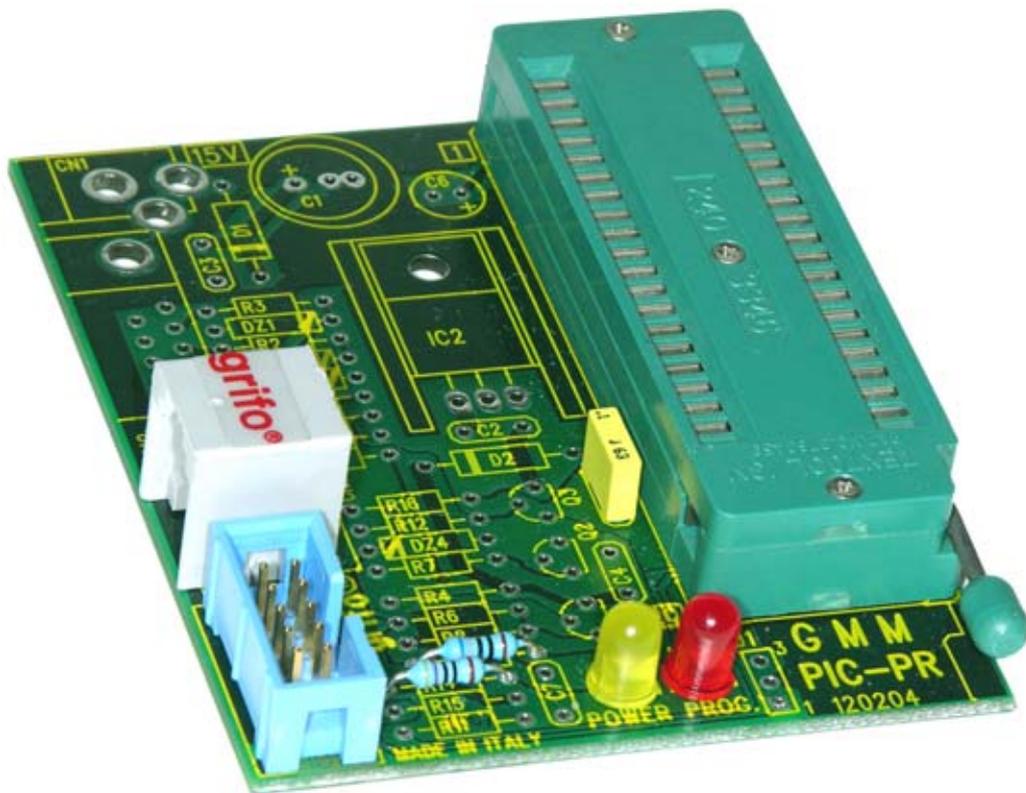


# GMM PIC-PR

**grifo**<sup>®</sup> Mini Module PIC Programmer

## TECHNICAL MANUAL



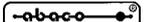
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GMM PIC-PR      Rel. 5.10      Ed. 01 September 2004

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# GMM PIC-PR

**grifo**<sup>®</sup> Mini Module PIC Programmer

## TECHNICAL MANUAL

**40 pin ZIF socket**, dual in line, pitch 100 mils, width 600 mils capable to support **grifo**<sup>®</sup> Mini Modules like **GMM 876**, **GMM 4620**, **CAN PIC**, etc.; very small size: 80 x 66 x 30 mm; **2 layers PCB** to obtain **best** noisy resistance and best **EMI performance**; Yellow LED on +5 Vdc tension; Red LED on **Programming** voltage; RJ12 6 pins connector for direct connection to Microchip **MPLAB**<sup>®</sup> **ICD 2**; low profile 10 pins male connector for direct connection to **MP PIK+**

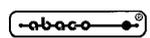
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### IMPORTANT

Although all the information contained herein have been carefully verified, **grifo®** assumes no responsibility for errors that might appear in this document, or for damage to things or persons resulting from technical errors, omission and improper use of this manual and of the related software and hardware.

**grifo®** reserves the right to change the contents and form of this document, as well as the features and specification of its products at any time, without prior notice, to obtain always the best product.

For specific informations on the components mounted on the card, please refer to the Data Book of the builder or second sources.

### SYMBOLS DESCRIPTION

In the manual could appear the following symbols:



Attention: Generic danger



Attention: High voltage



Attention: ESD sensitive device

### Trade Marks

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## INTRODUCTION

The use of these devices has turned - IN EXCLUSIVE WAY - to specialized personnel.  
This device is not a **safe component** as defined in directive **98-37/CE**.



Pins of Mini Module are not provided with any kind of ESD protection. They are connected directly to their respective pins of microcontroller. Mini Module is affected by electrostatic discharges. Personnel who handles Mini Modules is invited to take all necessary precautions to avoid possible damages caused by electrostatic discharges.

The purpose of this handbook is to give the necessary information to the cognizant and sure use of the products. They are the result of a continual and systematic elaboration of data and technical tests saved and validated from the manufacturer, related to the inside modes of certainty and quality of the information.

The reported data are destined- IN EXCLUSIVE WAY- to specialized users, that can interact with the devices in safety conditions for the persons, for the machine and for the environment, impersonating an elementary diagnostic of breakdowns and of malfunction conditions by performing simple functional verify operations , in the height respect of the actual safety and health norms.

The informations for the installation, the assemblage, the dismantlement, the handling, the adjustment, the reparation and the contingent accessories, devices etc. installation are destined - and then executable - always and in exclusive way from specialized warned and educated personnel, or directly from the TECHNICAL AUTHORIZED ASSISTANCE, in the height respect of the manufacturer recommendations and the actual safety and health norms.

The devices can't be used outside a box. The user must always insert the cards in a container that respect the actual safety normative. The protection of this container is not threshold to the only atmospheric agents, but specially to mechanic, electric, magnetic, etc. ones.

To be on good terms with the products, is necessary guarantee legibility and conservation of the manual, also for future references. In case of deterioration or more easily for technical updates, consult the AUTHORIZED TECHNICAL ASSISTANCE directly.

To prevent problems during card utilization, it is a good practice to read carefully all the informations of this manual. After this reading, the user can use the general index and the alphabetical index, respectly at the begining and at the end of the manual, to find information in a faster and more easy way.

## CARD VERSION

The present handbook is reported to the **GMM PIC-PR** card release **120204** and later. The validity of the bring informations is subordinate to the number of the card release. The user must always verify the correct correspondence among the two denotations. On the card the release number is present in more points both board printed diagram (serigraph) and printed circuit (for example near socket ZC1 on the solder and component side side).

## GENERAL INFORMATION

**GMM PIC-PR** (**grifo**<sup>®</sup> Mini Module **PIC PR**ogrammer) has been designed to allow to program quickly **grifo**<sup>®</sup> Mini Modules like **GMM 876**, **GMM 4620**, **CAN PIC**, etc.

Mini Modules have a very small area, like a 28 pin or 40 pins DIL ICs, but they are complete control systems, provided with on board microcontroller that features all the peripherals required by industrial automation (A/D converter, PWM, digital I/O lines, etc.) and FLASH and EEPROM memories to keep the application program and configuration data.

**GMM PIC-PR** allows to program and read both non-volatile memories for program and data and eventually the CPU configuration word, to cast the complete profile of an application in the Mini Module with just one operation.

Overall features are:

- **40 pin ZIF socket**, dual in line, pitch 100 mils, width 600 mils capable to support **grifo**<sup>®</sup> Mini Modules like **GMM 876**, **GMM 4620**, **CAN PIC**, etc.
- Very small size: 80 x 66 x 30 mm
- **2 layers PCB** to obtain **best** noisy resistance and best **EMI performance**
- Yellow LED on +5 Vdc tension
- Red LED on **Programming** voltage
- RJ12 6 pins connector for direct connection to Microchip **MPLAB**<sup>®</sup> **ICD 2**
- Low profile 10 pins male connector for direct connection to **MP PIK+**

Here follows a block diagram description of **GMM PIC-PR**, please refer to figure 1.

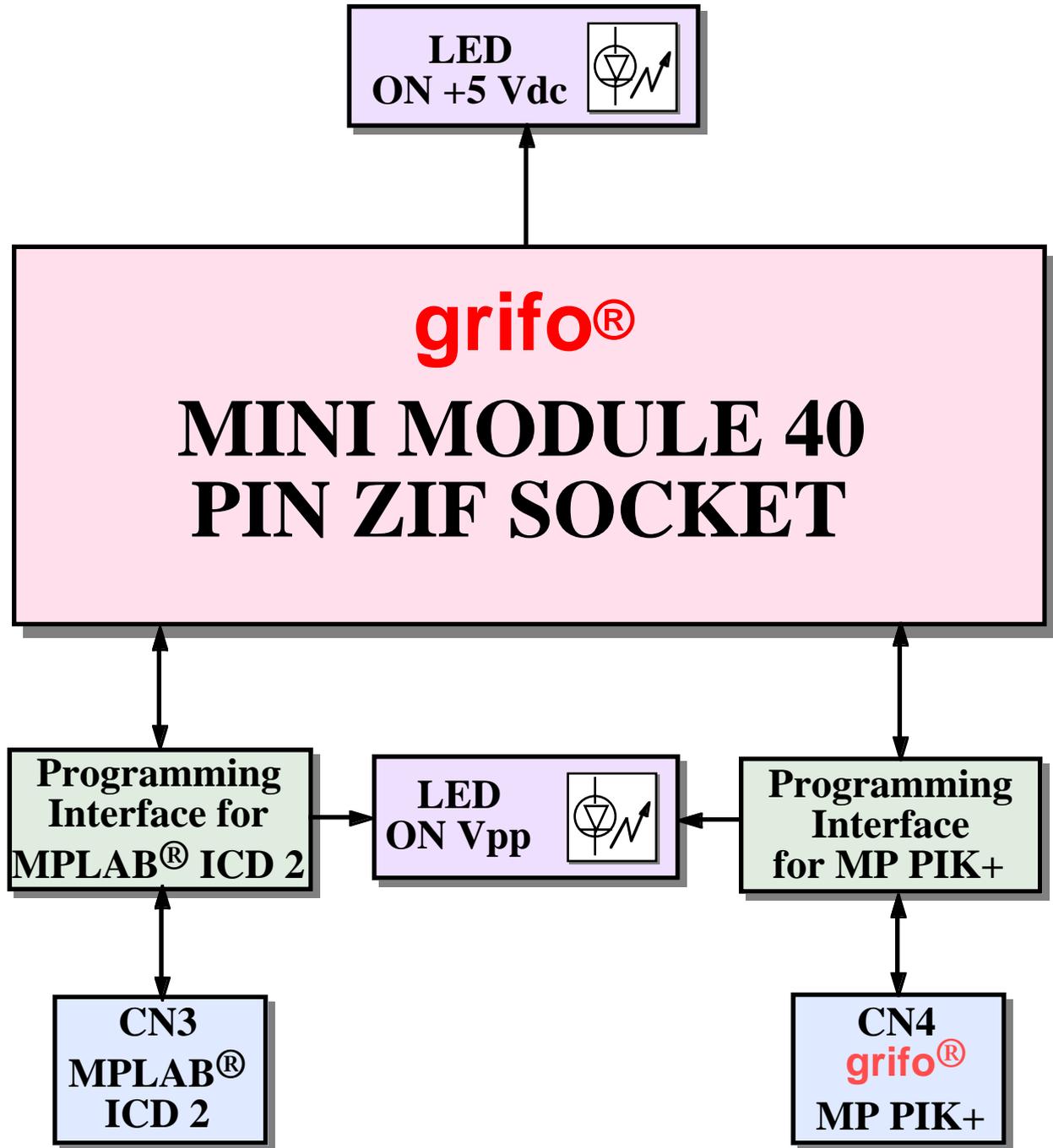


FIGURE 1: BLOCK DIAGRAM OF GMM PIC-PR

## INTERFACING MPLAB® ICD 2

Microchip, brand creator of PIC type microcontrollers, produces and sells a great number of tools to program and debug its own products.

One of these tools is **MPLAB® ICD 2**: it is an interface between a PC provided with RS 232 or USB serial port and the application board where the PIC microcontroller is installed.

**MPLAB® ICD 2** is delivered with the integrated development environment **MPLAB® IDE**, which allows a strict integration amongst officially supported development languages and Microchip tools, up to making possible to use **MPLAB® ICD 2** as a programmer or a source level debugger.

The application board where the microcontroller is installed must feature an In Circuit Programming (ICSP) interface to let **MPLAB® ICD 2** read and write the microcontroller internal memories and also change its configuration bits without having to unsolder it.

In case of **grifo®** Mini Modules, ICSP interface is not on board; yet it is possible to use **grifo® GMM PIC-PR** as an ICSP interface for Mini Modules.

It is enough to insert Mini Module in **grifo® GMM PIC-PR** ZIF socket and connect CN3 of this latter to **MPLAB® ICD 2** using the plug cable provided.

For further information please refer to chapter "USING THE PROGRAMMER" of this manual, for further information about ICSP programming please refer to Microchip application notes on their web site.

## INTERFACING MP PIK+

**MP PIK+** is an unexpensive and versatile programmer designed to program all the Microchip PIC type microcontrollers.

In detail, the programmer features a low profile connector with all the signals required for In Circuit Programming (ICSP) that is to read and write the microcontroller internal memories and also change its configuration bits without having to unsolder it.

The application board where the microcontroller is installed must feature an (ICSP) interface to let **MP PIK+** work.

In case of **grifo®** Mini Modules, ICSP interface is not on board; yet it is possible to use **grifo® GMM PIC-PR** as an ICSP interface for Mini Modules.

It is enough to insert Mini Module in **grifo® GMM PIC-PR** ZIF socket and connect CN4 of this latter to **MP PIK+** using the flat cable provided.

For further information please refer to chapter "USING THE PROGRAMMER" of this manual, for further information about ICSP programming please refer to Microchip application notes on their web site.

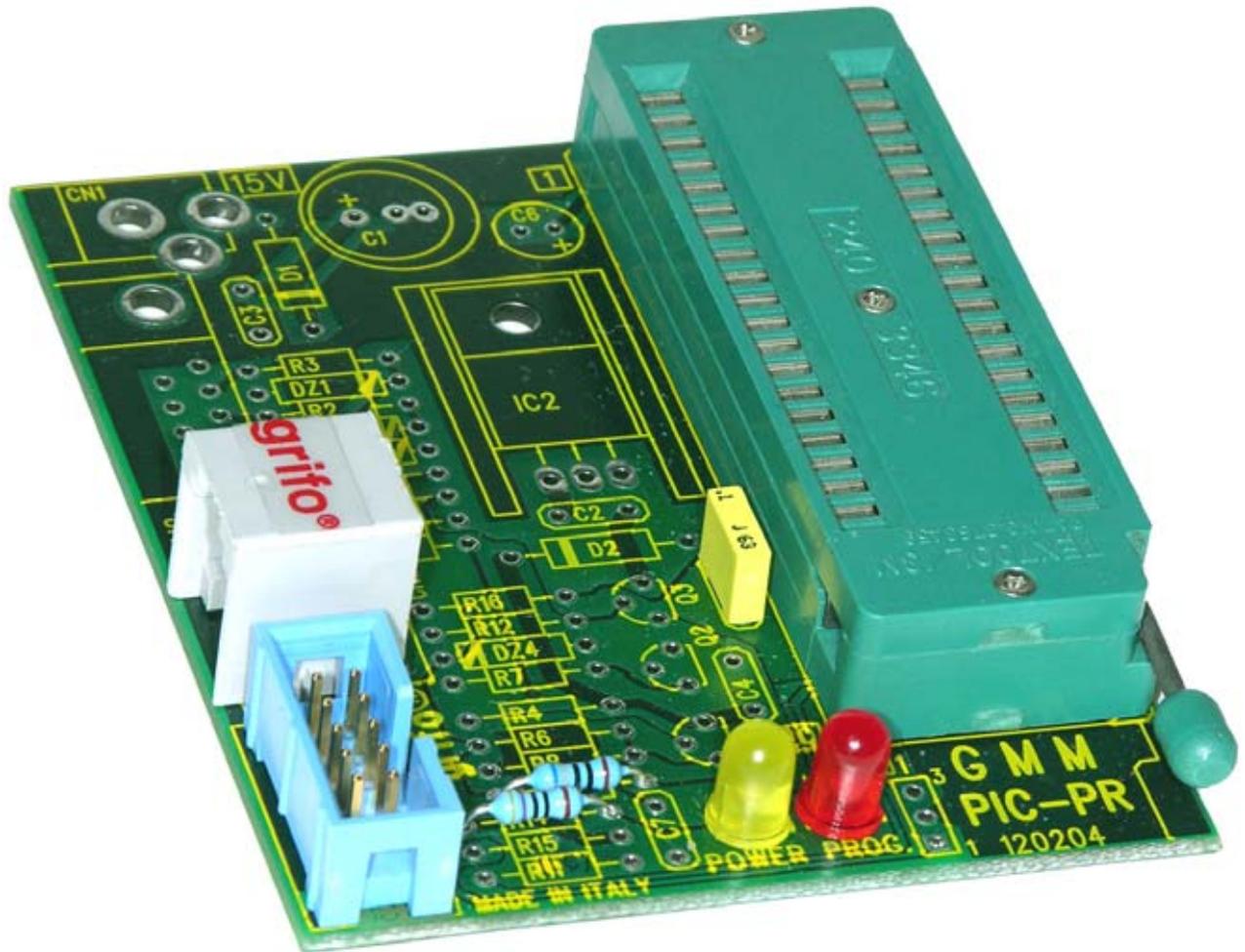


FIGURE 2: IMAGE OF PROGRAMMER GMM PIC-PR

## INSTALLATION

In this chapter there are the information for a right installation and correct use of **GMM PIC-PR**. In detail there are the locations and functions of each connector, LEDs, and so on.

### VISUAL SIGNALATIONS

**GMM PIC-PR** features the LEDs described in the following table:

LED	COLOUR	MEANING
LD1	Red	Visualizes the presence of the +13 Vdc programming tension.
LD2	Yellow	Visualizes the presence of the +5 Vdc power supply tension.

**FIGURE 3: LED TABLE**

The main function of LEDs is to inform the user about status of current operation in progress. To easily locate the LEDs please refer to figure 7.

### CONNECTIONS

The **GMM PIC-PR** module has 2 connector that can be linkeded to other devices of the programming system.

In this paragraph there are connectors pin out, a short signals description (including the signals direction) and connectors location (see figure 7) that simplify and speed the installation phase.

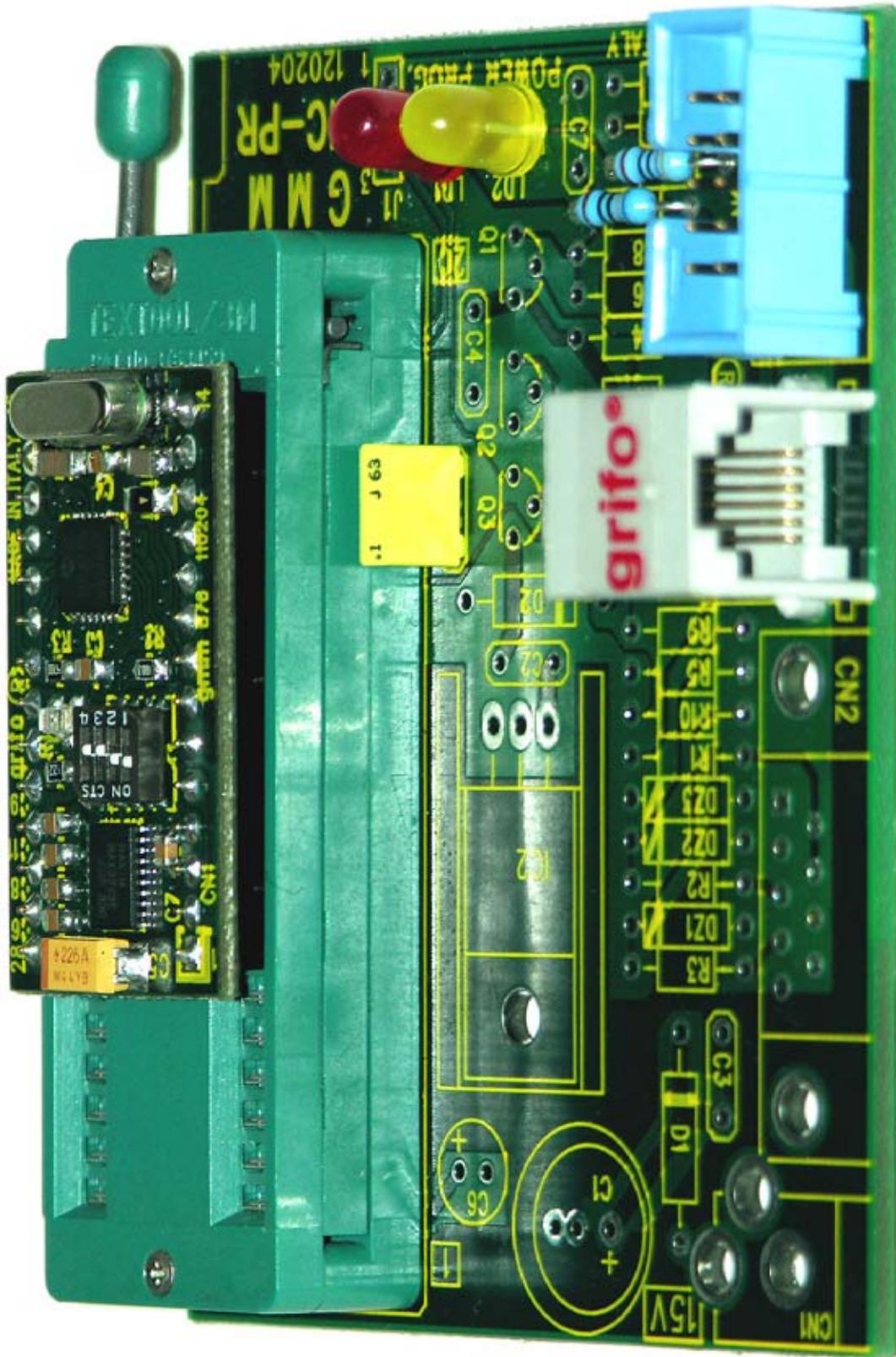


FIGURE 4: IMAGE OF PROGRAMMER GMM PIC-PR WITH MINI MODULE GMM 876 INSTALLED

## CN3 - CONNECTOR FOR MPLAB® ICD 2

CN3 is a 6 pins plug connector, female, 90 degrees.

The connector features all the signals required to program the Mini Module in ICSP mode using MPLAB® ICD 2 and MPLAB® IDE.

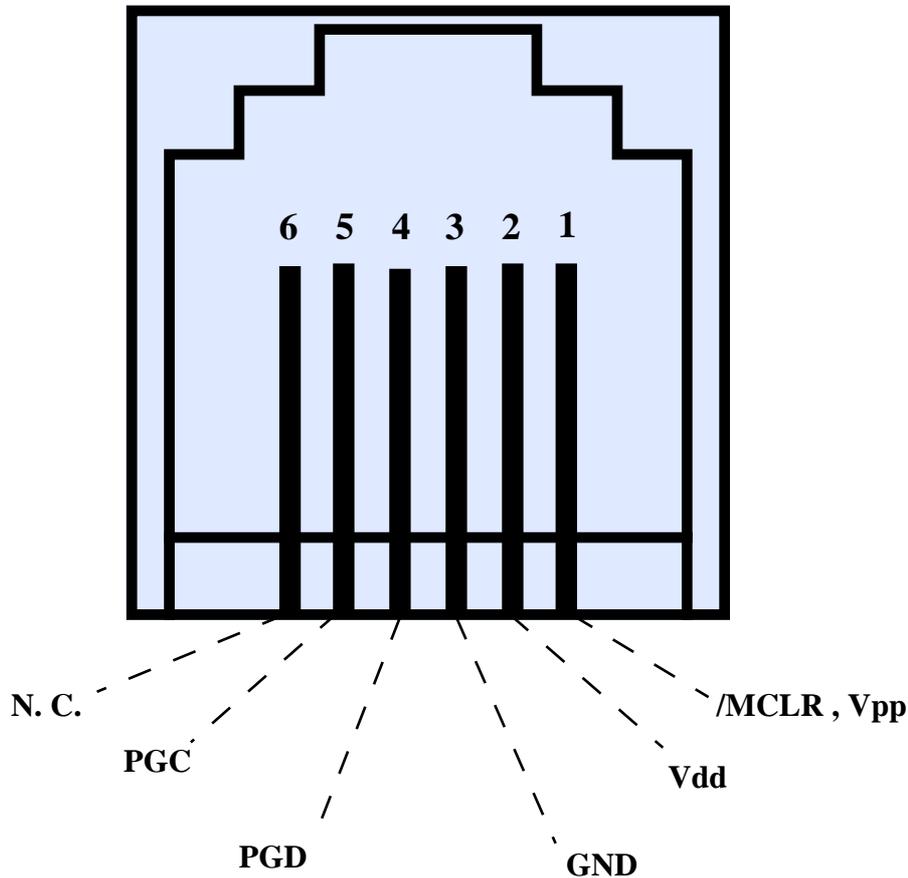


FIGURE 5: CN3 - CONNECTOR FOR MPLAB® ICD 2

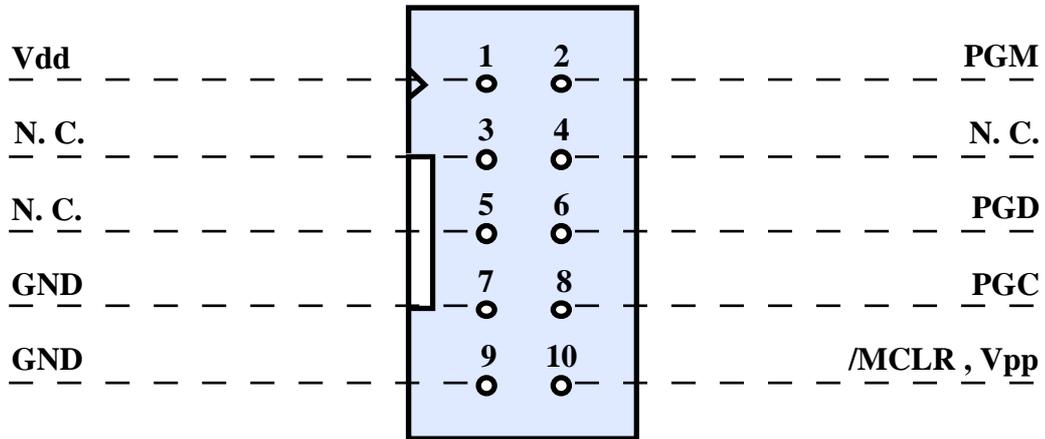
Signals description:

<b>Vdd</b>	= I - Power supply +5 Vdc
<b>GND</b>	= - Ground
<b>/MCLR, Vpp</b>	= I - Reset (active low) and input of programming voltage (Vpp)
<b>PGC</b>	= I - Clock input of synchronous programming interface (ICSP)
<b>PGD</b>	= I/O - Data input/Output of synchronous programming interface (ICSP)
<b>PGM</b>	= I - Enable/Disable low voltage programming
<b>N. C.</b>	= - No connection

**CN4 - CONNECTOR FOR MP PIK+**

CN4 is a 10 pins low profile vertical connector, male, pitch 2.54 mm.

The connector features all the signals required to program the Mini Module in ICSP mode using MP PIK+.



**FIGURE 6: CN4 - CONNECTOR FOR MP PIK+**

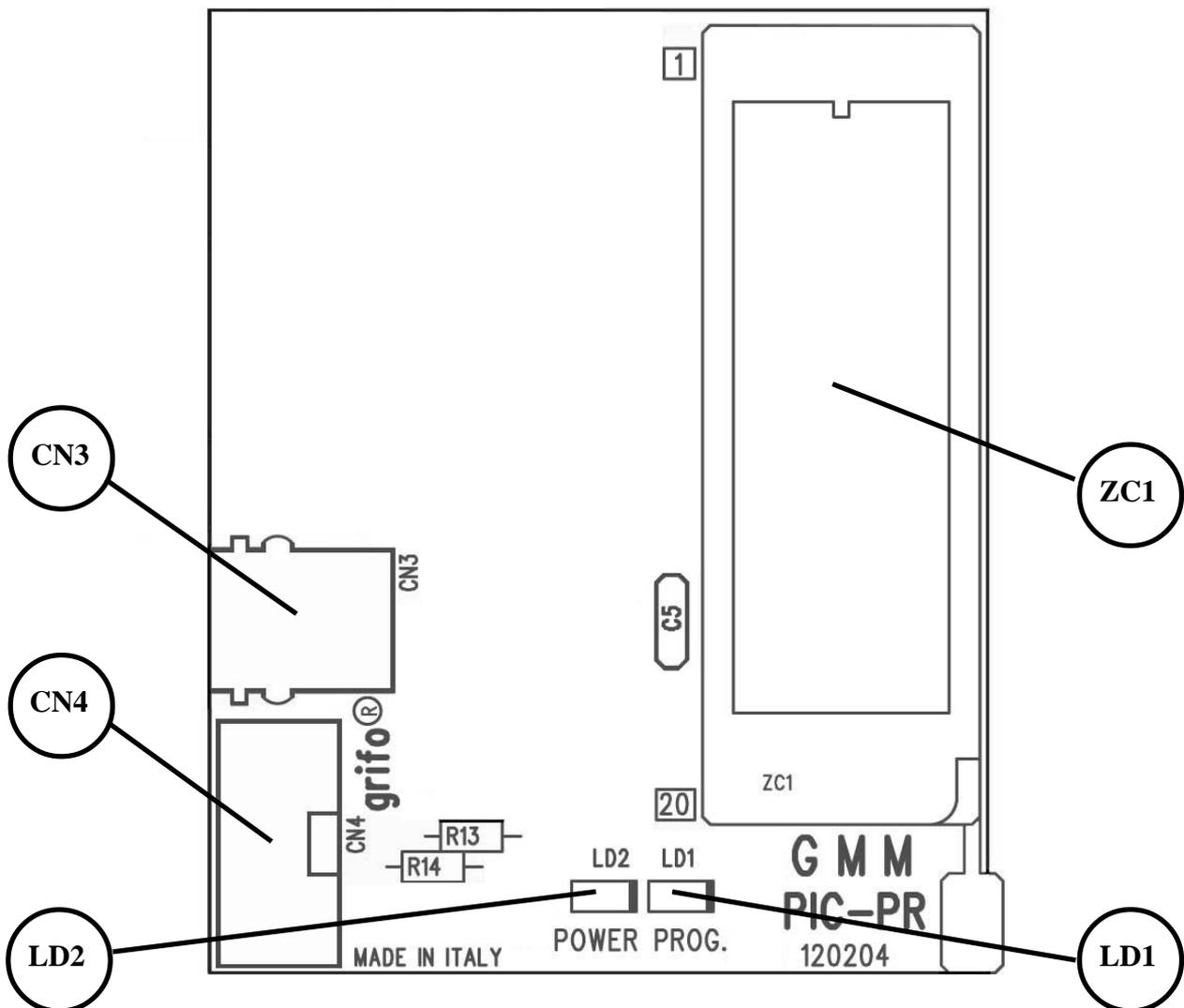
Signals description:

- Vdd** = I - Power supply +5 Vdc
- GND** = - Ground
- /MCLR , Vpp** = I - Reset (active low) and input of programming voltage (Vpp)
- PGC** = I - Clock input of synchronous programming interface (ICSP)
- PGD** = I/O - Data input/Output of synchronous programming interface (ICSP)
- PGM** = I - Enable/Disable low voltage programming
- N. C.** = - No connection

**CONNECTOR SIGNALS INTERFACEMENT**

To prevent possible connecting problems between **GMM PIC-PR** and the external systems, the user has to read carefully the previous paragraph information and he must follow these instructions:

- All TTL signals must follow the rules of this electric standard. The connected digital signals must be always referred to card ground (GND) and then the 0V level corresponds to logic status 0, while the 5V level corresponds to logic status 1.



**FIGURE 7: LEDs, CONNETTORS, ETC. LOCATION**

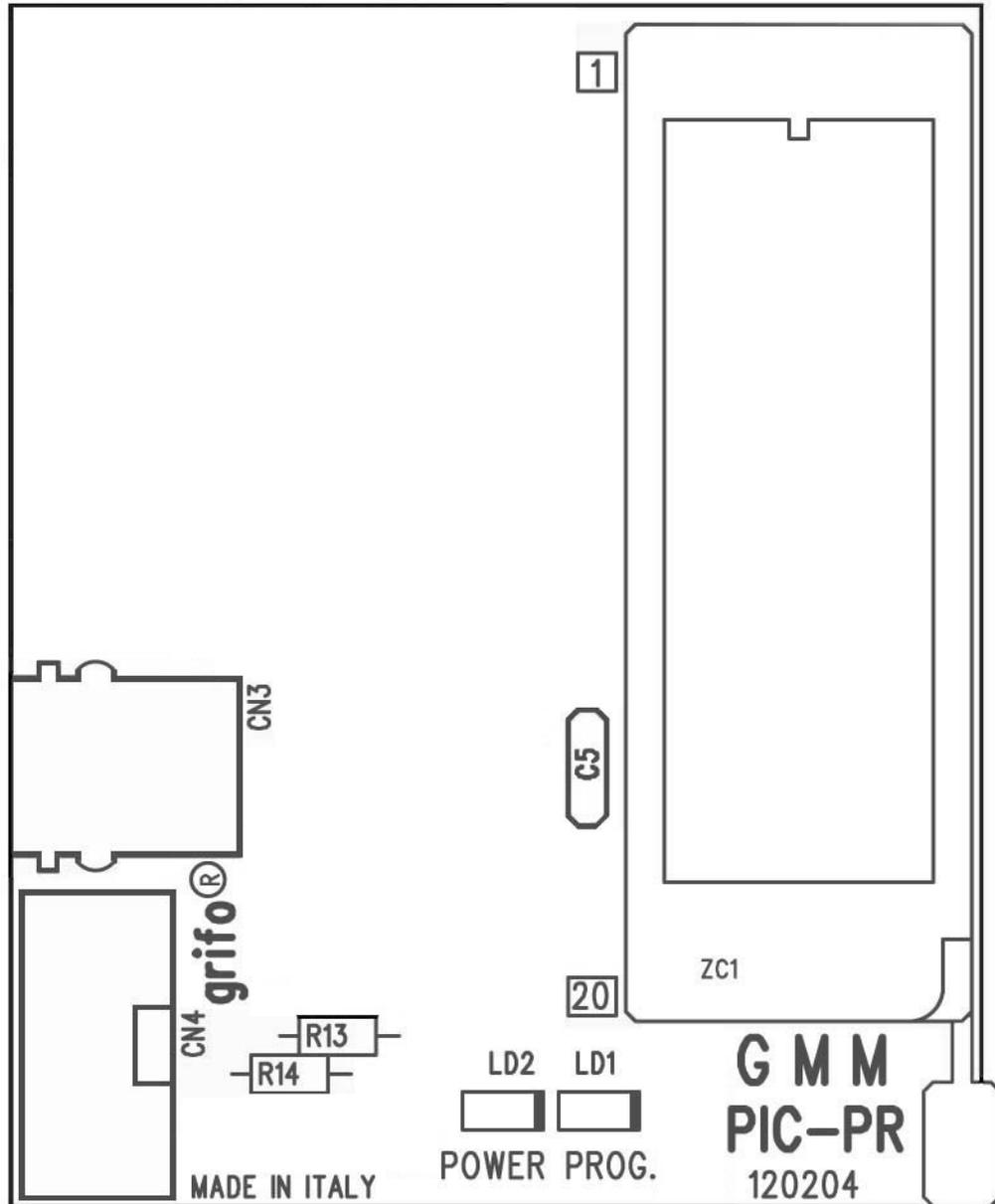


FIGURE 8: COMPONENTS MAP - COMPONENTS SIDE

## USING THE PROGRAMMER

One of the most important features of Mini Modules with PIC type microcontroller is the possibility to program their internal memories and status bits through **grifo® GMM PIC-PR** matched to a wide range of hardware and software tools.

The best systems are:

### Hardware

Microchip MPLAB® ICD 2 and **grifo® GMM PIC-PR**  
**grifo® MP PIK+** and **grifo® GMM PIC-PR**

### Software

MPLAB® IDE Rel. 6.00 or greater  
**grifo® PG4UW 2.00** or greater

A PC with a free RS 232 serial port or parallel is required.

Presence of USB port is optional, required only to connect MPLAB® ICD 2 using this interface.

**grifo® GMM PIC-PR** board has been designed exclusively to program Mini Modules featuring both 28 and 40 pin, with PIC family microcontroller on board.

To be able to develop application programs also an opportune software development tools is required. For this, it is possible to use specific programming language like Assembler, BASIC, C, PASCAL, etc.

For further information please refer to specific Mini Modules manuals.

Here follows a list of the typical steps to take during the development of a generic application.

## HARDWARE AND SOFTWARE INSTALLATION

About hardware installation, both for **MPLAB® ICD 2** and **MP PIK+**, please refer to user manuals of respective devices.

The control program of **MPLAB® ICD 2** is Microchip **MPLAB® IDE**: please be sure to download from Microchip web site the latest version.

About the installation of **MPLAB® IDE**, please refer to the instructions on the Microchip web site itself and to the screen of the installation program.

The control program of **MP PIK+** is PG4UW, that can be found in the Mini CD delivered with the programmer.

Also the user manual is in the Mini CD.

Please refer to user manual for both hardware and software installation.

## USING MPLAB® ICD 2

After the software has been correctly installed and MPLAB® ICD 2 has been connected correctly to the PC through RS 232 or USB port:

- A) Connect MPLAB® ICD 2 to connector CN3 of **grifo® GMM PIC-PR** through the delivered plug cable.

### NOTES:

Do not supply **grifo® GMM PIC-PR**: it is supplied by MPLAB® ICD 2

MPLAB® ICD 2 **must be always supplied by an external power supply**, even when USB port is used

## DEVICE SELECTION

- B) Insert the Mini Module to program in the ZIF socket ZC1 of **grifo® GMM PIC-PR** and lower the lever, then select the CPU using the menu Configuration | Select device (please refer to Mini Module manual to know exactly which CPU is installed on Mini Module).
- C) Select menu Programmer | Select programmer | MPLAB® ICD 2, open the window of menu Programmer | Settings | Power and uncheck the box "Power target from MPLAB® ICD 2 (5V Vdd)", select menu Programmer | Connect. After giving OK the yellow LED (POWER) of **grifo® GMM PIC-PR** turns ON.

## MEMORIES SELECTION

- D) To read or write data contained in the Mini Module, first the desired type of data must be selected: this can be done through the window of menu Programmer | Settings | Program, setting the option "Allow ICD 2 to select memories and ranges" the panel to select the memory type and addressing range is enabled. For further information please refer to MPLAB® ICD 2 documentation and to CPU data sheet.

## READ MEMORIES

- E) After the memory type has been selected (point D), give the command to read using the menu Programmer | Read. The red LED (PROG) of **grifo® GMM PIC-PR** turns ON and then OFF. To open the windows that show memories content, use the several voices of menu View.

## LOAD FROM FILE

- F) If the data that must be written into memories are stored in a separate file on disk, open the window of menu File | Import and use it to load the file.

## DEVICE CONFIGURATION

- G) To access the device configuration bits window use the menu Configuration | Configuration bits.

## ERASE MEMORIES

- H) To erase the memories selected at point D, use the menu Programmer | Erase Part. The red LED (PROG) of **grifo® GMM PIC-PR** turns ON and then OFF.

**PROGRAMMING MEMORIES**

I) After having selected memories type to program (see point D) and eventually read or loaded data to write (respectively points E or F), configured the device configuration (point G) and erased the data already present (point H) it is possible to program the memories with the menu Programmer | Program. The red LED (PROG) of grifo® GMM PIC-PR turns ON and then OFF.

J) If programming has completed successfully, give the command Programmer | Select programmer | None.

**SAVING TO FILE**

K) If the content of the device selected at point B has been read from it (point E) or from a file (point F) and the configuration has been eventually changed (point G), data can be saved to a file on disk giving the command File | Export.

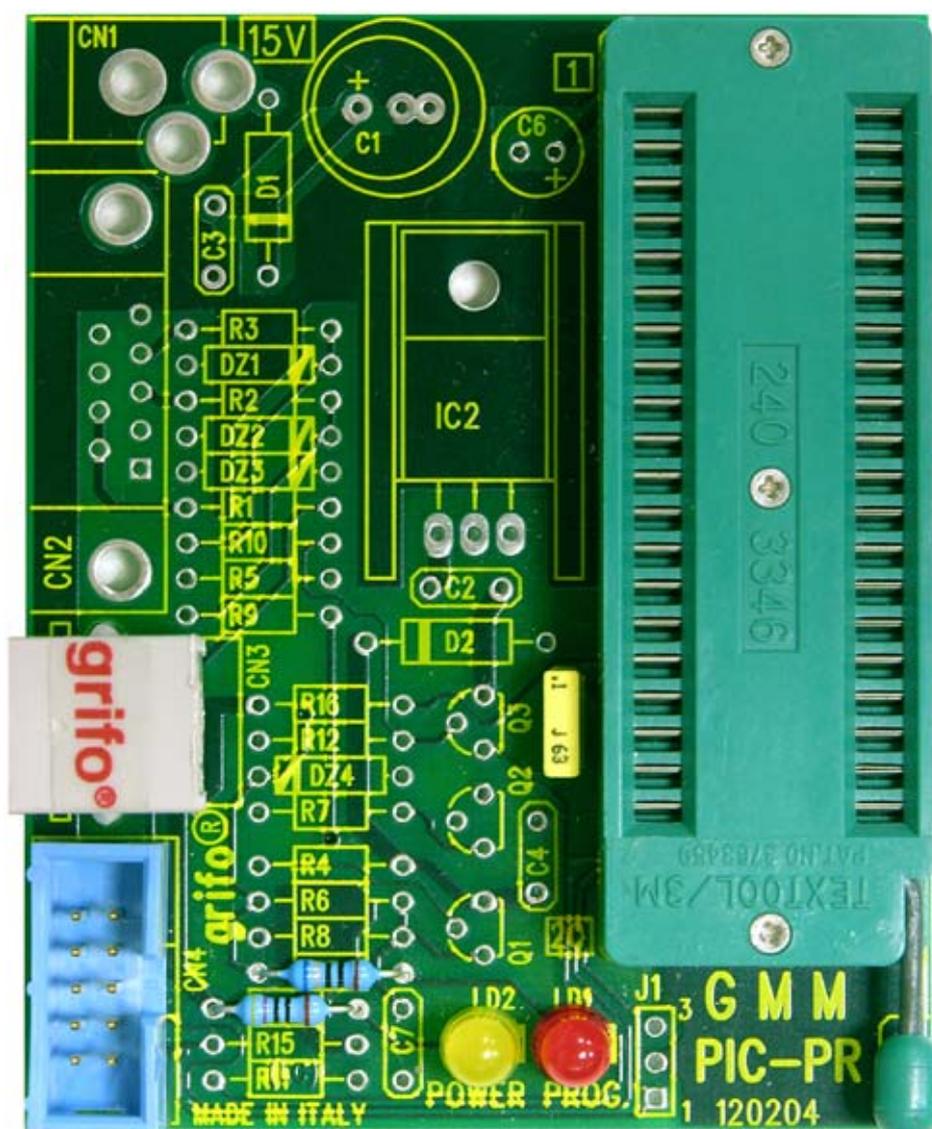


FIGURE 9: IMAGE FROM TOP OF PROGRAMMER GMM PIC-PR



FIGURE 10: USING THE PROGRAMMER THROUGH MPLAB® ICD 2

## USING MP PIK+

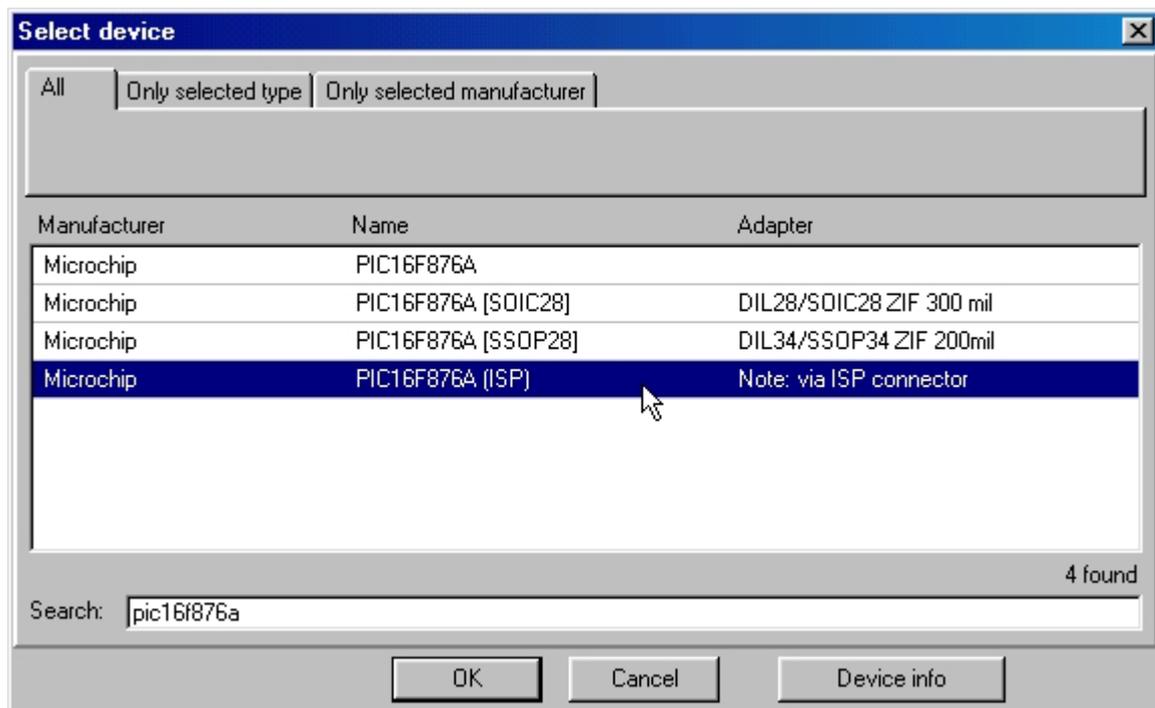
After the software has been correctly installed and MP PIK+ has been connected correctly to the PC through parallel port:

- A) Connect MP PIK+ to connector CN4 of **grifo**® GMM PIC-PR through the delivered flat cable.

Do not supply **grifo**® GMM PIC-PR: it is supplied by MP PIK+

### DEVICE SELECTION

- B) Insert the Mini Module to program in the ZIF socket ZC1 of **grifo**® GMM PIC-PR and lower the lever, then select the CPU using the menu Device | Select device (please refer to Mini Module manual to know exactly which CPU is installed on Mini Module, figure 11 shows as an example the CPU of **GMM 876**). **NOTE: Always select the CPU that indicates as adapter "via ISP connector"**.



**FIGURE 11: SELECT DEVICE USING PG4UW**

- C) Open the window of programming options configuration pressing the key ALT and, at the same time, pressing letter "o" and uncheck the box called "Low Voltage Programming" as shown in figure 12.

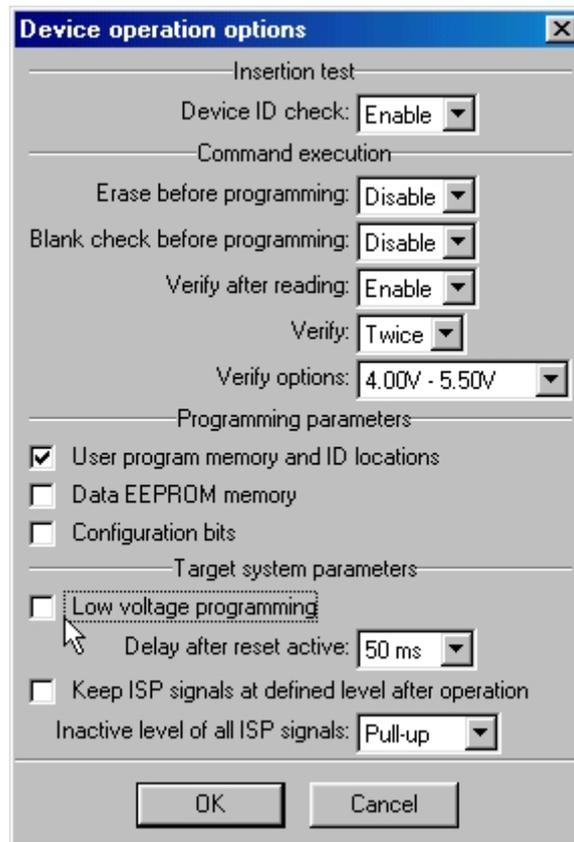


FIGURE 12: DEVICE OPERATION OPTIONS WINDOW OF PG4UW

## MEMORIES SELECTION

D) To read or write data contained in the Mini Module, first the desired type of data must be selected: this can be done through programming options configuration window (please see point C), where you can find the panel to select memory types and addressing range. For further information please refer to data sheet of CPU.

## READ MEMORIES

E) After the memory type has been selected (point D), give the command to read using the Read button on the button bar. The red LED (PROG) and yellow LED (POWER) of grifo® GMM PIC-PR turn ON and then OFF. To open the windows that show memories content, use the button Edit.

## LOAD FROM FILE

F) If the data that must be written into memories are stored in a separate file on disk, open the window of menu File | Load file and use it to load the file as shown in figure 13.

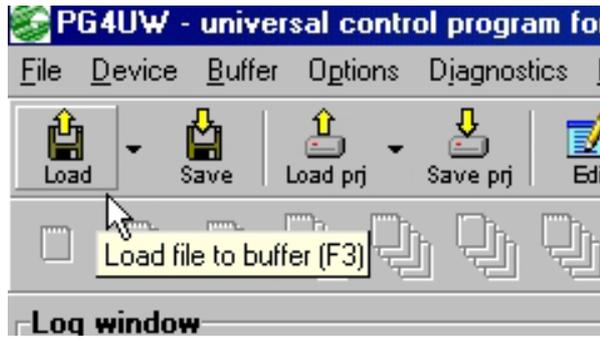


FIGURE 13: LOAD OF FILE TO PROGRAM WITH PG4UW

### DEVICE CONFIGURATION

G) To access the device configuration bits window (see figure 14) press the key ALT and, at the same time, pressing letter "s"

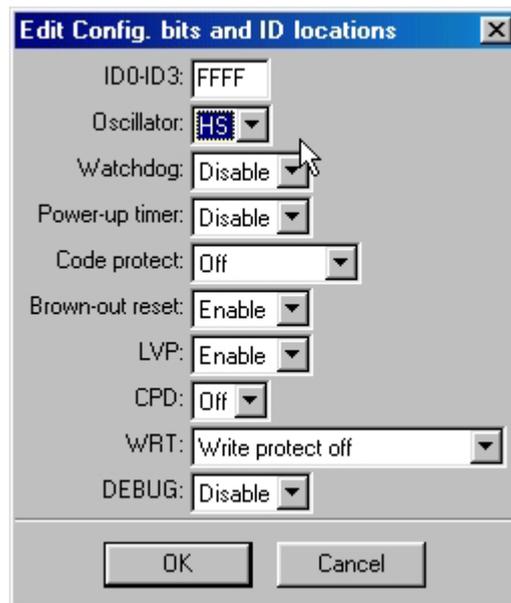


FIGURE 14: CONFIGURATION BITS MANAGEMENT WITH PG4UW

### ERASE MEMORIES

H) To erase the memories selected at point D, press button Erase in the button bar. The red LED (PROG) and yellow LED (POWER) of grifo<sup>®</sup> GMM PIC-PR turn ON and then OFF.



FIGURE 15: USING THE PROGRAMMER THROUGH MP PIK+

## PROGRAMMING MEMORIES

I) After having selected memories type to program (see point D) and eventually read or loaded data to write (respectively points E or F), configured the device configuration (point G) and erased the data already present (point H) it is possible to program the memories pressing the button Program on the button bar. The red LED (PROG) and the yellow LED (POWER) of **grifo® GMM PIC-PR** turn ON and then OFF.



FIGURE 16: MEMORIES PROGRAMMING WITH PG4UW

## SAVING TO FILE

J) If the content of the device selected at point B has been read from it (point E) or from a file (point F) and the configuration has been eventually changed (point G), data can be saved to a file on disk giving the command File | Save File.

## POWER SUPPLY

Programmer **grifo® GMM PIC-PR** does not need any external power supply, as described in the several paragraph of chapter "USING THE PROGRAMMER".

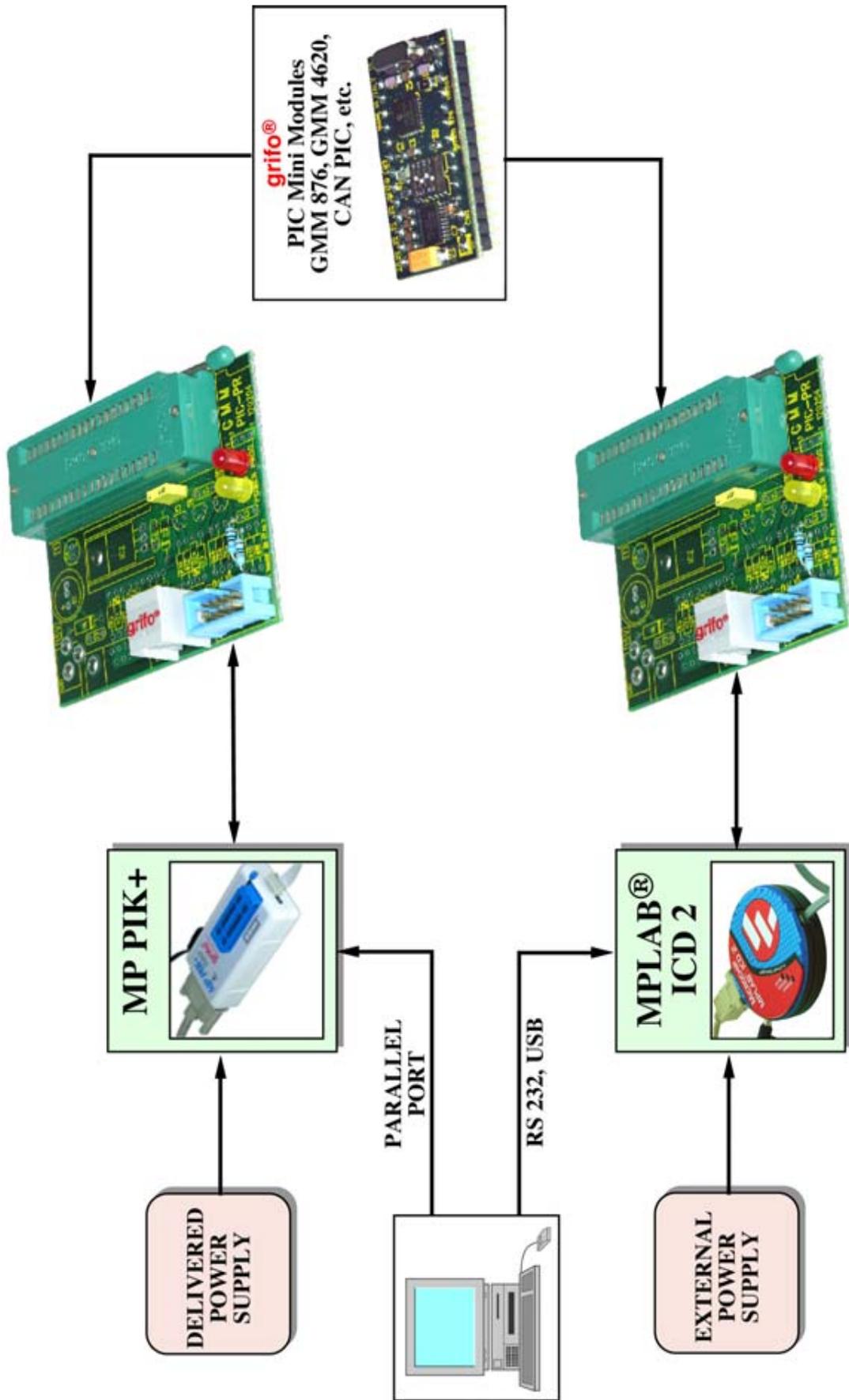


FIGURE 17: CONNECTIONS EXAMPLE

## EXTERNAL DEVICES

Programmer **grifo**<sup>®</sup> **GMM PIC-PR** is designed to program **grifo**<sup>®</sup> Mini Modules based on Microchip PIC microcontrollers.

Here follows a list of such devices and a short descriptions of their features, for further information please refer to Mini Module's specific manuals available on our web site [www.grifo.com](http://www.grifo.com).

### GMM 876

**grifo**<sup>®</sup> Mini Module PIC 16F876A

**grifo**<sup>®</sup> Mini Modulz 28 pin baszd on **CPU Microchip PIC 16F876A** with **14.3K FLASH; 368 byte SRAM; 256 byte EEPROM; 2 Timer Counter; 2 PWM; 5 A/D; 1 Analog Comparator; I<sup>2</sup>C BUS; Master/Slave SPI; 22 lines I/O TTL; RS 232 or TTL; 1 status LED**; etc.

### CAN PIC

Controller Area Network - **grifo**<sup>®</sup> Mini Module PIC

CAN Mini Module 28 pin based on **CPU Microchip PIC 18F4680** with **64K FLASH; 4K RAM; 1K EEPROM; 3 Timer Counter** and **2 sections** of high performance Timer Counter (**PWM, compare**); **RTC** featuring 240 Bytes RAM, backed with **Lithium battery**; **I<sup>2</sup>C BUS; 22 lines I/O TTL; 10 A/D 10 bit; RS 232 or TTL; CAN; 2 status LEDs**; configuration **Dip switch**; etc.

### GMM 4620

**grifo**<sup>®</sup> Mini Module PIC 18F4620

**grifo**<sup>®</sup> Mini Module 40 pin based on **CPU Microchip PIC 18F4620** with **64K FLASH; 4K SRAM; 1K EEPROM; 3 Timer Counter; 2 PWM; RTC + 240 Bytes RAM**, backed with **Lithium battery**; **13 A/D; 1 Comparator; I<sup>2</sup>C BUS; Master/Slave SPI; 33 lines I/O TTL; RS 232 or TTL; 2 status LEDs**; etc.

## APPENDIX A: ALPHABETICAL INDEX

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