 Response average time: Digital: 100μs. Analogical: 6ms (from 10% to 90% of the whole dynamic).
 Protection of digital outputs: optocouplers with 2.500V_{RMS} maximum operative voltage.
 Connectors: pitch terminal block

WEB-ADIO-WiFi: Input/output Card with 8 analogical inputs, 8 digital inputs, 8 analogical outputs and 8 digital outputs, Ethernet and WiFi interfaces, integrated web, telnet and SNMP servers



WEB-ADIO-WiFi is a card to manage 8 optocoupled digital inputs, 8 analogical inputs, 8 optocoupled digital outputs and 8 analogical outputs with Ethernet and WiFi interfaces, equipped with a web, a telnet and an SNMP servers. The web server allows to connect and to manage the card using any web browser (i. e. Internet Explorer and Firefox), with no needs to install a software on your PC. Beside, the card can be connected directly to a switch or to a router with no need to use a PC. The board is available with built-in antenna or with ultra miniature coaxial (U.FL) connector for external antenna connection.

It is also possible to develop a customized software managed by telnet service.

The analogical inputs and outputs have an operative voltage from 0V to 10V, with a resolution of 10mV and are calibrated one by one.

WEB-ADIO-WiFi can be directly connected to PLC or to analogical transducer, to input devices from operator and to other I/O systems. Each input and output status can be read by a WEB browser or a telnet client at any moment, besides, the status of digital inputs and outputs it is shown directly on the board thanks to LEDs fixed on.

General technical features:

Power supply: external, from 15V_{DC} to 32V_{DC}
 Working temperature: from 0°C up to + 60°C
 Storage temperature: from -40°C up to + 85°C
 Size: European format card (100 x 160 mm - 3,94 x 6,30 inches)
 Max thickness: 20mm
 Ethernet interface: 1 Ethernet RJ45 port

Supported protocols:

Telnet: the card can work as telnet server
 HTTP: the card can work as web server
 SNMP: the card can work as SNMP server

WiFi technical features:

- Compatibility: WiFi 802.11b (2,4GHz).
- Security: WEP, WPA and WPA2.
- Transmit power: 10dBm (10mW).
- Receiver sensitivity: -83dBm
- Built-in antenna or *ultra miniature coaxial* (U.FL) connector for external antenna connection
- Configurable to connect to any Access Point, with any channel and SSID.

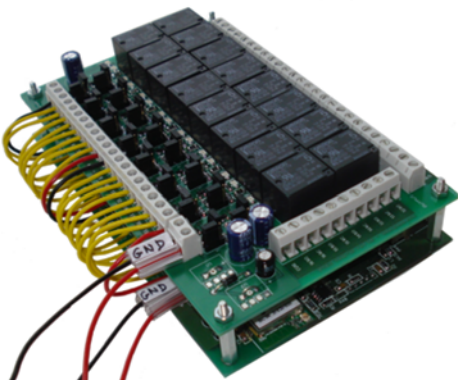
Timeout control to turn off all the digital outputs if it does not receive commands from the host within a time configurable through software.

Technical features of inputs:

Number of inputs: sixteen: 8 analogical and 8 digital
 Operative voltage of digital inputs: from 3,3V_{DC} to 36V_{DC}.
 Operative voltage of analogical inputs: from 0V to 10V (10 bit ADC).
 Max current absorbed on each input: Digital: 10mA. Analogical: 0,1mA.
 Input impedance: Digital: ≈2,5kΩ. Analogical: >1MΩ.
 Logic low level: < 1V
 Logic high level: > 2.5V
 Protection: Digital: optocouplers with 2.500V_{RMS} maximum operative voltage.
 Analogical: overvoltage protection through clamp diodes.
 Connectors: pitch terminal block

Technical features of outputs:

Number of outputs: sixteen: 8 analogical and 8 digital
 Operative voltage of digital outputs: from 3,3V_{DC} to 36V_{DC}.
 Operative voltage of analogical outputs: from 0V to 10V (10 bit DAC).
 Max current on each output: Digital: 150mA. Analogical: ± 25mA.
 Response average time: Digital: 100 μs. Analogical: 6ms (from 10% to 90% of the whole dynamic).
 Protections Digital: optocouplers with 2.500V_{RMS} maximum operative voltage.
 Connectors: pitch terminal block



RELAY I/O(-SEL) is an expansion module with 16 digital inputs that can control 16 SPDT relay outputs 5A @ 250VAC or 5A @ 24VDC each

These modules can be used as an expansion for any I/O card, transforming the TTL or contact freedmen open-collector type outputs (up to a maximum of 16 ones) in 16 relay outputs with NO and/or NC contact.

IPSES provides two board models, based on different relay output tipology:

- RELÉ-IO board: the sixteen outputs are divided in two groups of eight with common COM contact and both NC and NO contacts available on output connectors.
- RELÉ-IO-SEL board: each output is independent and each relay provides COM contact and one contact selectable between NC and NO according dedicated selector configuration.

To operate the cards require an external power supply. Two versions are available: RELÉ-IO(-SEL)-5 which requires an external power supply of 5VDC or RELÉ-IO(-SEL)-40 which requires an external power supply included from 7VDC up to 40VDC.

The card is in standard Eurocard format (100 x 160 mm - 3,94 x 6,30 inches) and can be supplied mounted on opened DIN rail.

LabVIEW Library for I/O cards:



A complete library for LabVIEW, giving the feasibility of I/O devices remote control, is available on request. The Library allows to implement a LabVIEW application without knowing the details of the communication protocol, making the development quick and easy.

Each library is provided with a help file which explains deeper each function included with.

IN8-USB: *Input Card with 8 inputs and USB interface*



IN8 is a low size auto powered control unit equipped with USB interface. IN8 can check eight galvanic isolated inputs: on each input it is possible to apply voltages regardless from the USB ground, with a maximum voltage of 30V. Easy to use, thanks to the driver provided with and to the LabVIEW 8.2 library available on demand, IN8 also reduce installation costs.

The board low size to be easily integrated in several systems. Besides, IN8 has its inputs galvanically isolated to protect from electromagnetic disturbances and ground loops, improving its reliability and quality.

IN8 is the right answer to the need to acquire digital signals from a PC in an industrial environment.

General technical features:

Power supply: self-powered through USB

Working temperature: from 0°C up to + 60°C

Storage temperature: from -40°C up to + 85°C

Size: 80 x 75 mm (2,95 x 3,15 inches)

- Possibility to connect directly to an host port up to 256 cards, for a maximum of 2.048 inputs

USB port technical features:

1 type B port, compatible with USB 2.0, autonomously powered for the host connection

Technical features of inputs:

Number of inputs: 8

Operative voltage: from 3,3V_{DC} up to 36V_{DC}

Max current absorbed: 10mA (on each input)

Input impedance: $\approx 2.5K\Omega$

Logic low level: < 1V

Logic high level: > 2.5V

Port read average time execution: 12 ms

Protection: optocouplers with 2.500V_{RMS} maximum operative voltage

Connectors: pitch terminal block

The state of the inputs is shown through LEDs on the board

For further details, please consult our website: <http://www.ipses.com>.

CONTACTS

IPSES S.r.l. conceives, designs, and markets electronic and scientific instruments. The customized design of our devices allows us to address specific needs for integration into embedded systems. IPSES customers enjoy access to a dedicated project engineering team, available as needed.

Our staff consists of highly competent professionals whose experience in the field is extremely strong. Thanks to constant training, process and technical development, IPSES is a leading company, combining the dynamism of a young group into the competence and reliability of a qualified staff.

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SUPPORT INFORMATION

The customer can contact the relevant engineer at IPSES S.r.l. directly.

A call can be logged in a variety of ways:

Telephone	:	++39 02 39449519 ++39 02 320629547
Fax	:	++39 02 700403170
Email	:	support@ipses.com

PROBLEM REPORTING

In case you encounter a problem using an IPSES product, we kindly ask you to report it by filling the form in the next page and sending it by fax to +39 02 700403170. The form can also be scanned and sent by e-mail to support@ipses.com. An electronic form is available on our web site (www.ipses.com)

ENGINEERING PROBLEM REPORT

Problem describer

Name		IPSES s.r.l. Via Lazzarotto, 10 Cesate (MI) Italy Fax ++39 02/700403170 e-mail support@ipses.com
Company		
Date	Tel.	

Product

Name	Version	Serial No.
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Report Type (bug, change request or technical problem)

Major bug	<input type="checkbox"/>	Urgency:	
Minor bug	<input type="checkbox"/>	High	<input type="checkbox"/>
Change request	<input type="checkbox"/>	Medium	<input type="checkbox"/>
Technical problem	<input type="checkbox"/>	Low	<input type="checkbox"/>

Problem Description

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Reproduction of Problem

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IPSES s.r.l. Action notes

Received by	Date	Report No.	Action
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(Product code IO-69-U Rel. 01.05.0000)

IPSES S.r.l.
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