GAB H844

grifo® Analog BLOCK Housing, 8 analog inputs, 4 opto inputs, 4 Relays ouput

TECHNICAL MANUAL

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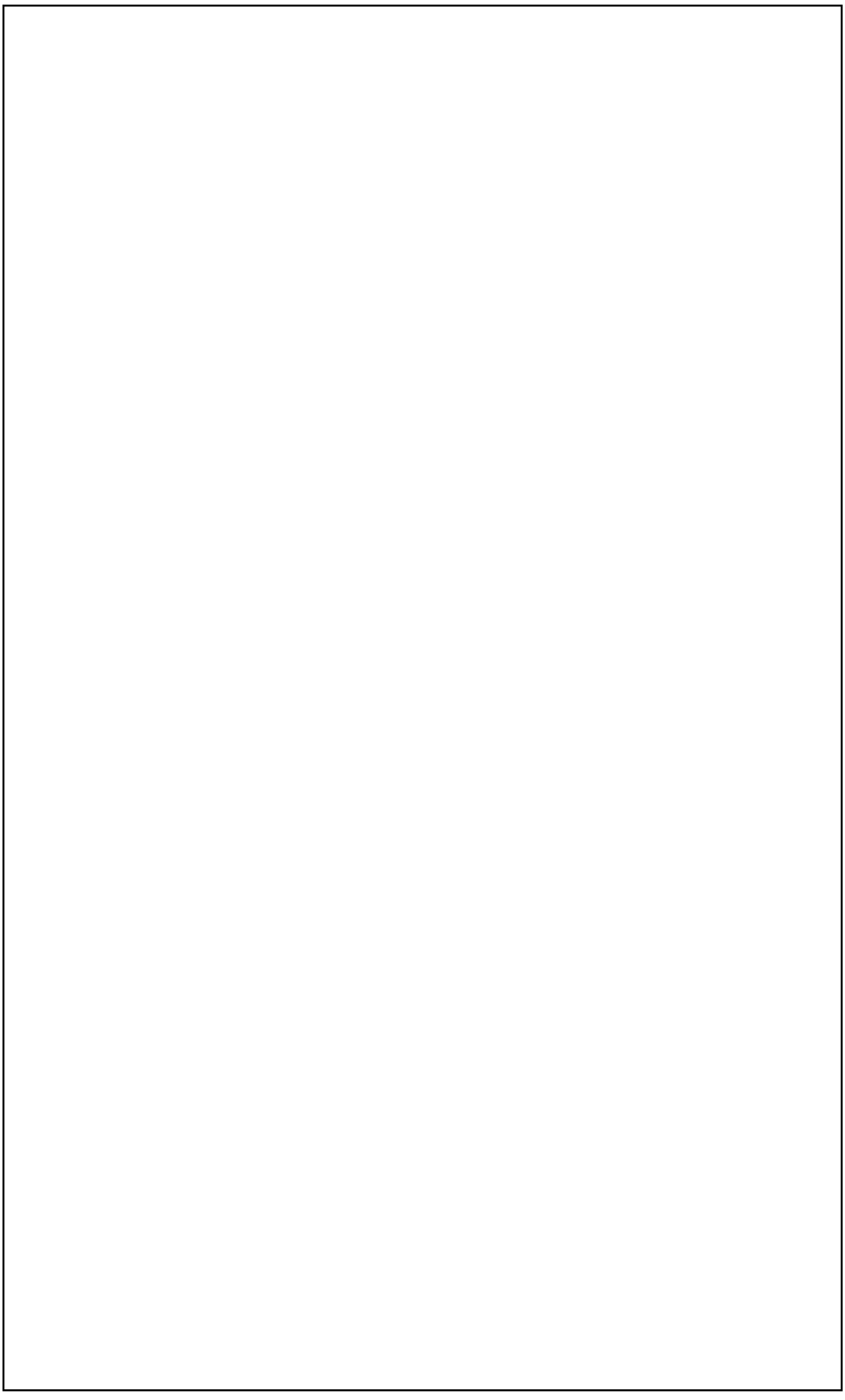
GAB H844 Rel. 5.00 *Edition 21 November 2008*



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TECHNICAL MANUAL

GAB H844 is a module for **DIN** rail with a **grifo®** where a **28** or **40** pins **Mini Module CPU** type **GMM** or **CAN** can be installed.
The card is complete with analogical inputs and digital inputs "Galvanically" Isolated, relay output, visualizations through the **LED**, different lines of serial communication and other more features like multifunction signals, filters etc.
The **GAB H844** is supplied with a plastic standard case provided with some hooks for the classical Omega guides that you can find in every electrical panel.
The typical applications of the **GAB H844** are those in which some analogical signals, which are generated by the external sensors, need to be acquired, like those for the temperature, humidity, pressure, levels, weights etc which can also be checked through the remaining digital signals you can, for example, command warmers, engineers, pumps, electrical valve with and acquiring at the end, alarms, etc.
For those who does not have time and/or the resources to develop this product, the **grifo®** sells many Mini Modules from its own correspondence, plus the rich range of tools for developing software, like for example the cheap and powerful **BASIC** compilers (BASCOM 8051, BASCOM AVR, PICBASIC, etc..), the **C Compilers** (C/51, SYS51CW, ICC AVR, HiTechC, etc..), **Pascal** compilers (SYS51PW, MikroPASCAL, etc..), and many other packages.
The card id supplied with a series of easy connectors it can be easily connected to the signals field, without foreseeing any module and therefore any supplementary cost. Those connectors also simplify the possible updating phases and assistance that you might need in the future.

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IMPORTANT

Although all the information contained herein have been carefully verified, grifo® assumes no responsability 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

abaco, **GPC®**, grifo® : are trade marks of grifo®.
Other Product and Company names listed, are trade marks of their respective companies.

GENERAL INDEX

FIGURES INDEX

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 enviroment, 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 rispect 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 **GAB H844** card release **120508**.
The validity of the bring informations is subordinate to the number of the card release.

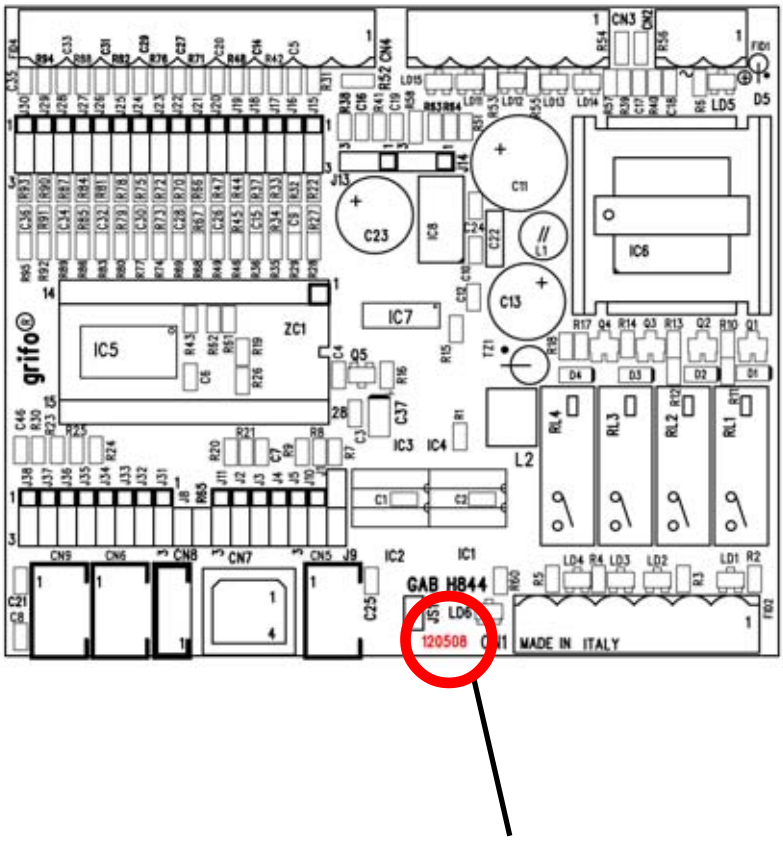


FIGURE 1: POSITION OF CARD RELEASE OF GAB H844

GENERAL INFORMATION

GAB H844 is a module for DIN rail with a **grifo®** where a 28 or 40 pins Mini Module CPU type **GMM** or **CAN** can be installed.
The card is complete with analogical inputs and digital inputs galvanically isolated, output relays, visualizations through the LEDs, different lines of serial communication and other more features like multifunction signals, filters etc.. The card belongs to the range of the low cost controllers and it can operate autonomously as a smart device and/or in a wider net of telecontrol and/or data capture.
The **GABH844** is supplied with a plastic standard case provided with some hooks for the classical Omega guides that you can find in every electrical panel. Thanks to the low cost of this interface and its CPU Mini Modules it is possible to contend with the whole series of automations which have a limited budget plan.
The typical applications of the **GABH844** are those in which some analogical signals, which are generated by the external sensors, need to be acquired, like those for the temperature, humidity, pressure, levels, weights etc which can also be checked through the remaining digital signals you can, for example, command warmers, engineers, pumps, electrical valve with and acquiring at the end, alarms, etc..
With all the information you can find in this manual, the user can make an hardware which if inserted in the 28 pin socket, can take advantage of all the features of the GAB H844.
For those who does not have time and/or the resources to develop this product, the **grifo®** sells many Mini Modules from its own correspondence, plus the rich range of tools for developing software, like for example the cheap and powerful BASIC compilers (BASCOM 8051, BASCOM AVR, PICBASIC, etc..), the C compilers (C/51, SYS51CW, ICC AVR, HiTechC, etc..), Pascal compilers (SYS51PW, MikroPASCAL, etc..), and many other packages.
As an alternative the card can be bought in the form of GMT 844 which is supplied with a previously installed firmware which can manage all the board resources through a simple serial communication according to the standard ModBUS protocol.
The card id supplied with a series of easy connectors it can be easily connected to the signals field, without foreseeing any module and therefore any supplementary cost. Those connectors also simplify the possible updating phases and assistance that you might need in the future.
The features of the card, completed with options, change when the installed Mini Module changes but as a rule they can be resumed:

Overall features of **GAB H844** are:

- Modular plastic Container **DIN 50022 Modulbox**, model **M6 HC53**
- Size: front **90** x **106** mm, height **58** mm
- Mounting on **Omega** rail DIN 46277-1 and DIN 46277-3
- **4** buffered inputs connectable to an optocoupled interface that can be both **NPN** or **PNP**
- Power supply for optocoupled inputs user selectable, shown by a different colours LEDs.
- Each physical optocoupled digital has input has to be connected to **fresh contacts**, that are contacts without any added voltage
- The **4** buffered **inputs** can be connected to external TTL signal too, through the proper connector.
- Status of **4** buffered inputs shown by **LEDs**
- Some inputs can pefrom **Interrupt** or Counter functions
- **4** Relay Outputs **5 A, 35Vdc**
- Status of **4** outputs shown by **4 LEDs**

- 8 analog inputs in current or voltage with possibility to select the input range (**0÷20 mA; 4÷20 mA; 0÷2,5 V; 0÷10V**)
- Up to 6 multifunction line in **TTL** level
- Some inputs can work as **counter** and **interrupt**
- 1 **TTL output** driven by optional **RTC** of Mini Module and visualized by its own LED
- 1 asynchronous serial Line in RS 232, RS 422, RS 485, current loop or TTL
- 1 **CAN** inteface, if present on Mini Module and drived by proper connector
- 1 **USB** interface, if present on Mini Module and drived by proper connector
- All signals connection through **comfortable connectors** with **standard** pin out
- All signals can be connected through connectors featuring **Normalized** pin out
- Up to **6 I/O TTL** signals
- **I²C BUS** available on connector for external devices
- **Switching** power supply on board; protection of on board logic, through **TransZorb™**
- Power supply voltage **filter** of board logic, through **TransZorb™**
- **28 pin** socket 600 mils, for connection of Mini Modules **grifo®** like: **CAN XXX** or **GMM XXX**.

Here follows a description of the board's sections and the operations they perform. To easily locate such section on verify their connections please refer to figure 2.

ANALOG INPUT

Eight analog inputs is available connected through a field connector to a specific circuitery that allows to acquire signals in variable ranges with the resolution typical of Mini Module installed. The interface circuitery can be configured to acquire the following analog signals:

in current 0÷20 mA;
in current 4÷20 mA;
in voltage 0÷A/D max value;
in voltage 0÷(A/D max value*4);

the last two inputs, in case of **grifo®** Mini Module, normally provided of a reference voltage(=max value) of 2,5 V, that meet the range 0÷2,5 V or 0÷10 V. In the same analog interface circuitery are present some filters that can minimize the noise, in order to get a better acquired signal.
For the A/D conversion of connected analog signals, we have to referring to the technical manual of Mini Module selected, where the resolution, the precision, the speed and the conversion mode are available.
For further information on analog inputs, please see the CN4 - ANALOG INPUTS and ANALOG INPUTS SELECTION paragraphs.

OPTOCOUPLED DIGITAL INPUTS

GAB HR84 features 8 NPN and/or PNP inputs connected to a quick release screw terminal connector that are directly acquired by 8 I/O lines of Mini Module through a galvanically isolated interface. These lines are visualized by specific LEDs and have been selected to be able to take advantege completely of Mini Module's CPU internal peripherals, so the inputs can generate interrupts, be counted by hardware counters, etc.
Optocoupled inputs are supplied by a specific voltage called +Vopto that must be provided from an external source.

DIGITAL RELAYS OUTPUTS

The board is provided with 4 relays outputs 5 A, normally open, whose status is visualized by 4 LEDs. Each line is driven directly by a I/O line of Mini Module, buffered through a specific driver and connected to a comfortable quick release screw terminal connector to easy interface to the field signals.

ASYNCHRONOUS SERIAL COMMUNICATION

GAB H844 features one interface for an asynchronous serial line whose physical protocol (baud rate, stop bit, bit per character, etc.) is completely settable by software programming the Mini Module installed on the card, so for further information please refer to its technical manual.
By hardware it is possible to select the electric protocol, through a comfortable set of jumpers and drivers to install. In detail line can be not buffered (**TTL**) or buffered in **current loop, RS 232, RS 422 or RS 485**; in these last two cases also abilitation and direction of line can be defined.
Please remark that by default the board is provided with both serial lines in RS 232, so any different configuration must be specified in the order.
For further information about serial communication please refer to paragraph: “CONNECTIONS” and “SERIAL COMMUNICATION SELECTION”.
Here follows a description of the board's sections and the operations they perform. To easily locate such section on verify their connections please refer to figure 2.

MULTIFUNCTION LINES

GAB H844 allows to connect up to 6 lines of 28 pins socket to a specific connector for the field. The purposes of these signals is completely user defined and, when a **grifo®** Mini Module is installed, become available some interesting and automous functionalities derived by some hardware peripherals that are at the edge of the same lines.
For example it is important to remind theexternal interrupt lines, PWM line to generate an analog signal, count signal associated to Timer Counter, the interrupt line for the potential RTC, analog input lines, etc.

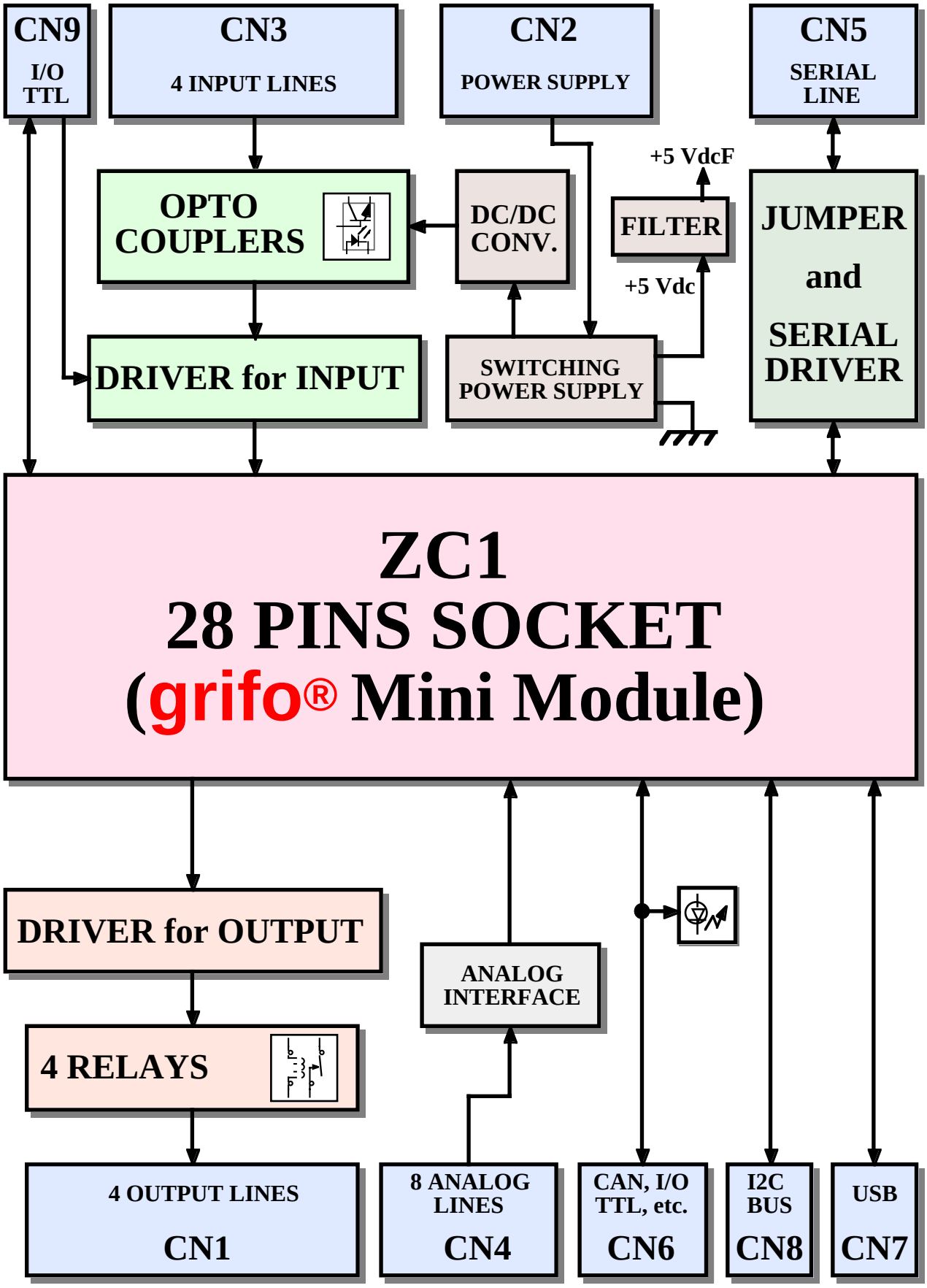


FIGURE 2: BLOCKS DIAGRAM

MINI MODULE

Mini Module refers to the component installed on the 28 pins ZC1 socket and that manages all the resources of the card. This component normally is based on a microcontroller, programmable with a specific firmware, that defines the card functionality according with user requirements. By using **grifo®** Mini Modules there are many high level development tools for the user firmware, that are ready to use, and many other modalities for programming the obtained firmware inside the microcontroller (i.e. serial Boot loader), with no requirements of additional accessories.
GAB H844 has been designed to accept all the 28 and 40 pins **grifo®** Mini Modules or any hardware that can fit in a standard 28 pins 600 mils, DIL socket.
For further information please refer to description of socket ZC1 and to chapter dedicated to PERIPHERAL DEVICES SOFTWARE DESCRIPTION.
Every combination **GAB H844** plus **grifo®** Mini Module is a separated item on our products list; in order to simplify their use each couple of cards is described by its own manual. When a combination **GAB H844** + **grifo®** Mini Module has been ordered, it will be delivered already installed, configured and ready for use.
Mini Module is also software programmable, to allow the user to satisfy needs that can also change in time.

CAN INTERFACE

GAB H844 featurea an interface for an eventual CAN line available on Mini Module installed.
Such interface is simply a connector for field connection and CAN line termination circuitery, while all other hardware and software characterisrtics (line driver, bit rate, etc.) are the ones of Mini Module installed, so for further information please refer to its technical documentation.

I^2C BUS LINES

GAB H844 is provided with one connector dedicated to I^2C BUS, which can be a hardware peripheral of the microcontroller or sofware emulated, connected to two signals of Mini Module, each provided with a 4.7 kΩ pull-up installed on **GAB H844**.
This kind of interface allows to connect devices featuring the same communication standard, to easily improve the system performances.
A wide set of software examples explains the management of most common I^2C BUS peripherals like A/D and D/A converters, display drivers, memories, temperature sensors, etc.
For this purpose it can be intresting to condifer **K51-AVR**, for which both technical manual and electric diagram are available, also a wide set of examples in several languager are avalable.
For further information, please see the CN8 - CONNECTOR FOR I2C BUS LINE and I2C BUS INTERFACE paragraphs.

POWER SUPPLY SECTION

GAB H844 is provided with an efficent switching power supply section, that provides supply +5 Vdc voltage needed by logic and output circuits, in any condition of input load and voltage.
If this section is not present, supply voltages must be provided from an external source.
The board features components and circuits designed to reduce consumptions (including the possibility of power-down and idle working modes of Mini Modules) and to reduce noise sensibility.
Remarkable is protection circuit based on TransZorb™ that avoids damages due to incorrect voltages.
To supply optocouplers of galvanically isolated sections an extezrnal voltage is needed.
For further information please refer to chapter "ELECTRIC FEATURES" and paragraph "SUPPLY VOLTAGES".

USB INTERFACE

If the assembled Mini Module is supplied with a USB interface, **GAB H844** has a compatible connector which is ready to the connection with all the external systems with that interface.
This is a very important peculiarity which allows you to add **GAB H844** resources to every personal computer by using standard cables without any extra costs.
For further informations, please consult the technical manual relative to the Mini Module.

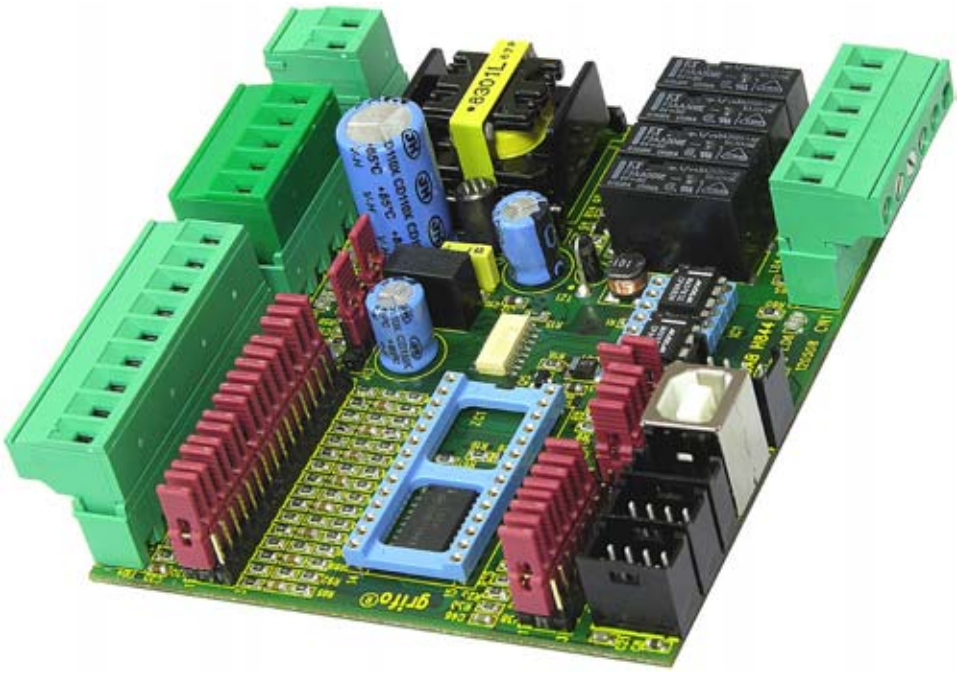


FIGURE 3: GAB H844 WITH ITS CONTAINER

TELECONTROL FIRMWARE

The Mini Module installed on **GAB H844** can be provided with a telecontrol firmware; such firmwares allow to manage all the board resources through a set of commands to send to the serial line.
Taking advantage of these firmwares make possible to use well developed commands that solve fundamental problems of automation like impulse count, wave from generation, debounced input acquisition, Real Time Clock managentent, etc.
In addition, Master Slave communication mode is supported; this allows to remote single modules also at great distance, to build a telecontrol network driven by a unique master unit (PC, PLC, **GPC®**, etc.).
By now, some standard protocols like **ALB x84** (**ABACO®** Link BUS) and **MODBUS** are available, anyway new protocols can be developed on specific request of the customer.
Please contact **grifo®** for further information.

TECHNICAL FEATURES

GENERAL FEATURES

On board resources:

4 optocoupled digital inputs NPN and PNP
4 relays digital buffered outputs 5 A
1 serial line (RS 232, TTL, RS422, RS485, Current Loop, etc.)
1 connector for **I²C BUS** lines
1 **USB** connector
8 analog inputs
6 multifunction line
4 digital I/O TTL inputs
1 CAN connector
1 switching power supply section
11 status LEDs
1 DC/DC converter section

Mini Module: 28 or 40 pins on DIL socket of 600

Opto input cut-off frequency: 13 KHz

Analog inputs gain factor: -0,036

PHYSICAL FEATURES

Size:
90 x 106 x 58 mm (container DIN 50022)
85 x 102 x 32 mm (without container)

Container: DIN 50022 modulbox, model M6 HC53

Montaggio: On Ω rails type DIN 46277-1 and DIN 46277-3

Weight: 225 g (ZC1 socket empty)

Connectors:

CN1:	6 ways quick release screw terminal 5mm
CN2:	2 ways quick release screw terminal 5mm
CN3:	5 ways quick release screw terminal 5mm
CN4:	9 ways quick release screw terminal 5mm
CN5:	4+4 ways AMP Modu II, male, vertical
CN6:	4+4 ways AMP Modu II, male, vertical
CN7:	USB, vertical, B type, female
CN8:	4 ways AMP Modu II, male, vertical
CN9:	4+4 ways AMP Modu II, male, vertical

Temperature range: from 0 to 50 centigrad degreeses

Relative humidty: 20% up to 90% (without condense)

ELECTRICAL FEATURES

Power supply:	10÷38 Vdc or 8÷24 Vac	(*)
Power required for logic:	2.8 W	(*)
Current on +5 Vdc output:	320 mA max	
Output power supply voltage:	+5Vdc	
Available current on +5Vdc for external loads:	1000mA - used current by Mini Module	
Relays max voltage:	35 Vdc	
Relays max non inductive current:	5 A	(resistive load)
Analog voltage reference Vref:	2.5 V	
Analog input range in voltage:	depends on hardware on ZC1 (for grifo® Mini Module: 0÷2,5; 0÷10V)	
Analog input range in current:	0÷20 mA; 4÷20 mA	
Analog input impedance in voltage:	4.7 kΩ	
Analog input impedance in current:	121Ω	
Analog adapter reduction factor:	1/4	
Pull-up resistor I2C BUS:	10 kΩ	
Line impedance RS 422-485:	60Ω	
Termination network RS 422-485:	Line termination resistor Positive pull up resistor Negative pull down resistor	=120 Ω =3.3 KΩ =3.3 KΩ
CAN line impedance:	60Ω	

CAN termination network: 120 Ω resistor, disconnectable

*) The data are referred to 20 C° work temperature (for further information please refer to chapter "POWER SUPPLY VOLTAGE").

INSTALLATION

In this chapter there are the information for a right installation and correct use of the card.
The user can find the location and functions of each connector, LED, jumper, etc. and some explanatory diagrams.

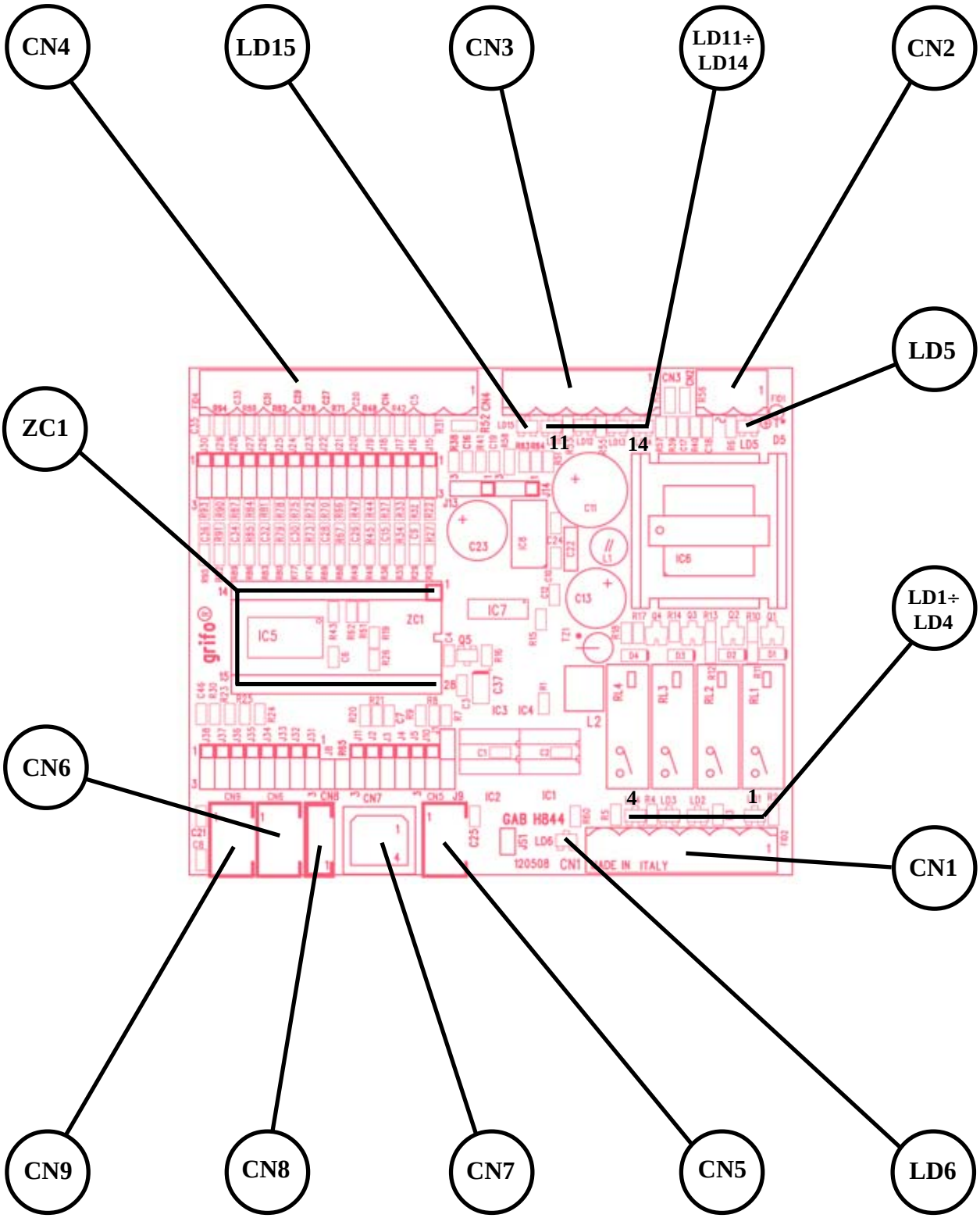


FIGURA 4: LOCATION OF JUMPERS, CONNECTORS, LED, ETC.

CONNECTIONS

GAB H844 has 10 connectors that can be linkeded to other devices or directly to the field, according to system requirements. Below are reported the pin outs, the meaning of the connected signals (including their directions); figure 4 shows the connectors position on the board and it simplify their recognitions. Finally the following figures show the on board connection for each connector, plus some examples, that simplify and speed the wiring phase.
All the connectors are accessible from the side breakings of the plastic container that allows comfortable insertion and deinsertion.

CN2 - POWER SUPPLY CONNECTOR

CN2 is a 2 ways, quick release screw terminal connector, vertical, 5.00 mm pitch.
CN2 allows to provide power needed by the switching power supply to generate logic control and optocouplers supply voltage.

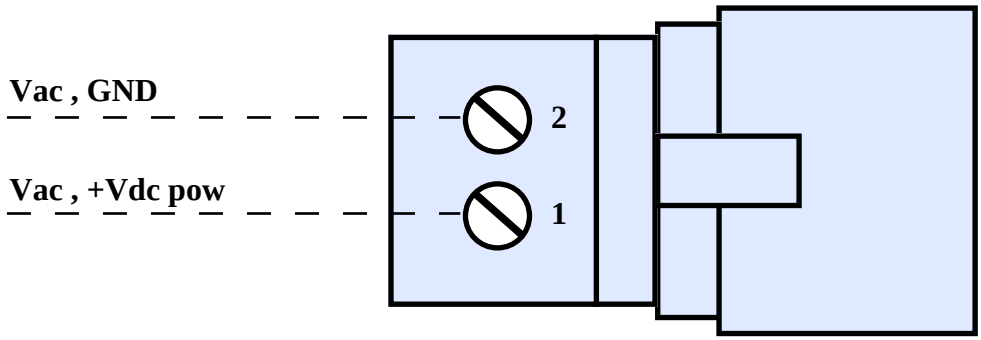


FIGURE 5: CN2 - POWER SUPPLY CONNECTOR

Signals description:

Vac = I - Power supply lines for alternate current connected to the on board switching; these signals meet a **8÷24 Vac**
+Vdc pow = **I** - Power supply line for direct current connected to the on board switching (**10÷38 Vdc**)
GND = I - Negative terminal of direct supply voltage.

For further information please refer to paragraphs "POWER SUPPLY" and "ELECTRIC FEATURES".

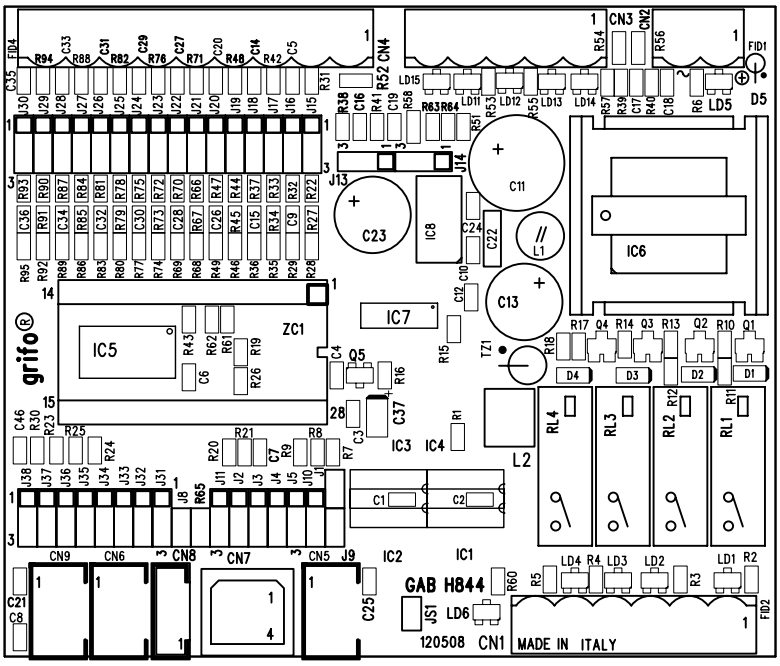


FIGURE 6: COMPONENTS MAP COMPONENT SIDE

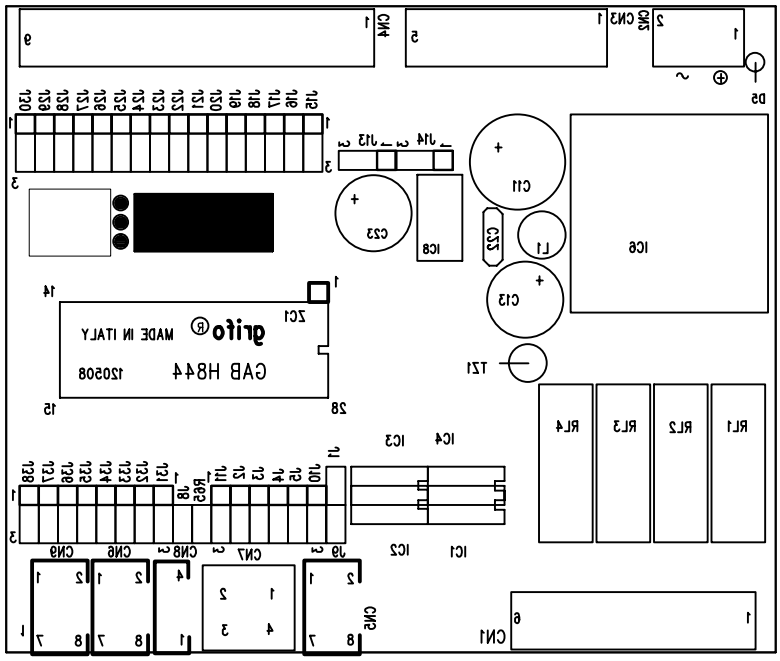


FIGURE 7: COMPONENTS MAP SOLDER SIDE

CN8 - I²C BUS LINE CONNECTOR

CN8 is a 4 ways, male, vertical, strip connector with 2.54mm pitch.
On CN8 is available a standard interface for any I²C BUS peripheral device.
The connector features +5 Vdc supply voltage generated by on board switching power supply that can be connected to external devices or systems.
Signals are TTL compliant, according to I²C BUS standard, their disposition has been designed to reduce interferences and so easy the connection.

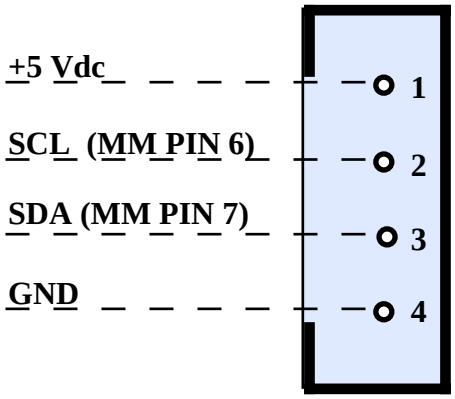


FIGURE 8: CN3 - I²C BUS LINE CONNECTOR

Signals description:

SDA = I/O - Data signal of I²C BUS
SCL = I/O - Clock signal of I²C BUS
MM PIN xx = I/O - Signal connected to pin xx of ZC1 socket
+5 Vdc = O - Unique +5 Vdc power supply.
GND = - Ground.

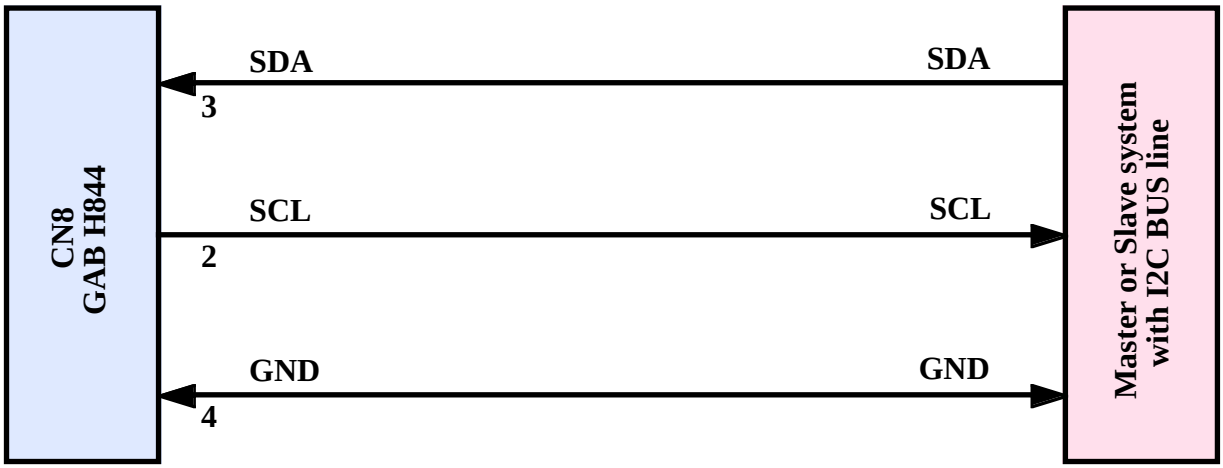


FIGURE 9: I²C BUS CONNECTION DIAGRAM

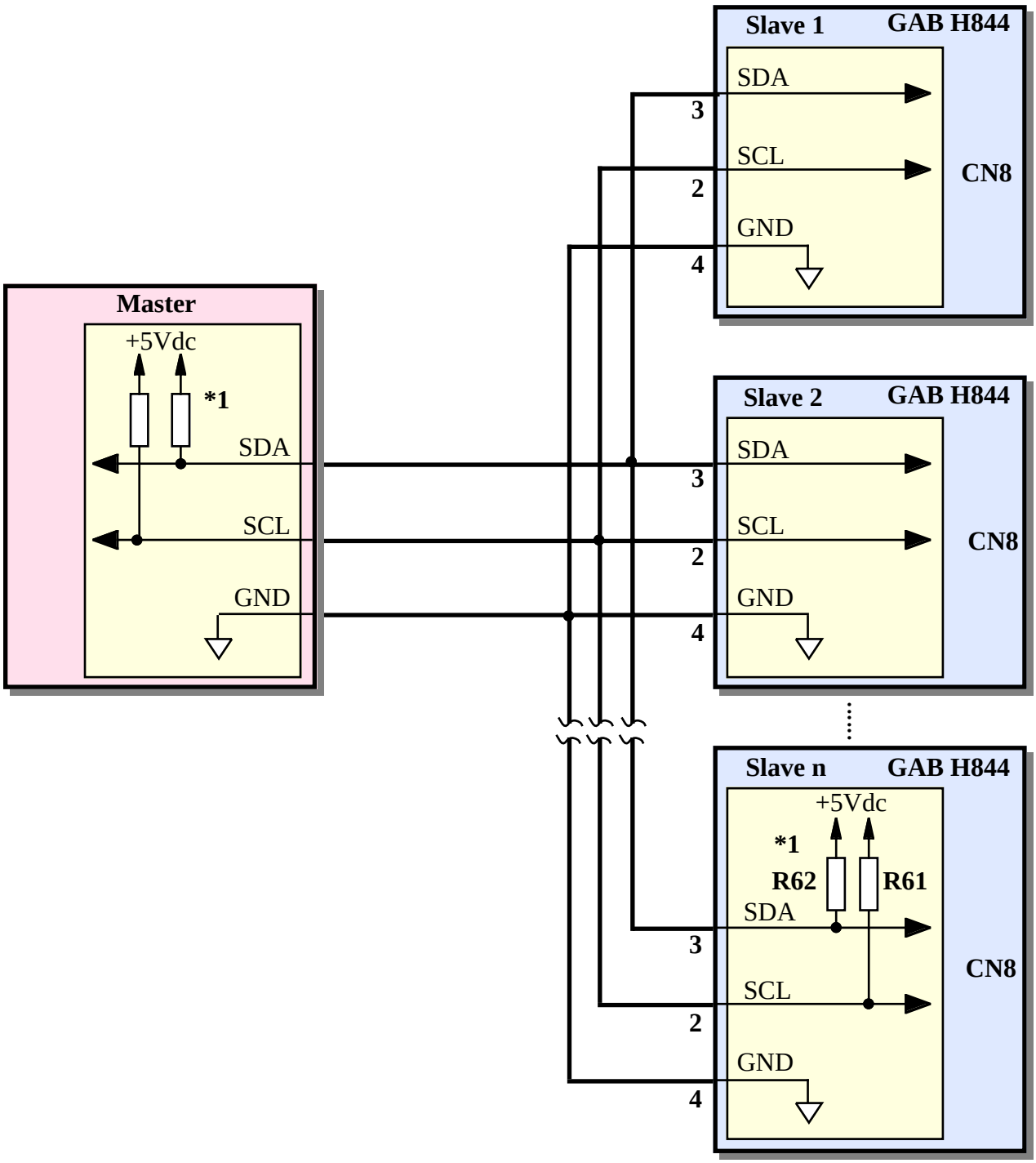


FIGURE 10: I2C BUS NETWORK CONNECTION EXAMPLE

Please remind that in a I2C BUS network must be connected two pull up resistors at the net extrems, respectevely near the master unit and the slave unit at the greatest distance from the master.
On **GAB H844** these resistors (*1) are always present in default configuration and they have the value described in ELECTRIC FEATURES paragraph. The user must select or configure the I2C BUS devices to connect, by taking care of this feature. In detail on **GAB H844** the described resistors must be removed on the units that are not at the line extremities, as shown in previous figure, on slaves 1 and 2.
For further information please refer to document "*THE I2C-BUS SPECIFICATIONS*", from PHILIPS semiconductors.

ZC1 - CONTROL DEVICE SOCKET

ZC1 is a 40 pin, 600 mils DIL socket.
Its purpose is to install the interlligent hardware module that manages all **GAB H844** on board signals (reads optocoupled inputs, set relays outputs, etc.).
Hardware strucuture of **GAB H844** is designed for use with **grifo®** Mini Modules. If you are using a combination **GAB H844 + grifo®** Mini Module please refer to its specific manual.
If you want to develop a new hardware or you have to check hardware compatibility of an existing board, please refer to the following figure, that shows which on board hardware resource is connected to each signal of 28 pins socket ZC1.
For further details about hardware, please refer to following paragraphs.
For further details about hardware, please refer to chapter "PERIPHERAL SOFTWARE DESCRIPTION".
For purpose of jumpers, please refer to chapter "JUMPERS".

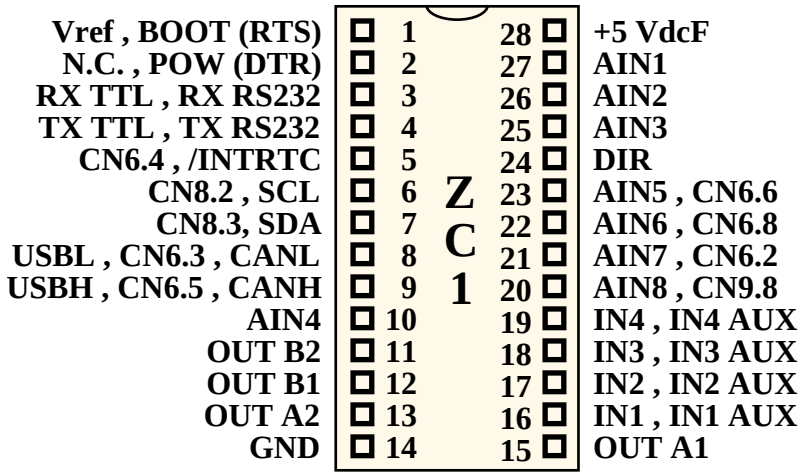


FIGURE 11: CONTROL DEVICE SOCKET

Signals description:

IN n	= I	- Line connected to optocoupled input n
IN n AUX	= I	- Line connected to TTL digital input n buffered
OUT An	= O	- Line connected to relay output n of group A.
OUT B n	= O	- Line connected to relay output n of group B.
CNx.y	= I/O	- Line connected to pin y of connector CNx.
Vref	= I	- Reference voltage for A/D converter section.
AINn	= I	- Analog input signal n.
/INTRTC	= I/O	- Real Time Clock interrupt signal of Mini Module or **.RTC** option.
CANL	= I/O	- Differential line low of CAN interface.
CANH	= I/O	- Differential line high of CAN interface.
USBL	= I/O	- Differential line low for USB interface.
USBH	= I/O	- Differential line high for USB interface.
SDA	= I/O	- Data signal for I2C BUS interface.
SCL	= I/O	- Clock signal for I2C BUS interface.

RX RS232	=	I	- Receive data for RS 232 asynchronous serial line.
TX RS232	=	O	- Transmit data for RS 232 asynchronous serial line.
RX TTL	=	I	- Receive data for TTL asynchronous serial line.
TX TTL	=	O	- Transmit data for TTL asynchronous serial line.
DIR	=	O	- Line for RS 422, RS 485 driver management of serial line 1 (primary).
POW	=	I	- CPU signal for power supply management (for **GMM 93x** ISP programming)
BOOT(RTS)	=	I	- Operative selection mode of CPU(for **GMM 93x** ISP programming)
+5 VdcF	=	O	- Filtered +5 Vdc power supply signal.
GND	=		- Ground signal.

Inside the manuals of the pairs **GAB H844 + grifo®** Mini Module are already available the configurations of both the card and Mini Module, that allow the user to take the maximum advantages from all the lines on ZC1. Moreover are described also the CPU signals names connected to the same lines, in order to simplify the software management of the resource.

NOTE: Some **grifo®** Mini Module could be mounted on ZC1 socket with some difficulties because they have variable sizes. When the Mini Module collides with the components placed near the socket it must be mounted by inserting two empty sockets with 28 pins. These sockets act as a space that raises the Mini Module, placing it at a sufficient depth where there is all the required free space.
When a Mini Module with 40 pins is installed, has to be alligned at bottom, that is the pin 20 of the Mini Module is to be inserted into pin 14 of the socket.

CN5 - ASYNCHRONOUS SERIAL LINE CONNECTOR

CN5 is a AMP MODU II, male, vertical, 4+4 pitch 2.45mm connector.
This connector features signals for serial communication in RS 232, RS 422, RS 485, current loop and TTL, performed through hardware module on ZC1 hardware serial port.
Signals position, reported as follows, has been designed to reduce interferences and easy connections to the field, while signals are compliant to CCITT standard of protocol used.
The female connector for CN2 is available among the grifo® accessories and it can be ordered by specifying the relative codes **CKS AMP8** or **AMP8.Cable**, as specified in APPENDIX A of the manual.
For further information about the serial comunication, please give a look at the fugure 22 and the paragraph SERAL COMUNICATION SELECTION.

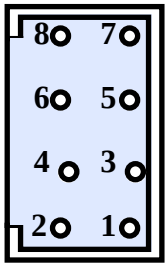


FIGURE 12: CN5 - SERIAL LINE CONNECTOR

Pin	*Signal*	*Direction*	*Description*
TTL serial line1:			
5	**RX TTL**	= I	- Receive data for TTL.
3	**TX TTL**	= O	- Transmit data for TTL.
7	**GND**	=	- Ground signal.
RS 232 serial line1:			
5	**RX RS232**	= I	- Receive data for RS 232.
3	**TX RS232**	= O	- Transmit data for RS 232.
7	**GND**	=	- Ground signal.
RS 422 serial line 1:			
6	**RX- RS422**	= I	- Negative receive data for RS 422.
5	**RX+ RS422**	= I	- Positive receive data for RS 422.
3	**TX- RS422**	= O	- Negative transmit data for RS 422.
4	**TX+ RS422**	= O	- Positive transmit data for RS 422.
7	**GND**	=	- Ground signal.
RS 485 serial line 1:			
6	**RXTX+ RS485**	= I/O	- Positive receive and trasmit data for RS 485.
5	**RXTX- RS485**	= I/O	- Negative receive and trasmit data for RS 485.
7	**GND**	=	- Ground signal.

Current Loop serial line 1:

6	**RX- C.L.**	=	I	- Negative receive data for Current Loop.
5	**RX+ C.L.**	=	I	- Positive receive data for Current Loop.
3	**TX- C.L.**	=	O	- Negative transmit data for Current Loop.
4	**TX+ C.L.**	=	O	- Positive transmit data for Current Loop.

GMM 93x ISP programming:

2	**POW(DTR)**	=	I	- CPU signal for power supply management on **GMM 93x** Mini Modules (to connect to buffered DTR signal in RS 232)
8	**BOOT(RTS)**	=	I	- Operative selection mode of CPU on **GMM 93x** Mini Modules, to connect to buffered RTS signal in RS 232 (see figure 38)

Power supply voltages:

1	**+5 Vdc**	=	O	- +5 Vdc power supply signal.
7	**GND**	=		- Ground signal.

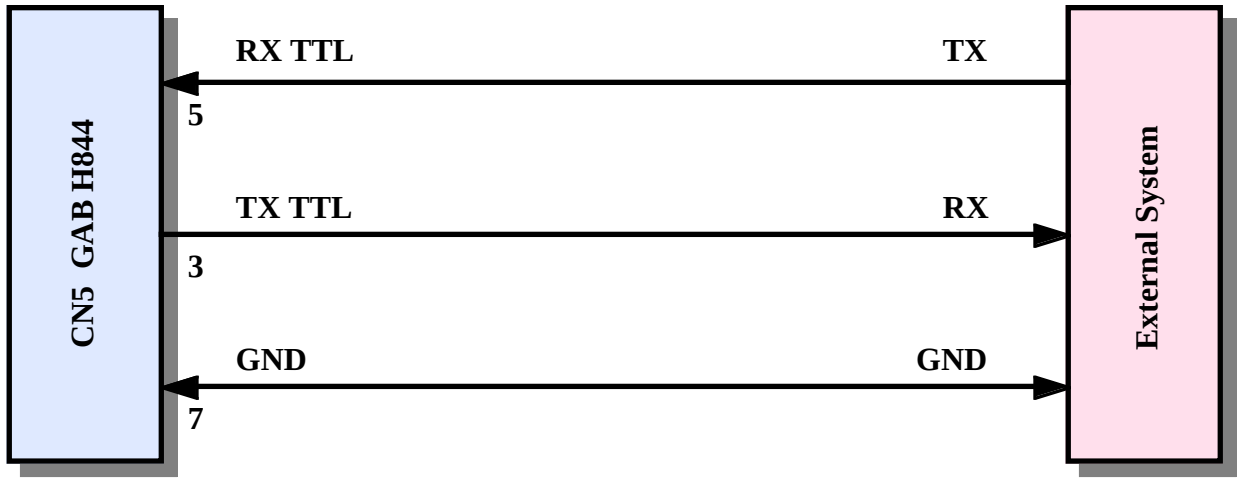


FIGURE 13: TTL POINT TO POINT CONNECTION EXAMPLE

FIGURE 14: RS 232 POINT TO POINT CONNECTION EXAMPLE

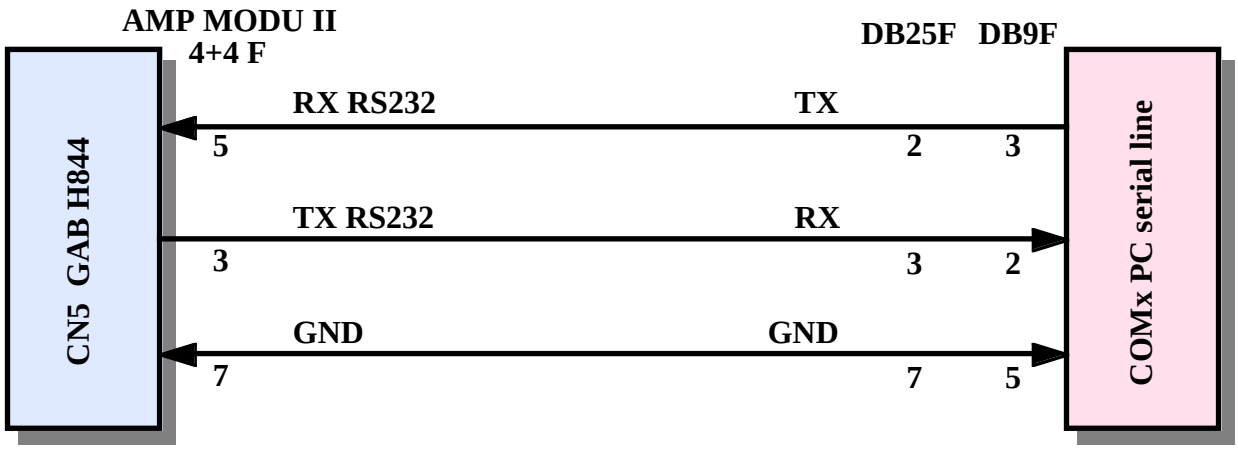


FIGURE 15: RS 232 POINT TO POINT CONNECTION EXAMPLE

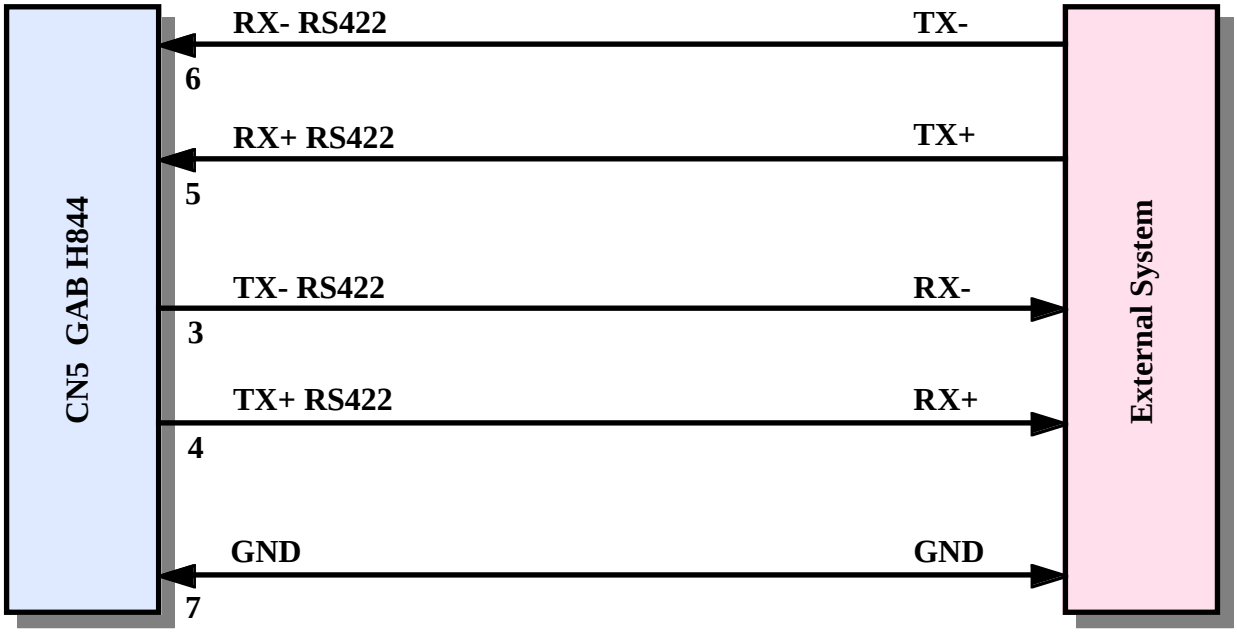


FIGURE 16: RS 422 POINT TO POINT CONNECTION EXAMPLE

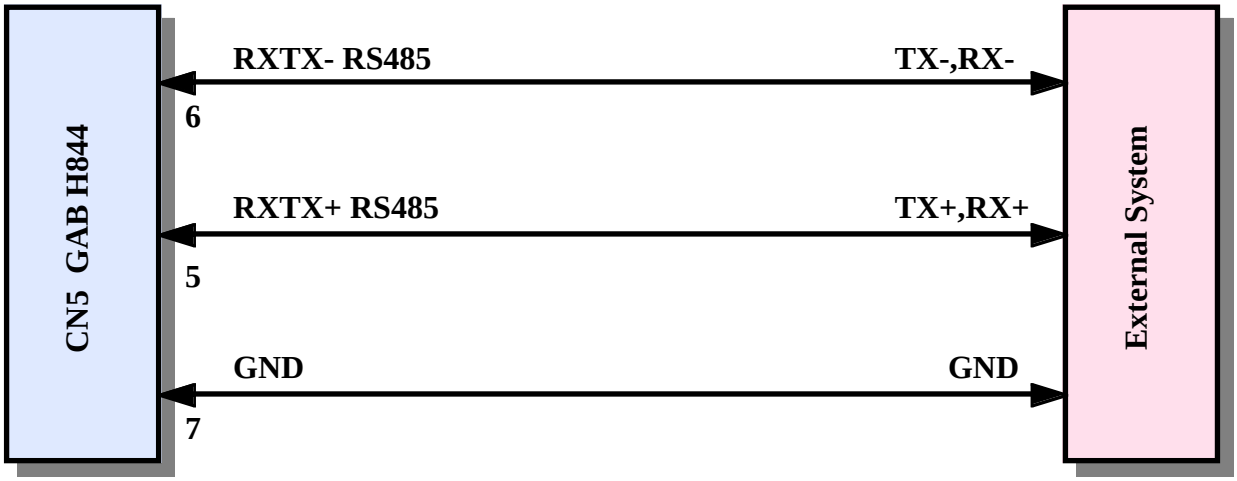


FIGURE 17: RS 485 POINT TO POINT CONNECTION EXAMPLE

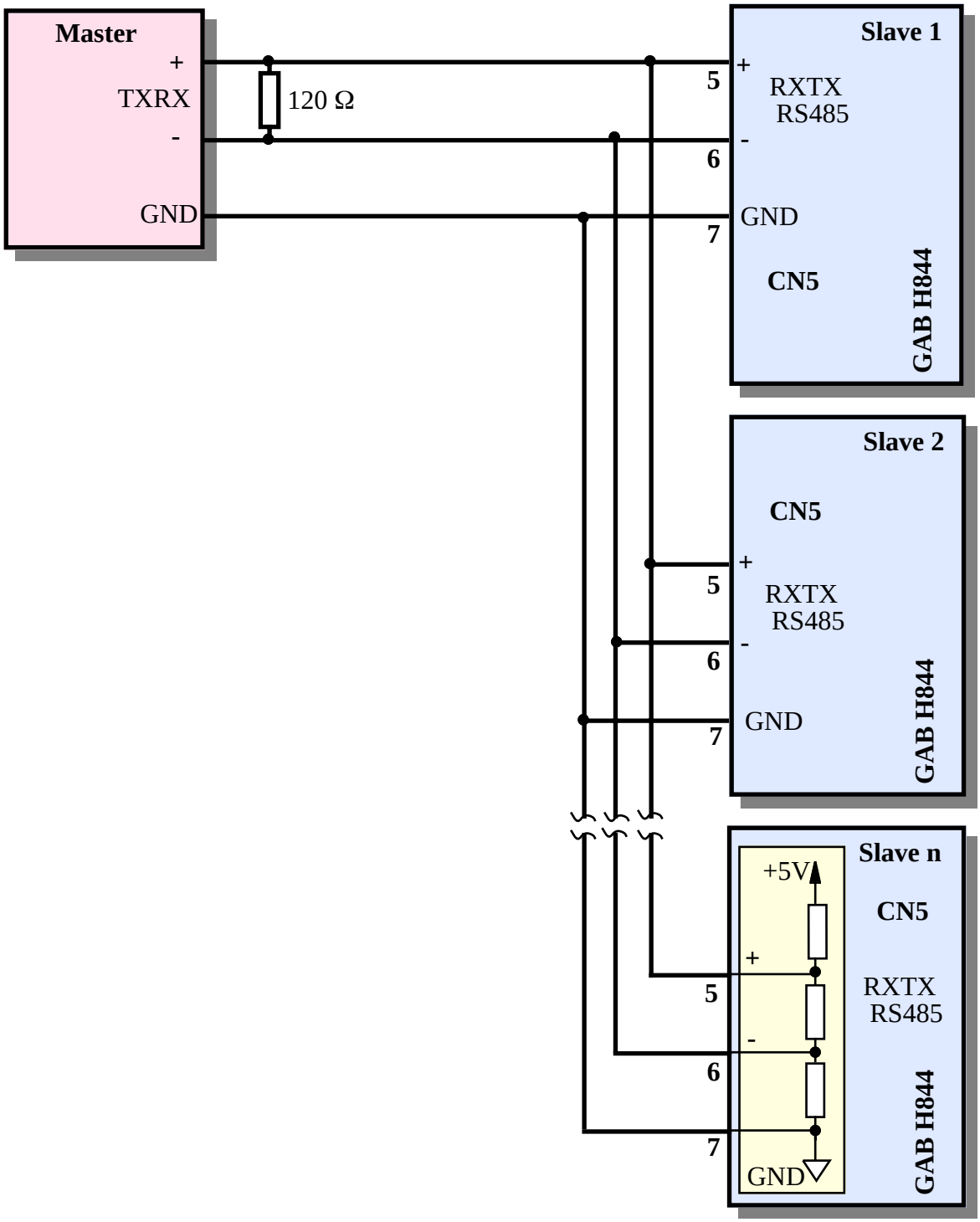


FIGURE 18: RS 485 NETWORK CONNECTION EXAMPLE

Please remark that in a RS 485 network two forcing resistors must be connected across the net and two termination resistors (120 Ω)must be placed at its extrems, respectevely near the Master unit and the Slave unit at the greatest distance from the Master.
Forcing and terminating circuitry is installed on **GAB H844** board. It can be enabled or disabled through specific jumers, as explained later.
For further information please refr to TEXAS INSTRUMENTS Data-Book , "*RS 422 and RS 485 Interface Cicuits*", the introduction about RS 422-485.

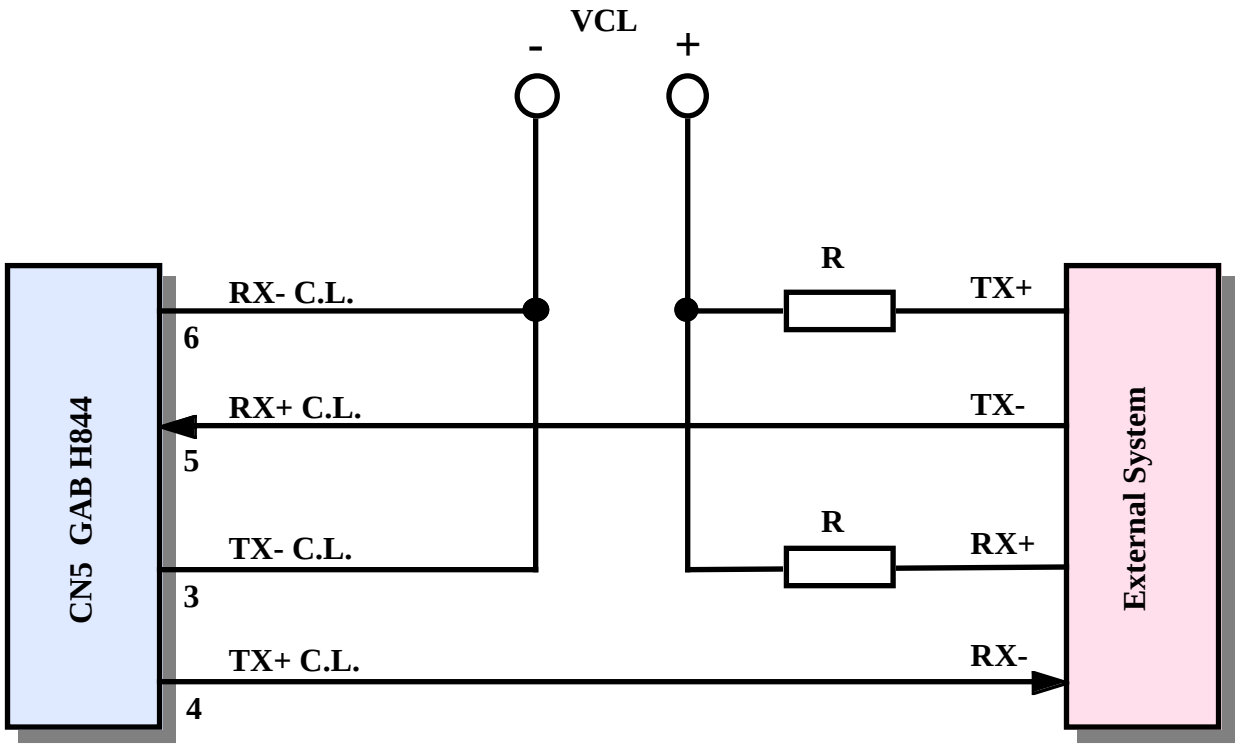


FIGURE 19: CURRENT LOOP 4 WIRES POINT-TO-POINT CONNECTION EXAMPLE

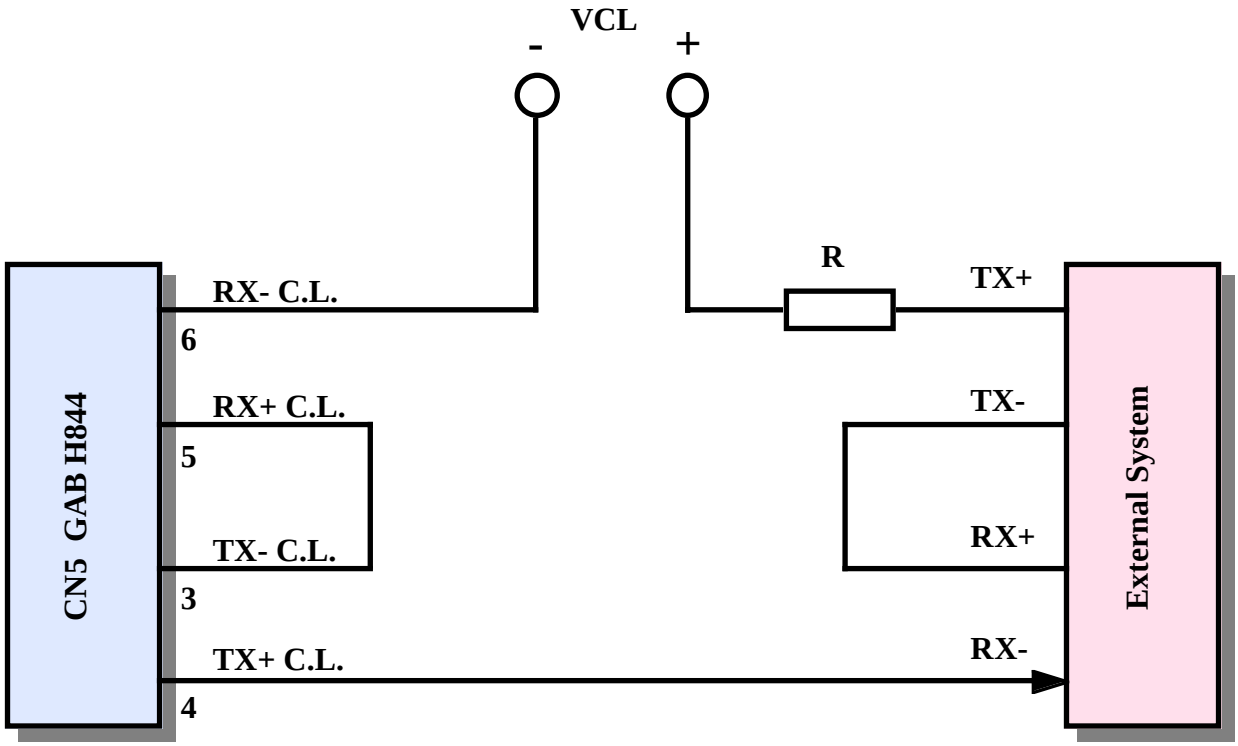


FIGURE 20: CURRENT LOOP 2 WIRES POINT-TO-POINT CONNECTION EXAMPLE

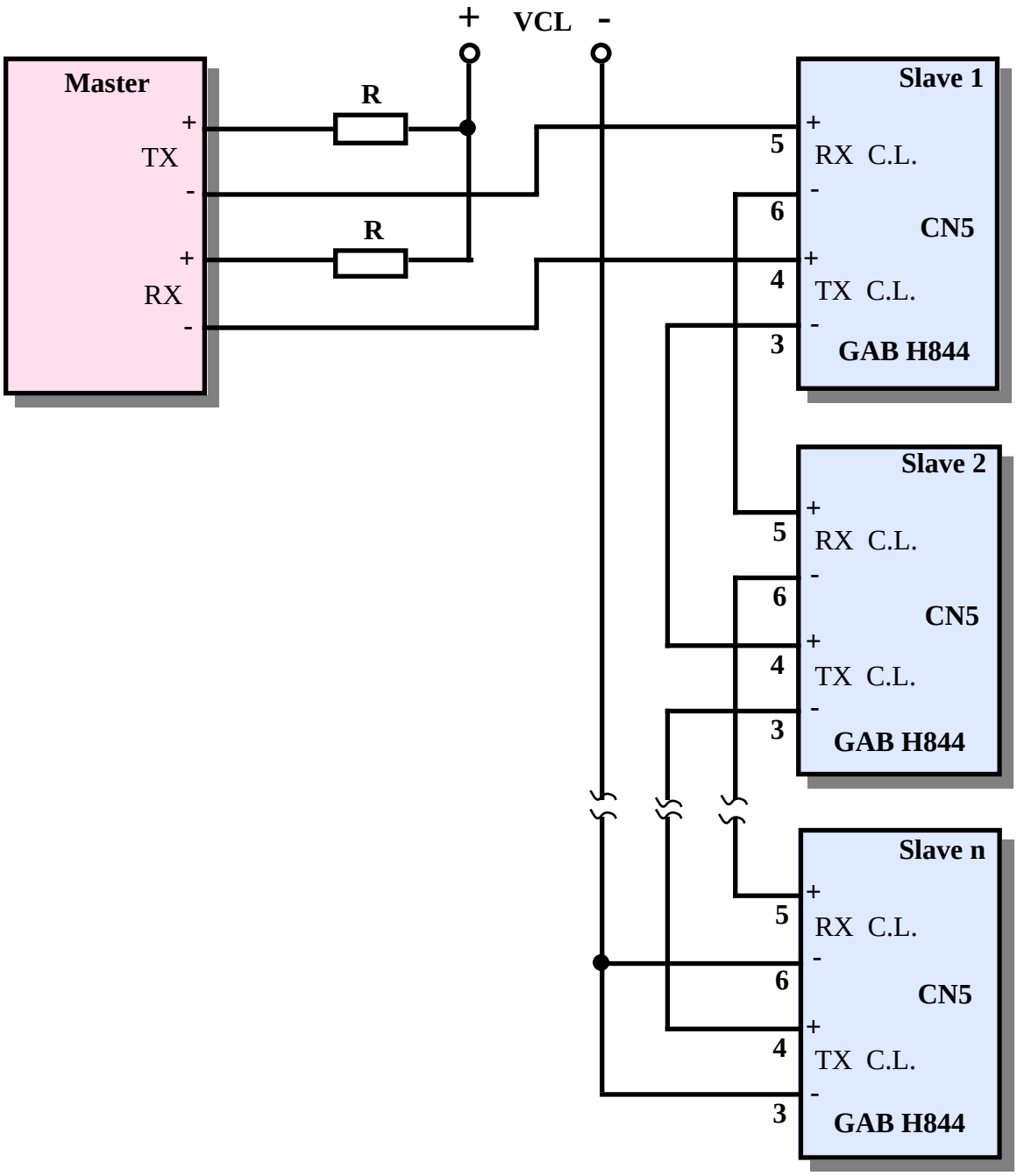


FIGURE 21: CURRENT LOOP NETWORK CONNECTION EXAMPLE

Possible Current Loop connections are two: 2 wires and 4 wires. These connections are shown in figures 16÷18 where it is possible to see the voltage for **VCL** and the resistances for current limitation (**R**). The supply voltage varies in compliance with the number of connected devices and voltage drop on the connection cable.
The choice of the values for these components must be done cosidering that:
- circulation of a **20 mA** current must be guaranteed;
- potential drop on each transmitter is about **2.35 V** with a 20 mA current;
- potential drop on each receiver is about **2.52 V** cwith a 20 mA current;
- in case of shortciruit each transmitter must dissipate at most **125 mW**;
- in case of shortciruit each receiver must dissipate at most **90 mW**.

For further info please refer to HEWLETT-PACKARD Data Book, (**HCPL 4100** and **4200** devices).

CN7 - USB INTERFACE CONNECTOR

CN7 is an USB connector, female, vertical, type B.
On CN7 is connected the USB interface that can be available on Mini Module installed on ZC1; the signals follows the international normative about this communication standard.

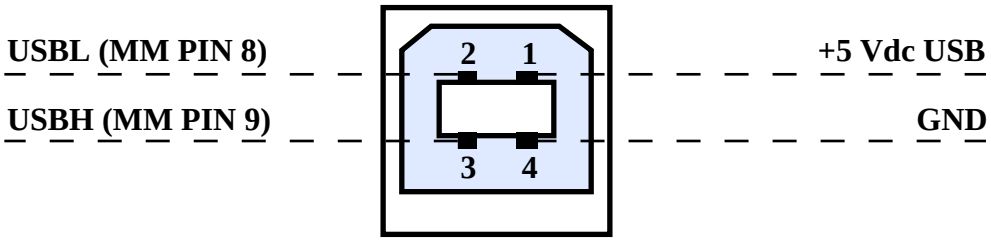


FIGURE 22: CN7 - USB INTERFACE CONNECTOR

Signals description:

USBL = I/O - Differential line low for USB communication.
USBH = I/O - Differential line high for USB communication.
MM PIN xx = I/O - Signal connected to pin xx of the ZC1 socket.
+5 Vdc USB = O - +5 Vdc power supply signal for USB.
GND = - Ground signal

Detailed information about the features of USB interface are contained in technical manual of the Mini Module provided of the same interface. It is important remind that **GAB H844** connects only the signals described in figure 21 to relative pins of socket, without any additional circuit.

NOTE On CN7 are available the two power supply signals +5 Vdc USB and GND but they can't be used to supply power to external systems, nor to supply the card.
The presence of USB communication signals on CN7 is subordinated to some jumpers configuration, as described in JUMPERS paragraph and in figure 39.

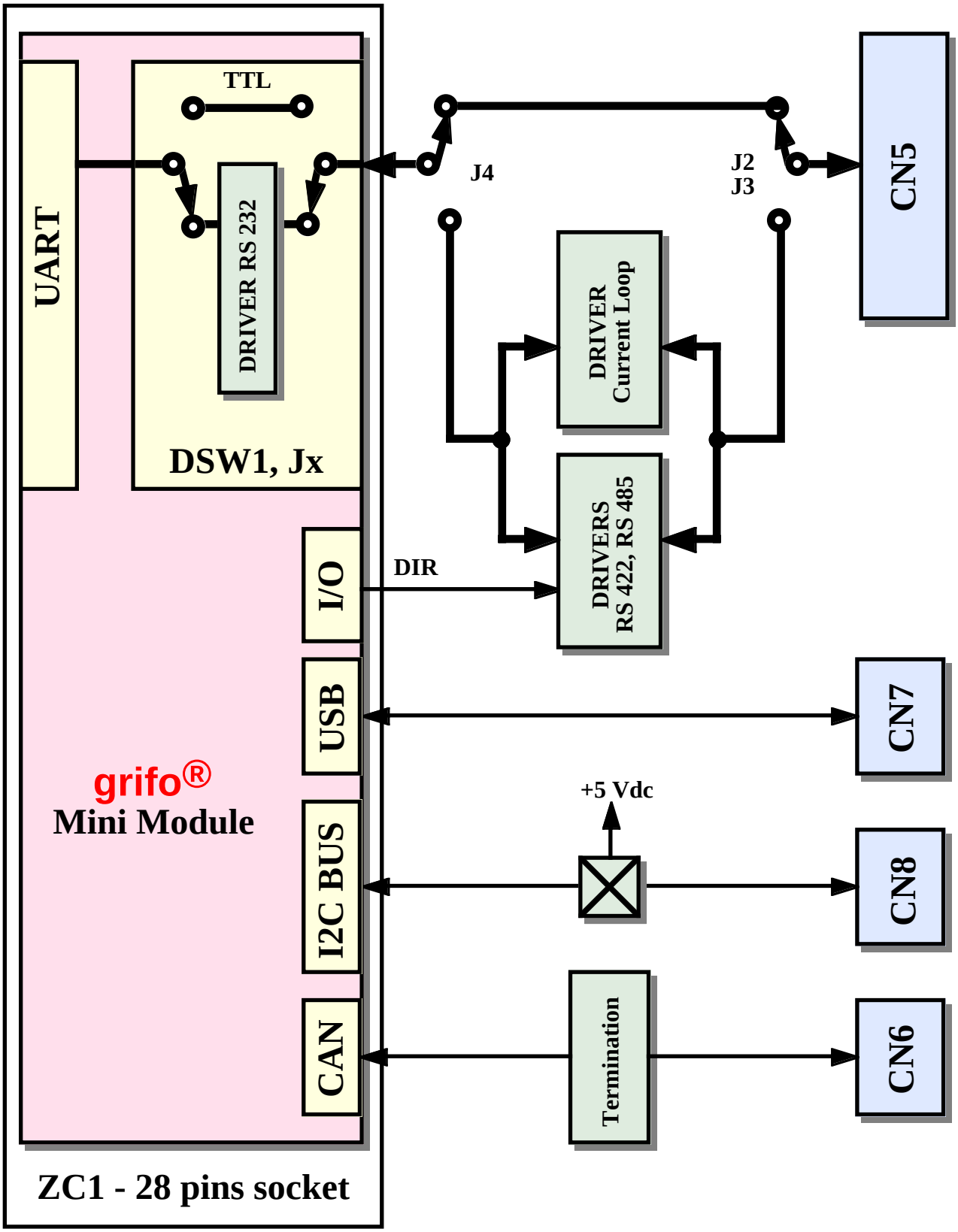


FIGURE 23: SERIAL COMMUNICATION LINE DIAGRAM

CN6 - MULTIFUNCTION SIGNALS, CAN, ETC, CONNECTOR

CN6 is a AMP MODU II, male, vertical, 4+4 pitch 2.45mm connector.
On this connector are always available: the +5 Vdc supply voltage generated by on board switching section,up to 5 multifunction lines, and the potential CAN interface.
With multifunction word it means that tese lines can perform several action such as external interrupt, counters, PWM, comparators, digital I/O, analog inputs, etc, directly managed from the used Mini Module peripherals.
When it is ordered the optional RTC, or the installed Mini Module has a RTC on board, the pin 4 of CN6 is connected to its interrupt signal, so it can be used as generic I/O only when specifics settings has been done.
Female connector for CN6 is directly available between grifo® accessories, and it can be ordered by using the codes **CKS.AMP8** or **AMP8.Cable**, as described in APPENDIX A of the manual.

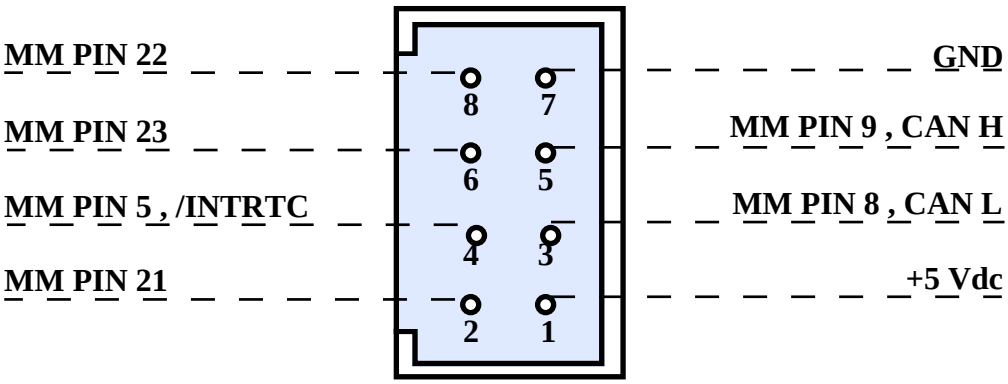


FIGURE 24: CN6 - MULTIFUNCTION SIGNALS CONNECTOR

Signals description:

MM PIN xx	= I/O - TTL digital I/O signal, connected to pin xx of Mini Module.
/INTRTC	= I/O - Real Time Clock interrupt signal of Mini Module or **.RTC** option.
CAN H	= I/O - Differential line high of CAN interface.
CAN L	= I/O - Differential line low of CAN interface.
+5 Vdc	= O - +5 Vdc power supply signal.
GND	= - Ground signal.

NOTE The connection of some signals on CN6 depends on configurations of some jumpers of the card: it is suggested to examine the hpmonimous paragraph JUMPERS and figures 26, 32 and 44.

Next pages report some figures concerning CN6 and the relative connection modalities for field signals.

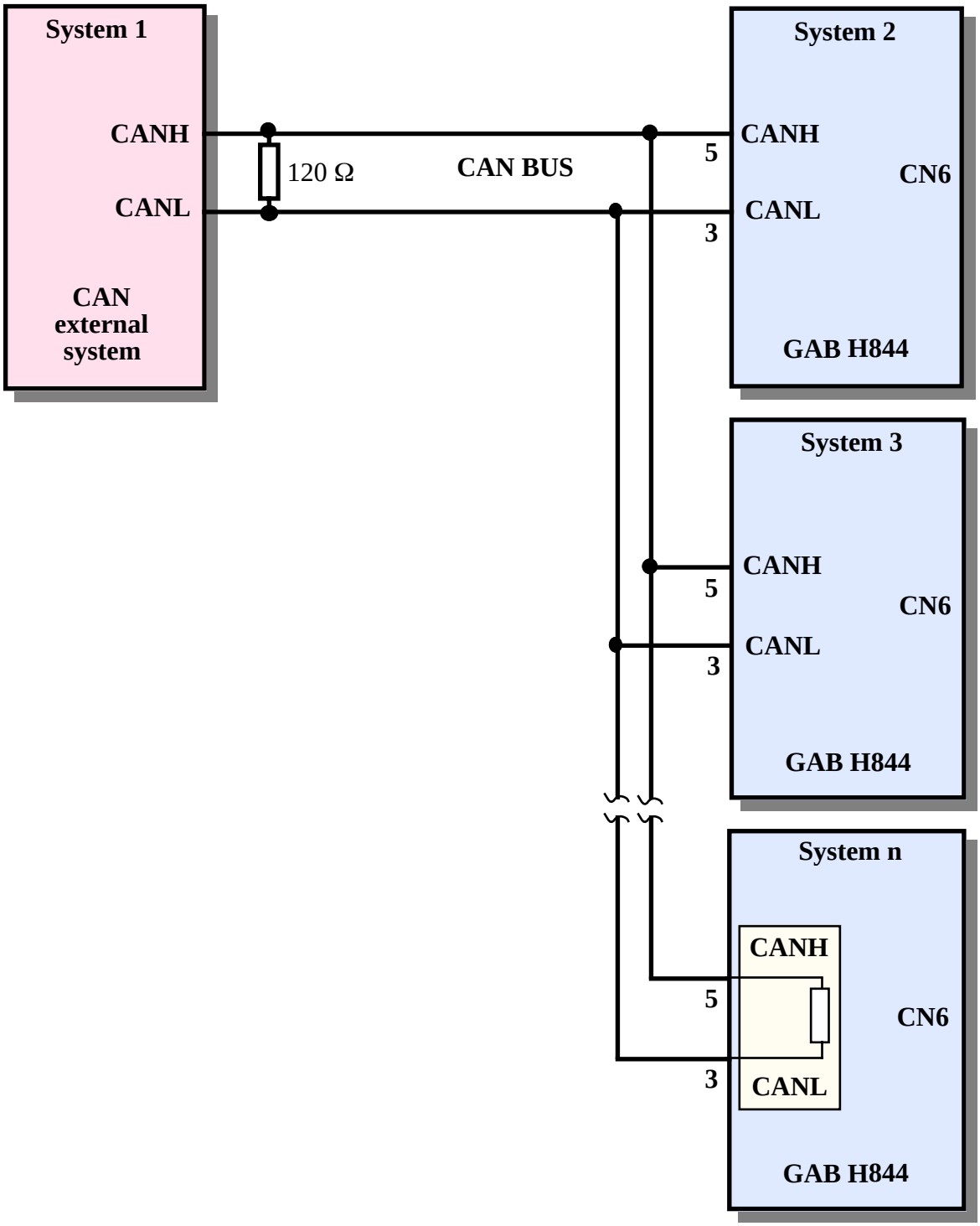


FIGURE 25: NETWORK CONNECTION EXAMPLE CAN COMMUNICATION

Please remind that a CAN network line must have impendace of 60 Ω; in order to obtain this, two termination resistors (120 Ω) placed at its extrems, respectevely near the master unit and the slave unit at the greatest distance from the master.
On **GAB H844** board the terminating circuitry is already installed: it can be connected or not through specific jumper, as explained later, in paragraph "JUMPERS".
If the system to connect are at very different potentials, it is possible to connect also the grounds of the systems, that is pin 7 of CN6, to solve eventual problems of communication and/or working.

CN1 - RELAYS OUTPUTS CONNECTOR

CN1 is a 6 ways, quick release screw terminal connector, pitch 5.0 mm.
This connector allows to connect 4 normally open contacts and common pins relays outputs available on **GAB H844**.
Please remark that maximum (resistive) load for each line is **5 A** and maximum voltage is **35 Vdc**.
These signals are software managed through Mini Module I/O ports, opportunely buffered, and selected carefully to easy management (plese refer to chapter "PERIPHERAL DEVICES SFOTWARE DESCRIPTION").

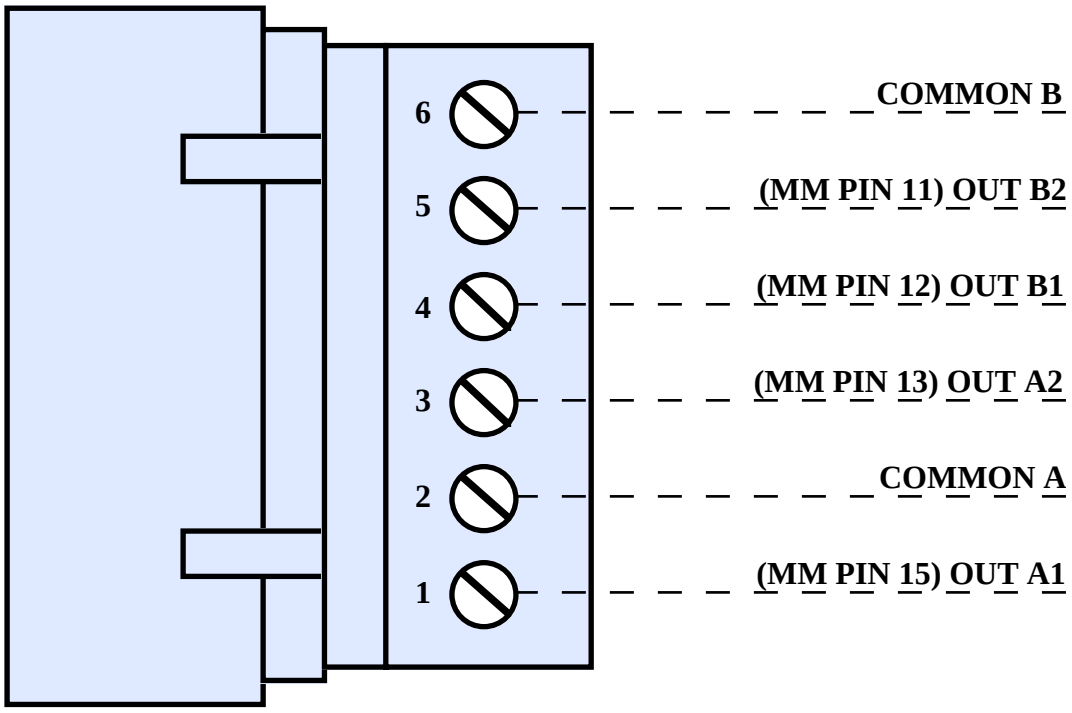


FIGURE 26: CN1 - RELAYS OUTPUTS CONNECTOR

Signals description:

OUT An = O - Normally open contact for n-th relay of group A,
COMMON A = - Common contact for relays of group A.
OUT Bn = O - Normally open contact for n-th relay of group B,
COMMON B = - Common contact for relays of group B
MM PIN xx = - Signal connected to pin xx of ZC1 socket

Output lines contains a LED diode with visual signalation function (the LED will swich on every times that the relay contact will be closed).

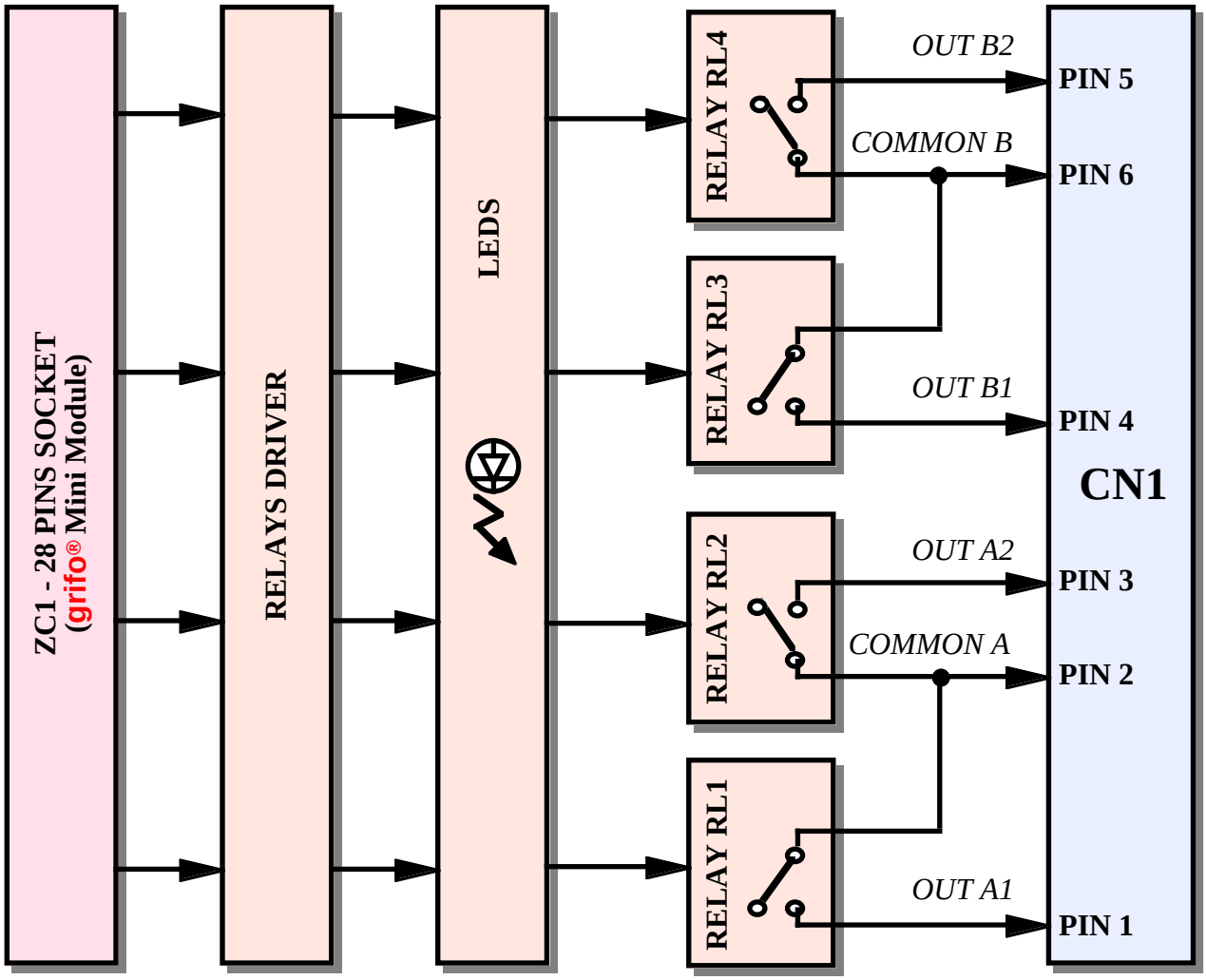


FIGURE 27: RELAY OUTPUTS BLOCK DIAGRAM

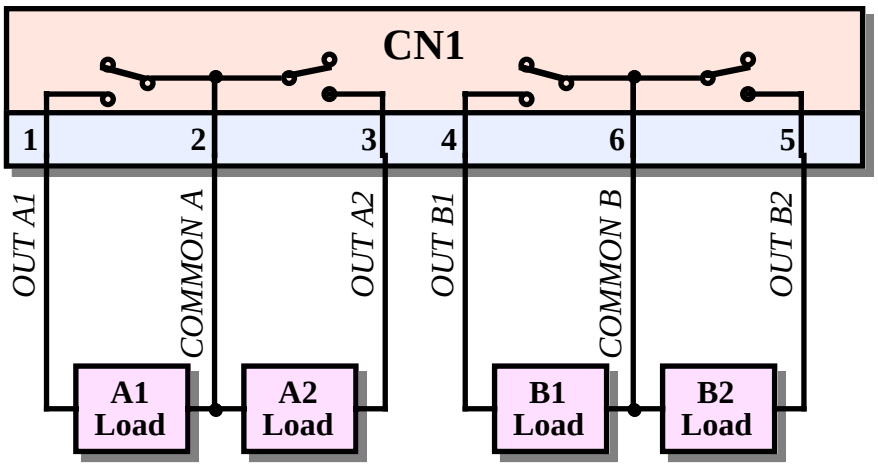


FIGURE 28: RELAY OUTPUTS CONNECTION DIAGRAM

CN3 - OPTPCOUPLED INPUTS CONNECTOR

CN3 is a 5 pins, vertical, quick release screw terminal connector.
CN3 is used to connect 4 optocoupled NPN or PNP input signals available on the card **GAB H844**, that are visualized by as many green LEDs. In addition to input lines, on the connector there is also the common pin where it must be connected the inputs to enable, with a pure contact. The lines of the 40 pins socket connected to CN3 inputs signals have been carefully selected to take advantage of **grifo®** Mini Modules internal peripherals.

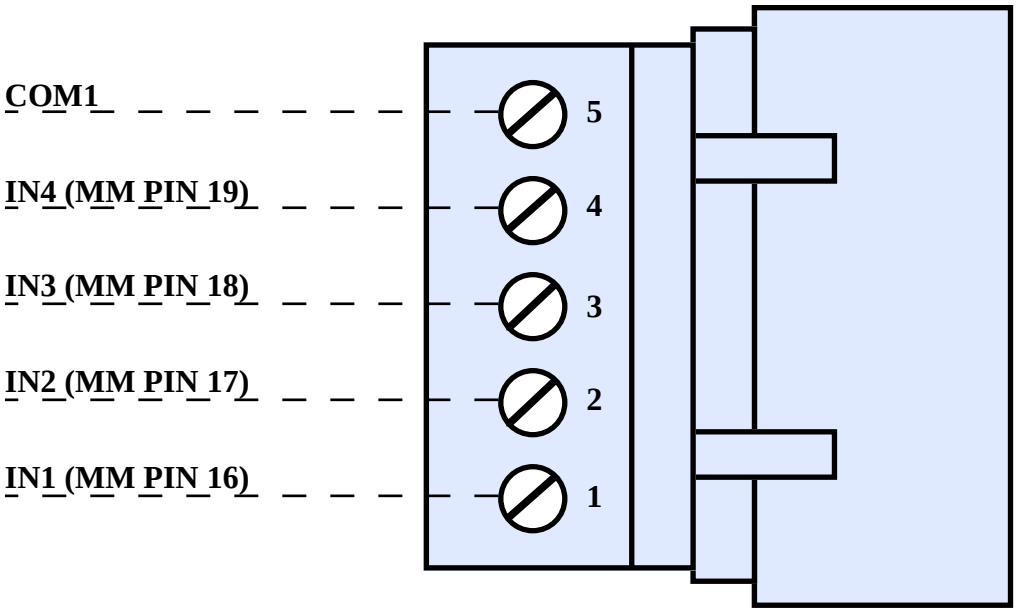


FIGURE 29: CN3 - OPTOCOUPLED INPUTS CONNECTOR

Signals description:

IN n	=	I	- Optocoupled input n, NPN or PNP type.
COM1	=		- Common pin where an input must be connected to enable it.
MM PIN xx	=	I	- Signal connected to pin xx of the ZC1 socket.

Input lines are optocoupled and provided with lowpass filter; this warrants a grade of protection for internal electronics against external noise. Each line has a LED for visual signalation that turns on whenever input pin and common pin are connected, regardless from current direction. By this way the input lines are suitable both for **PNP** and **NPN** drivers.

Mini Module signals connected to optocoupled interfaces can be alternatively used as TTL inputs on CN9 connector, through proper jumpers. For details, please see the following figure the paragraph that desrcribed that connector.

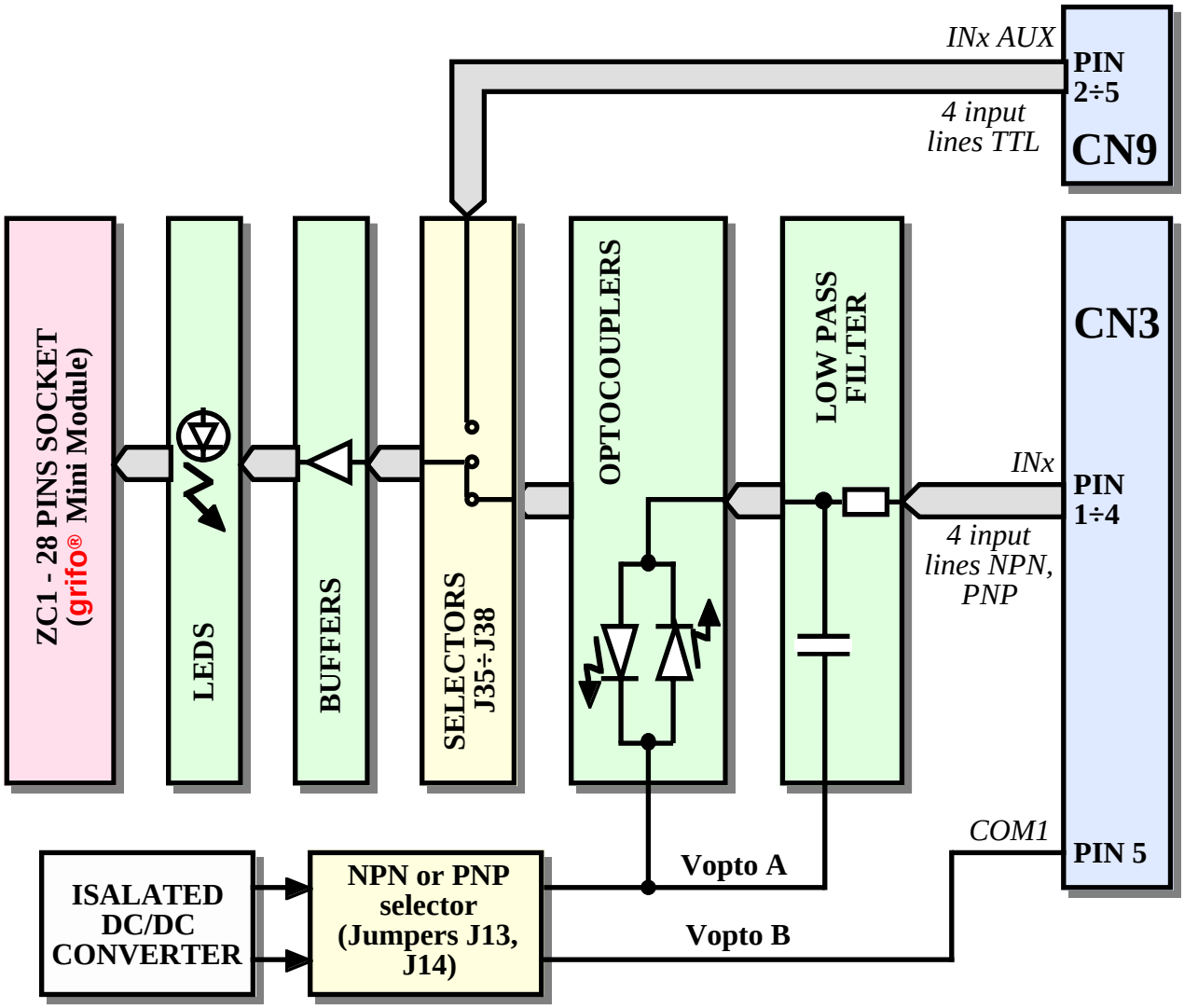


FIGURE 30: OPTOCOUPLED INPUTS BLOCK DIAGRAM

Supply voltage for optocouplers (named Vopto A and Vopto B) is generated on board starting from the single external supply voltage provided on CN2 connector, by a proper isolated DC/DC converter; thus to enable an input it is sufficient connect it to common signal COM1.
Next figures show connection modalities of optocoupled inputs available on CN3.

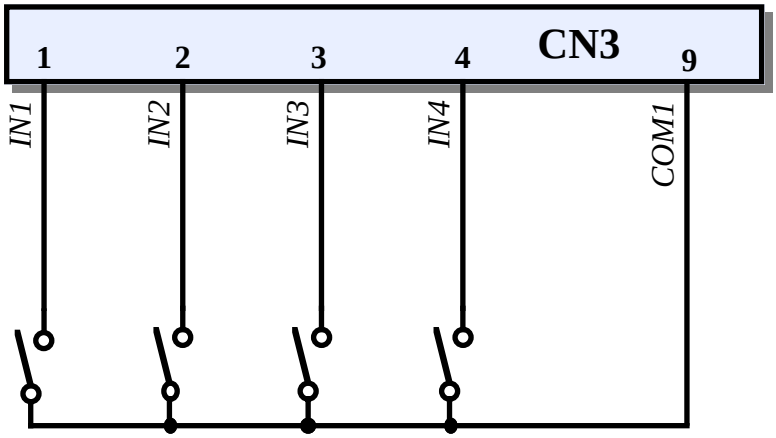


FIGURE 31: OPTOCOUPLED INPUT CONNECTION

CN4 - ANALOG INPUTS CONNECTOR

CN4 is a 9 pins, vertical, quick release screw terminal connector.
This connector allows to connect 8 analog inputs with interface, present on **GAB H844**. Analog lines on CN4 are low impedance lines provided of a low pass filter in order to avoid the noise that come from the field. The list of signals too, is realized for guarantee a good transmission of the signal and to make a easy connection with the field.
In case of connection we have to respect the described rules in the ELECTRIC FEATURES paragraph, dependig on the configuration of the same analog inputs.
The inputs management is made of a signals series of ZC1 socket, to semplify the software management.

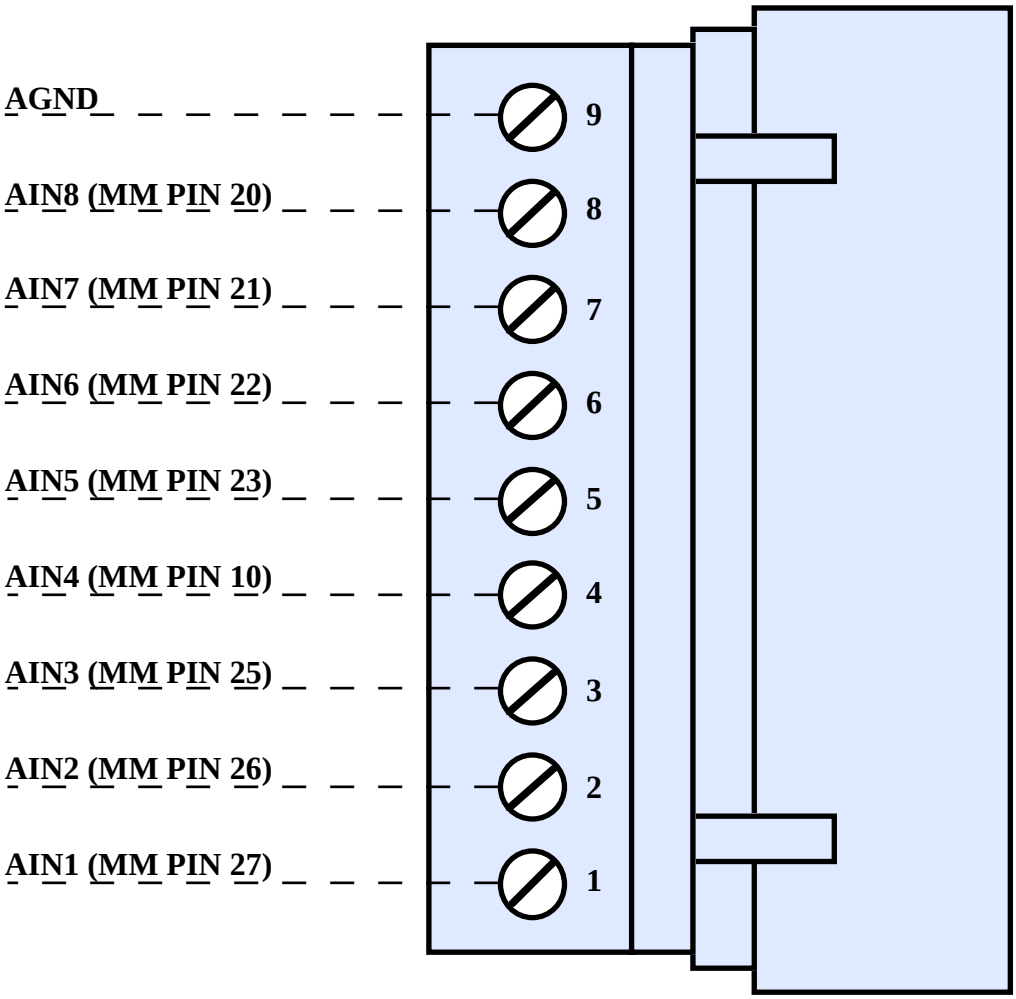


FIGURE 32: CN1 - ANALOG INPUT CONNECTOR

AINn = I - Analog input n.
AGND = - GND reference for analog inputs.
MM PIN xx = I - Signal connected to pin xx of the ZC1 socket.

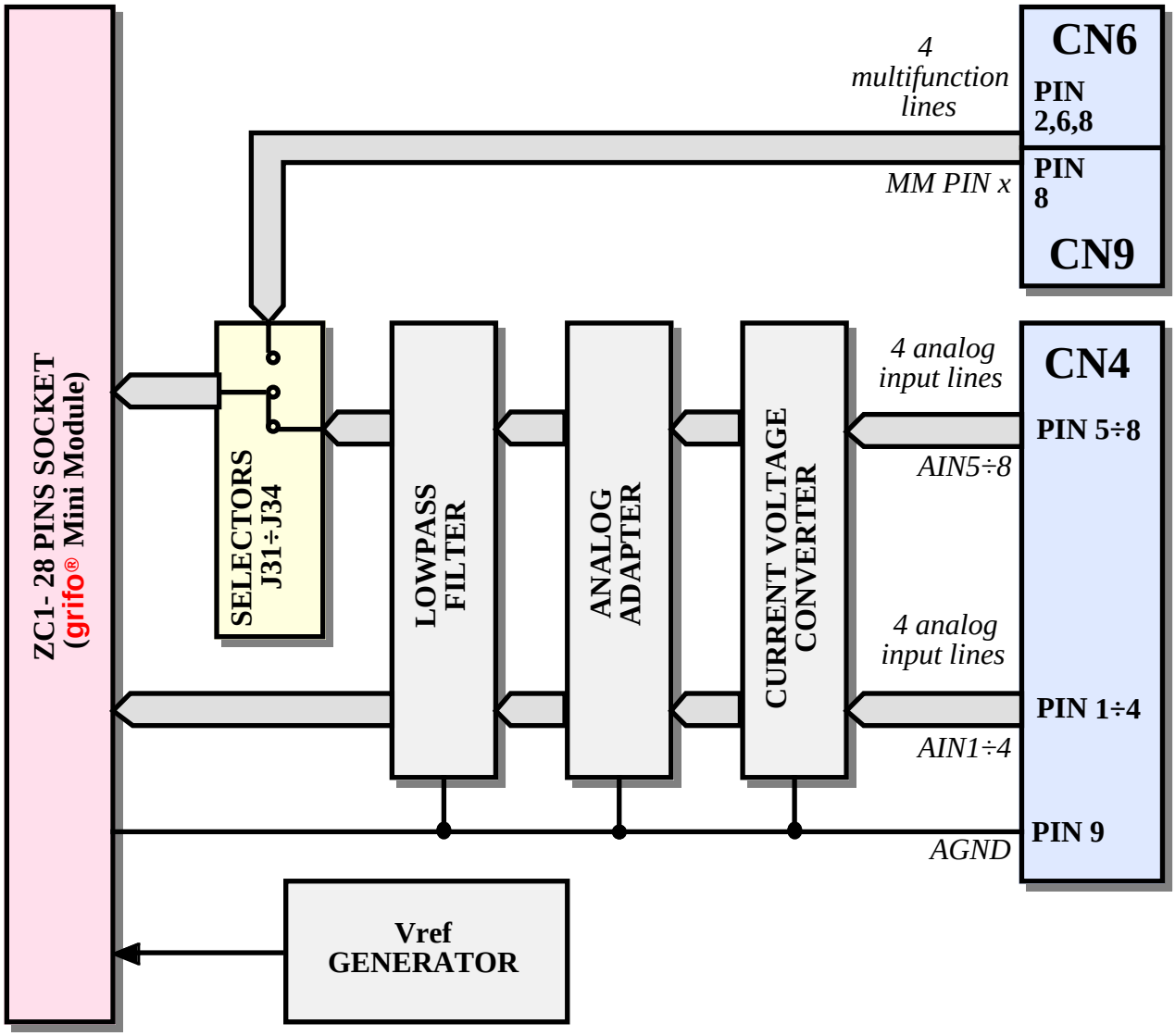


FIGURE 33: TTL SERIAL LINE CONNECTION EXAMPLE

As described in the proper ANALOG INPUTS SELECTION paragraph, both the analog adapter and the current voltage converter can be configured by user depending on the kind of signal to acquire and the its max value.

If analog signals are not compatible with the interface circuitery of **GAB H844**, user can connect them to CN6 and CN9 connector where are directly connected to the installed Mini Module. In this case there are only 4 inputs available and user has to connect a proper circuitery in order to make a relation between the analog signals and the Mini Module inputs.

CN9 - MULTIFUNCTION SIGNAL, TTL INPUTS CONNECTOR

CN9 is a AMP MODU II, male, vertical, 4+4 pitch 2.45mm connector.
On this connector are always available: the +5 Vdc supply voltage generated by on board switching section,and depending on the jumpers positions 1 multifunction line, and up to 4 buffered digital inputs.
With multifunction word it means that these lines can perform several action such as external interrupt, counters, PWM, comparators, digital I/O, analog inputs, etc, directly managed from the used Mini Module peripherals.
Female connector for CN9 is directly available between grifo® accessories, and it can be ordered by using the codes **CKS.AMP8** or **AMP8.Cable**, as described in APPENDIX A of the manual.

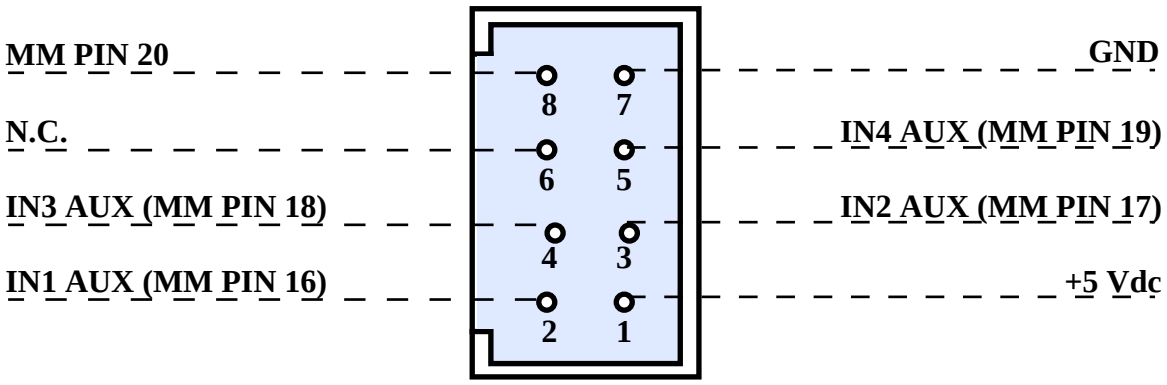


FIGURE 34: CN9 - MULTIFUNCTION SIGNAL, TTL INPUTS CONNECTOR

INn AUX = I - TTL buffered digital inputs
MM PIN xx = I/O - Signal connected to pin xx of Mini Module.
+5 Vdc = O - +5 Vdc power supply signal.
GND = - Ground signal.

NOTE The connection of some signals on CN6 depends on configurations of some jumpers of the card: it is suggested to examine the homonimous paragraph JUMPERS and figures 26, 32 and 44.
Remind that INn and AUX signals are alternative to the omonymous optocoupled inputs on CN3, as described in figure 26. User can use them when has to acquire some TTL digital inputs, not compatible with the separation circuitery.

INTERRUPTS

Interrupts management on **GAB H844** depends completely on hardware installed on ZC1, in fact it's this latter to determine which signals are interrupts.
When a grifo® Mini Module is installed, several interrupt sources are available, depending on which model is used.
Please refer to specific manual of Mini Module for further information.

FIGURE 35: GLOBAL VIEW

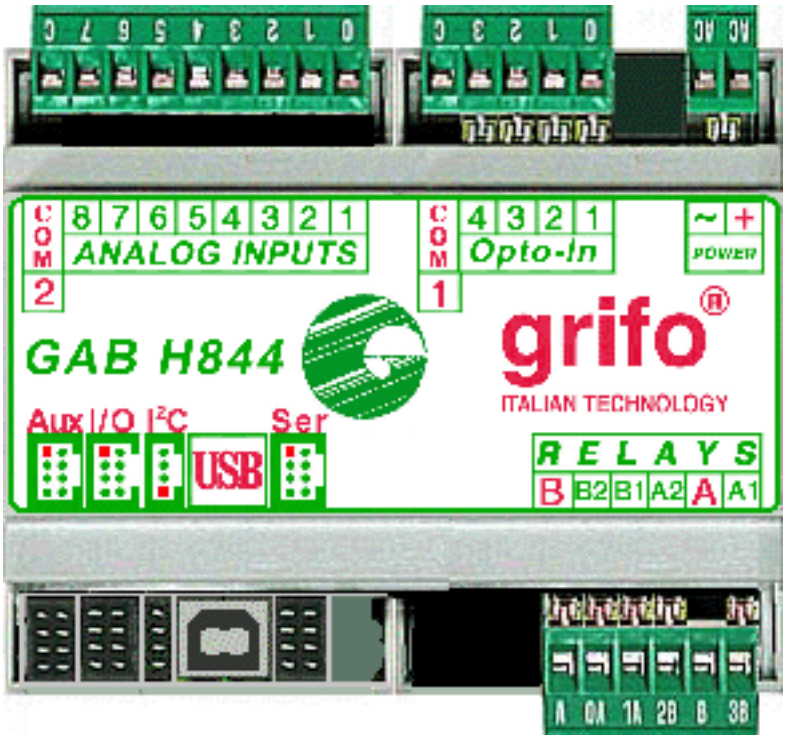


FIGURE 36: TOP VIEW

POWER SUPPLY VOLTAGE

GAB H844 is provided with a power supply section that solves in a efficent and comfortable way the problem to supply the board, in any situation. It generates energy for all sections of the board: control logic, Mini Module, optocoupled inputs, relays outputs, serial interfaces, I2C BUS line, etc. On board there is a switching power supply that requires a 10÷38 Vdc or 8÷24 Vac voltage, provided through CN5 (polarity must be respected in case of DC supply). This allows to supply the module by using standard industrial and commercial power sources like transformers, batteries, solar cells, etc. A comfortable and inexpensive solution for power supply can be the **EL 12** product that can be directly connected to the terminal starting from mains.
Please remind that on board switching section is provided with single diode rectifier, so in case of DC supply, all ground signals of the module (GND) are at the same potential.
When a single AC source is used to supply different units (both some **GAB H844** or other cards provided of supply section with single diode rectifier), please ensure that the two phases of AC voltage must be connected at the same input pins of power supply connector. Whenever this rule is not satisfied dangerous malfunctions or damages can rise up on all the connected devices. For example, if we call Phase1 and Phase2 the two signals of the AC voltage, then Phase1 must be always connected to positive inputs (Vac, +Vdc pow) and Phase2 must be connected to negative input (Vac, GND) of all the cards.
Complete information and details can be found on paragraph CN5 - POWER SUPPLY CONNCECTOR.

A second part of power supply section includes a galvanically isolated DC/DC converter that generates the **V opto** voltage, used to supply the optocoupled inputs. This voltage can be connected in two different modes, as described in NPN OR PNP INPUTS CONFIGURATION paragraph and has to galvanically isolated from the other voltages in order to guarantee the its working and to avoid noises.

The **GAB H844** is always provided with a **TransZorb™** protection circuit in order to avoid damages from incorrect voltages and/or break down of power supply section. It is also provided with a distribuited filtering circuitry that saves the card from disturbs or noises from the field, improving the overall system performances. As described in following pages, the presence of power supply voltages generated on board is also displayed by two dedicated LEDs.
The card has an additional features that allows the user to fetch both the general power supply (+5 Vdc) and opto inputs power supply (Vopto A and Vopto B) generated on board, through the connectors CN3 and CN4. To warrant highest immunity against noise and so a correct working of the cards, it is essential that these two voltages remains galvanically isolated.

We add the +5Vdc USB voltage to the CN7 connector, that can't be used for supply external systems or the board itself.

For problems of shielding and layout, there is the AGND indication that is used to indicate the analog reference. We can distinguish from GND of the power supply, but AGND and GND are electrically connected themselves.

When the user must supply external systems by using the signals +5 Vdc, GND or Vopto A, Vopto B of the card, it is suggested to contact directly grifo® technicians.

For further information please refer to paragraph ELECTRICAL FEATURES, too.

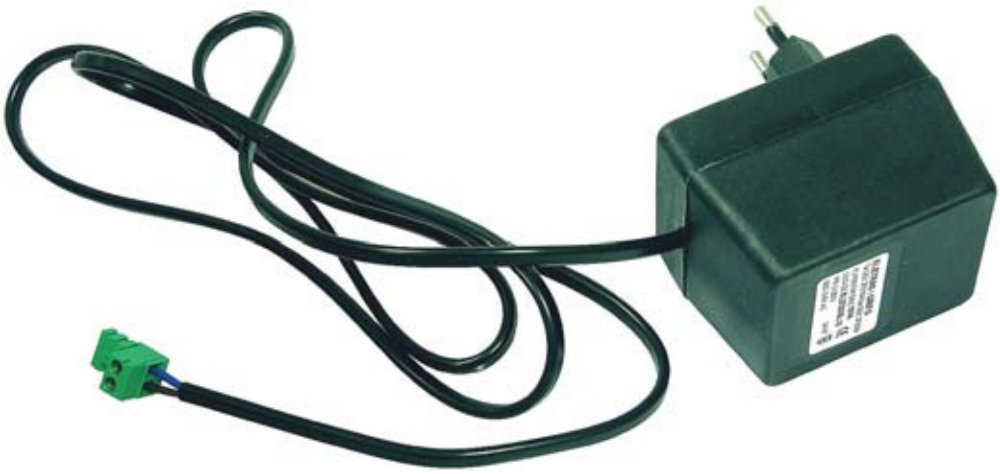


FIGURE 37: EL 12 POWER SUPPLY

I/O CONNECTION

To prevent possible connecting problems between **GAB H844** and the external systems, the user has to read carefully the previous paragraph information and he must follow these instrunctions:

- For all TTL signals the user must follow the rules of this electric standard. The connected digital signals must be always referred to card digital ground GND. For TTL signals, the 0V level corresponds to logic state 0, while 5V level corrisponds to logic state 1.

- Optocoupled input signals can be configured as described in paragraph NPN OR PNP INPUTS CONFIGURATION. When inputs are configured as NPN, positive voltage is present on input pins (INn-1 and INn-2) and ground is present on the common pins (COM1 and COM2), while when the inputs are configured as PNP the situation is reversed, this means ground on input pins and positive signal on common pins.
  In both the configurations, on the input connectors must be connected only pure, or clean, contacts (limit switches, relays contacts, push buttons, proximities, etc.) that simply short circuit or not the common (COM) to input INn-1,2 as illustrated on figure 24.
  Please remind that it is not possible to use a connection with mixed NPN and PNP inputs, but 16 inputs all NPN type or 16 inputs all PNP type.

- Relays outputs must be connected directly to the load to drive (electric valves, power relays, actuators, motors, etc.). The on board relays contacts are normally open and they can accept **5 A** current, up to **35 Vdc** voltage. In order to drive different loads, with different supplies, the card provides 4 couples of relays with as many commons pins, completely separated.
  When the loads don't respect the described features the user must interpose proper adaption circui, as for example specific external power relays.

- For the signals of the RS 232, RS 422, RS 485, Current Loop, CAN and USB interfaces, the user must follow the standard rules of each one of these protocols.

- For the I2C BUS interface, the user must follow the standard rules of this protocol and he must remind that both signals on CN4 are connected to a 4.7 KΩ pull up resistor.

- The analog input can be in two types: conditioned (on CN4) or direct (on CN6 and CN9). Those in the first type are provided with filtering capacitor that warrants more stability on the acquired signal but at the same time it decrease the cut-off frequency. In addition the analog input can be connected to a proper analog adapter that reduces its amplitude with a factor=4. The second ones are not modified and called direct. Thus in order to correctly select the signals accepted by analog input it must be considered the Mini Module features (admitted range, resolution, precision, etc.) and the described features of **GAB H844**.

ISP PROGRAMMING

Every Mini Module that can be instaleld on **GAB H844** can be programmed in-circuit (In System Programming) that allows to read and write internal memories of Mini Module with simple and comfortable operations.
Through ISP the user can, for example, change the application program, fetch and set configurations data and/or data gathered by the program, etc.
ISP activation mode changes according to which Mini Module is used but, in general, require a manual intervent on a jumper or dip switch.
When **GAB H844** is closed in its container, it is not possible to acces the Mini Module so ISP can be actived externally acting on connector CN5.
It is enough to manage pins 2 and 8 of this latter (see figure below) for example with the hw handshake of PC, making sure that these signals are not already used:

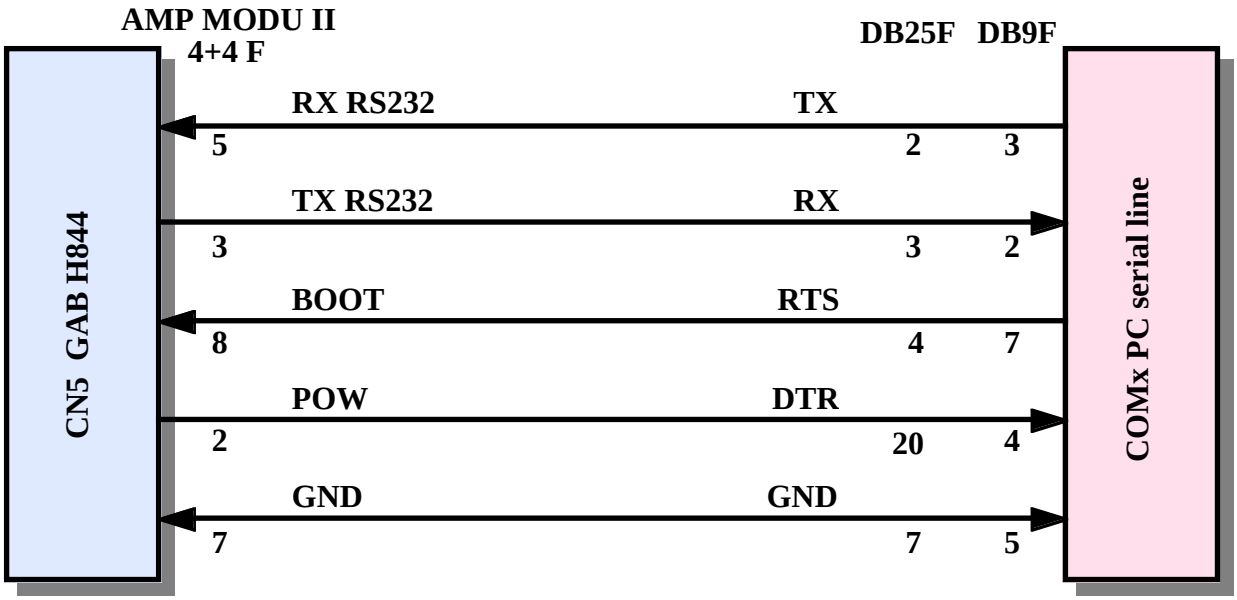


FIGURE 38: ISP ACTIVATION THROUGH CN4

NOTE
Activating ISP through CN5 can be done only on Mini Modules that have ISP abilitation on pin 1 and 2 of their socket (e.g. GMM 93x) and setting jumper J10 and J11 in position 1-2.
On other Mini Modules, you must open the container and act on specific selector.

VISUAL SIGNALATIONS

The main function of LEDs is to inform the user about card status, with a simple visual indication and in addition to this, LEDs make easier the debug and test operations of the complete system. To recognize the LED location on the card, please refer to figure 4.
All the LEDs described in figure 39 are visible from the breaks on the plastic container dedicated to the connectors, to allow inspection also when the board is closed and installed in the electric panel. In addition, LEDs that display buffered I/O are physically located near the corresponding pins to easy cabling verification and all other evental working tests.
GAB H844 features the LEDs described in the following table:

LED	COLOUR	FUNCTION
LD5	Yellow	If activates, show the presence of the +5 Vdc power supply in output from switching section.
LD6	Yellow	Show the MM PIN 5 line status connected to pin 4 of CN6, that normally meet the interrupt signal of Real Time Clock. Those LED activates itself with the low level of /INTRTC line of the potential Mini Module RTC.
LD1÷LD4	Red	Show the relay outpus status with the corrispondence OUT A1, OUT A2, OUT B1, OUT B2 on CN3. The activates LED shows the contact closing of the relay outup to COMMON x common.
LD11÷LD14	Green	Show the digital inputs status IN4÷IN1 on CN3 or IN4 AUX÷IN1 AUX on CN9. For the optocoupled inputs of CN3, the activated LED show the current circolation between INn-1 input and COM1 common. For the TTL inputs the activated LED shows the status of INn AUX input.
LD15	Green	If activates the combination of jumpers J13 and J14 in 1-2 is selected, that transforms optocoupled inputs on CN3 of **NPN** type.
	Red	If activates the combination of jumpers J13 and J14 in 2-3 is selected, that transforms optocoupled inputs on CN3 of **PNP** type.

FIGURE 39: LEDS TABLE

JUMPERS

On **GAB H844** there are 36 jumpers for card configuration.
Here below is the jumpers list, number of ways and function:

JUMPER	N°PINS	FUNCTION
J1, J9	2	Connect the termaination and forcig circuitery to the serial line in RS 422, RS 485.
J2, J3, J4	3	Select the signal connection for the serial line of the Mini Module.
J5	3	Configures the serial line for RS 422 or RS 485.
J8	2	Connects the termination circuitery to the CAN line.
J10	3	Gets ready the ZC1 socket for **GMM 93x** Mini Modules.
J11	3	Gets ready the ZC1 socket for **GMM 93x** Mini Modules and defines the connection of Vref of A/D converter of Mini Module.
J13, J14	3	Select the input type between NPN or PNP.
J15, J17, J19, J21, J23, J25, J27, J29	3	Select the connection of a analog adapter on 8 analog inputs and define the range of their connected signals.
J16, J18, J20, J22, J24, J26, J28, J30	3	Configure the 8 analog inputs for signals in current or voltage.
J31	3	Selects the connection of the MM PIN 23 signal.
J32	3	Selects the connection of the MM PIN 22 signal.
J33	3	Selects the connection of MM PIN 21 signal.
J34	3	Selects the connection of MM PIN 20 signal.
J35, J36, J37, J38	3	Select the connection of the 4 buffered digital input signals.
JS1	2	Connects the metallic case of USB CN7 connector to GND.

FIGURE 40: JUMPERS SUMMARIZING TABLE

The following tables describe all the right connections of **GAB H844** jumpers with their relative functions.
To recognize these valid connections, please refer to the board printed diagram (serigraph) or to figures 41 of this manual, where the pins numeration is listed; for recognizing jumpers location.
The "*" denotes the default connection, or on the other hand the connection set up at the end of testing phase, that is the configuration the user receives.

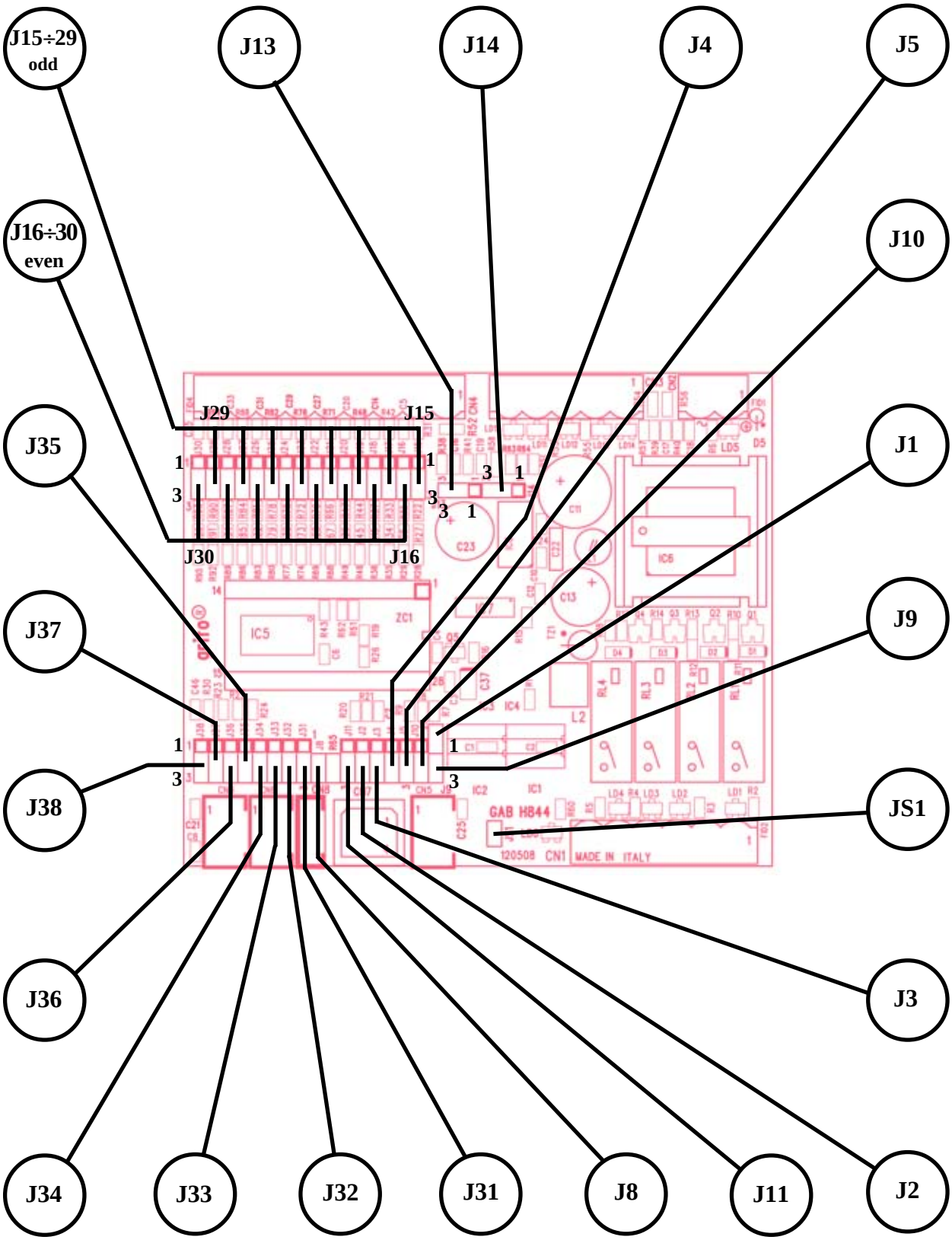


FIGURE 41: JUMPERS NUMERATION AND LOCATION

3 PINS JUMPERS

JUMPER	CONNECTION	FUNCTION	DEF.
J2, J3, J4	position 1-2	Connect the signals of the serial line on CN5 to driver for the RS 422, RS 485, Current Loop electric standard.	
	position 2-3	Connect the signals of the serial line on CN5 directly to Mini Modulo on ZC1, getting the electric interfaces RS 232 e TTL.	*
J5	position 1-2	Configures the serial line for the RS 485 electric standard (half duplex a 2 fili).	
	position 2-3	Configures the the serial line for the RS 422 electric standard (full duplex a 4 fili).	*
J10	position 1-2	Gets ready the ZC1 socket for Mini Modules **GMM 93x**, connecting MM PIN 2 to POW signal on CN5.2.	
	position 2-3	Does not connect any signal to MM PIN 2 of the ZC1 socket.	*
J11	position 1-2	Gets ready the ZC1 socket for Mini Modules **GMM 93x**, connecting MM PIN 1 to BOOT signal on CN5.8.	
	position 2-3	Connets a voltage of about 2,5 Vdc to MM PIN 1 signal of ZC1 socket. This signal meet the reference voltage Vref of the A/D converter section, needed on some Mini Modules of grifo®.	*
	not connected	Does not connect any signal to MM PIN 1 of the ZC1 socket.	
J13, J14	position 1-2	Select the NPN typology for the optocoupled input of CN3 (see NPN OR PNP INPUT CONFIGURATION paragrph).	*
	position 2-3	Select the PNP typology for the optocoupled input of CN3 (see NPN OR PNP INPUT CONFIGURATION paragrph).	
J15	position 1-2	Does not connect the analog adapter to signal AIN1 on CN4.1, selecting the range 0÷A/D max. value.	*
	position 2-3	Connect the analog adapter to signal AIN1 on CN4.1, selecting the range 0÷A/D max. value*4)	
J16	position 1-2	Configure the analog adapter AIN1, on CN4.1, as voltage signal.	*
	position 2-3	Configure the analog signal AIN1, on CN4.1, as voltage signal.	

FIGURE 42: 3 PINS JUMPERS TABLE (1 OF 4)

JUMPER	CONNECTION	FUNCTION	DEF.
J17	position 1-2	Does not connect the analog adapter to the AIN2 signal on CN4.2, selecting the range 0÷A/D max value.	*
	position 2-3	Connect the analog adapter to the AIN2 signal on CN4.2, selecting the range 0÷(A/D max value*4).	
J18	position 1-2	Configures the AIN2 analog input, on CN4.2, as signal in voltage.	*
	position 2-3	Configures AIN2 analog input ,on CN4.2, as signal in current.	
J19	position 1-2	Does not connect the analog adapter to AIN3 signal on CN4.3, selecting the range 0÷A/D max value.	*
	position 2-3	Connect the analog adapter to AIN3 signal on CN4.3, selecting the range 0÷(A/D max value*4).	
J20	position 1-2	Configures the AIN3 analog input, on CN4.3, for the signal in voltage.	*
	position 2-3	Configures the AIN3 analog input, on CN4.3, for the signal in current.	
J21	position 1-2	Does not connect the analog adapter to AIN4 signal on CN4.4, selecting the range 0÷A/D max value.	*
	position 2-3	Connect the analog adapter to AIN4 signal on CN4.4, selecting the range 0÷(A/D max value*4).	
J22	position 1-2	Configures the AIN4 analog input, on CN4.4, for the signal in voltage.	*
	position 2-3	Configures the AIN4 analog input, on CN4.4, for the signal in current.	
J23	position 1-2	Does not connect the analog adapter to AIN5 signal on CN4.5, selecting the range 0÷A/D max value.	*
	position 2-3	Connect the analog adapter to AIN5 signal on CN4.5, selecting the range 0÷(A/D max value*4).	
J24	position 1-2	Configures the AIN5 analog input, on CN4.5, for the signal in voltage.	*
	position 2-3	Configures the AIN5 analog input, on CN4.5, for the signal in current.	
J25	position 1-2	Does not connect the analog adapter to AIN5 signal on CN4.5, selecting the range 0÷A/D max value.	*
	position 2-3	Connect the analog adapter to AIN5 signal on CN4.5, selecting the range 0÷(A/D max value*4).	

FIGURE 43: 3 PINS JUMPERS TABLE (2 OF 4)

JUMPER	CONNECTION	FUNCTION	DEF.
J26	position 1-2	Configures the AIN6 analog input, on CN4.6, for the signal in voltage.	*
	position 2-3	Configures the AIN6 analog input, on CN4.6, for the signal in current.	
J27	position 1-2	Does not connect the analog adapter to AIN7 signal on CN4.7, selecting the range 0÷A/D max value.	*
	position 2-3	Connect the analog adapter to AIN7 signal on CN4.7, selecting the range 0÷(A/D max value*4).	
J28	position 1-2	Configures the AIN7 analog input, on CN4.7, for the signal voltage.	*
	position 2-3	Configures the AIN7 analog input, on CN4.7, for the signal in current.	
J29	position 1-2	Does not connect the analog adapter to AIN8 signal on CN4.8, selecting the range 0÷A/D max value.	*
	position 2-3	Connect the analog adapter to AIN8 signal on CN4.8, selecting the range 0÷(A/D max value*4).	
J30	position 1-2	Configures the AIN8 analog input, on CN4.8, for the signal in voltage.	*
	position 2-3	Configures the AIN8 analog input, on CN4.8, for the signal current.	
J31	position 1-2	Connects MM PIN 23 of ZC1 to analog interface circuitery of the AIN5 signal, on CN4.5.	*
	position 2-3	Connects MM PIN 23 of ZC1 directly to CN6..6 pin.	
J32	position 1-2	Connects MM PIN 22 of ZC1 to analog interface circuitery of the AIN6 signal, on CN4.6.	*
	position 2-3	Connects MM PIN 22 of ZC1 directly to CN6..8 pin.	
J33	position 1-2	Connects MM PIN 21 of ZC1 to analog interface circuitery of the AIN7 signal, on CN4.7.	*
	position 2-3	Connects MM PIN 21 of ZC1 directly to CN6.2 pin.	
J34	position 1-2	Connects MM PIN 20 of ZC1 to analog interface circuitery of the AIN8 signal, on CN4.8.	*
	position 2-3	Connects MM PIN 20 of ZC1 directly to CN9..8 pin.	

FIGURE 44: 3 PINS JUMPERS TABLE (3 OF 4)

JUMPER	CONNECTION	FUNCTION	DEF.
J35	position 1-2	Connects MM PIN 16 of ZC1 to optocoupled digital input IN1, on CN3.1.	*
	position 2-3	Connects MM PIN 16 of ZC1 to TTL digital input IN1 AUX, on CN9.2.	
J36	position 1-2	Connects MM PIN 17 of ZC1 to optocoupled digital input IN2, on CN3.2.	*
	position 2-3	Connects MM PIN 17 of ZC1 to TTL digital input IN2 AUX, on CN9.3.	
J37	position 1-2	Connects MM PIN 18 of ZC1 to optocoupled digital input IN3, on CN3.3.	*
	position 2-3	Connects MM PIN 18 of ZC1 to TTL digital input IN3 AUX, on CN9.4.	
J38	position 1-2	Connects MM PIN 19 of ZC1 to optocoupled digital input IN3, on CN3.4.	*
	position 2-3	Connects MM PIN 19 of ZC1 to TTL digital input IN3 AUX, on CN9.5.	

FIGURE 45: 3 PINS JUMPERS TABLE (4 OF 4)

2 PINS JUMPERS

JUMPER	CONNECTION	FUNCTION	DEF.
J1, J9	not connected	Do not connect the termination and forcing circuitery to the receiver/transmitter RS 485 or to the receiver RS 422, of the serial line.	*
	connected	Connect the termination and forcing circuitery to the receiver/transmitter RS 485 or to the receiver RS 422, of the serial line.	
J8	not connected	Do not connect the termination circuitery the CAN line.	*
	connected	Connect the termination circuitery the CAN line.	
JS1	not connected	Do not connect the metallic case of the USB CN7 connector to GND.	
	connected	Connects the metallic case of the USB CN7 connector to GND.	*

FIGURE 46: 2 PINS JUMPERS TABLE

The default connection of **JS1** (solder jumper) is performed by a little wire in the components side; so if that conditions has to be changed, the path must be cut through a grinded cutter. To re-connect the jumper You can use a low power soldering with lead free tin.

NPN OR PNP INPUTS CONFIGURATION

The 16 optocoupled inputs of **GAB H844** can be collectively configured as NPN or PNP, according to connection of jumpers J13 and J14.
Power supply of optocoupling sections is generated on board, starting from the single voltage applied to CN2 connector (please read ELECTRIC FEATURES and POWER SUPPLY VOLTAGE paragraphs), by a proper isolated DC/DC converter that generate the two signals **Vopto A** and **Vopto B**, as described on figure 26.
Configuration of jumpers J1 and J2 selects one of the following conditions:

J1, J2	*Inputs type*	*Vopto A*	*Vopto B*	*Current flow*
position 1-2	PNP	Negative	Positive	from COMx to INn-1,2
position 2-3	NPN	Positive	Negative	from INn-1,2 to COMx

This allows to close an optocoupled input simply by connecting its terminal to common pin, for example with a pure contact.
The voltage Vopto A and Vopto B is reported on connectors CN6 and it is isolated from card power supply: the user must keep this galvanic separation.

NOTE The jumpers J13 and J14 **must be always moved together at the same time**; thus to change their configuartion, first both jumpers must be removed and then they can be placed in the new position. In other words it must be absolutely avoided the partial configurations with one jumper in position 1-2 and the other in 2-3 or the card could be damaged and broken. Alternatively the jumpers can be moved when power supply is off.

ANALOG INPUTS SELECTION

GAB H844 has an interface for 8 analog inputs and can accept a voltage signal in a variable type or range, according with jumpers. In order to semplify the description of the analog interface, we can define:

Jtype	->	analog input type selecting jumpers (J16,J18,J20,J22,J24,J26,J28,J30)
Jrange	->	analog input range selecting jumpers (J15,J17,J19,J21,J23,J25,J27,J29)
Jconn	->	analog input connection selecting jumpers (J31,J32,J33,J34)
Vmv	->	max value voltage of A/D converter section on Mini Module (2,5 for grifo®)
Cmax	->	max. combination reported from the A/D converter of used Mini Module

In the following table we are the configuration to set to obtain all analog inputs available on **GAB H844**:

Analog input	*Jconn*	*Jtype*	*Jrange*	*Notes*
Direct to Mini Module	2-3	Indifferent	Indifferent	4 inputs on CN6,CN9
In current 0÷20 mA	1-2	2-3	1-2	8 inputs on CN4
In current 4÷20 mA	1-2	2-3	1-2	8 inputs on CN4
In voltage 0÷Vmv	1-2	1-2	1-2	8 inputs on CN4
In voltage 0÷(Vmv*4)	1-2	1-2	2-3	8 inputs on CN4

FIGURE 47: ANALOG INPUT CONFIGURATION TABLE

Each analog input can be individually configured, providing the mode to acquire a combination of mixed signals too.

As described in figure 32, for any inputs on CN4 there are the analog converter, the current voltage converter and a double low pass filter that delete the very high frequences (that tipically can introduce noise into the system) and increase the stability of the signals obtained.
The analog interface is based on high precision passive components that are selected in mounting phase, in order to obtimize the signal acquiring. Otherwise the analog inputs on CN6 and CN9 have no any conditioning or filtering circuitery and they exactly respect the rules relatives to the Mini Module inputs.

The relationship between the provided signal to **GAB H844** and the combination of the A/D converter of used Mini Module, can be summarized by the following rules:

Analog input		*Combination*
Direct to Mini Module	->	(Supplied voltage/ Vmv)* Cmax
In current 0÷20 mA	->	(((Supplied current*121)/Vmv)*Cmax)*Kg
In current 4÷20 mA	->	(((Supplied current*121)/Vmv)*Cmax)*Kg
In voltage 0÷Vmv	->	((Supplied voltage/ Vmv)*Cmax)*Kg
In voltage 0÷(Vmv*4)	->	(((Supplied voltage/4)/Vmv)*Cmax)*Kg

where the current is express in Ampere, voltages in Volt, 121 meet the impedance of inputs in current in Ω, and the Kg gain value is 1,036 (from gain factor analog inputs=0,036%).

Anyway, to compensate eventual tollerances and thermal drifts, it is suggested to make a software calibration of the acquired signal, that is to calculate a correction coeffincent using a valid reference signal, and then to use such coefficent for successive analog signal acquisitions. The examples developed for **grifo®** Mini Modules show some calibration techniques that the user can modify according to application's requirements or he can directly use them as they are.

The user can discover the acquisition modality of the analog input (range, resolution, conversion time, etc.) and its possible absence, by consulting relative techical manual of **grifo®** Mini Modules or the pairs manual.

With the jumper J11 we can decide if connect or not the reference voltage of about 2,5 V, generated on board of **GAB H844**, to the ZC1 socket. With the Mini Module that need an external Vref, the jumper has to be connect and for those one with the internal Vref, or without Vref, J11 has to remain in open state. It is important to note that Vref meet the max value voltage convertible from the Mini Module too, that is the used Vmv in the previous description.

SERIAL COMMUNICATION SELECTION

Serial line of **GAB H844** can be buffered in RS 232, RS 422, RS 485, Current Loop or TTL.
By hardware can be selected which one of these electric standards is used, through jumpers connection (as described in the previous tables) and drivers installation.
By software the serial line can be programmed to operate with all the standard physical protocols, in fact the bits per character, parity, stop bits and baud rates can be decided by setting opportunes CPU internal registers. In the following paragraphs there are all the informations on serial communication configurations.
Some devices needed for RS 422, RS 485 and Current Loop configurations are not mounted on the board in standard configuration; this is why each fist non-standard (non-RS 232) serial configuration for line A must be always performed by **grifo®** technicians.
At this point the user can change in autonomy the configuration following the informations below:

- HW ASYNCHRONOUS SERIAL LINE IN RS 232 (default configuration)

J1, J9	=	not connected	Mini Module	= serial in RS 232 (#)
J5	=	indifferent	IC1	= no device
J2	=	position 2-3	IC2	= no device
J3	=	position 2-3	IC3	= no device
J4	=	position 2-3	IC4	= no device

- HW ASYNCHRONOUS SERIAL LINE A IN CURRENT LOOP (option .CLOOP)

J1, J9	=	not connected	Mini Module	= serial in TTL (#)
J5	=	indifferent	IC1	= no device
J2	=	position 1-2	IC2	= no device
J3	=	position 1-2	IC3	= driver HP 4200
J4	=	position 1-2	IC4	= driver HP 4100

Please remark that Current Loop serial interface is passive, so it must be connected an active Current Loop serial line, that is a line provided with its own power supply, like described in figures 18÷20. Current Loop interface can be employed to make both point-to-point and multi-point connections through a 2-wires or a 4-wires connection.

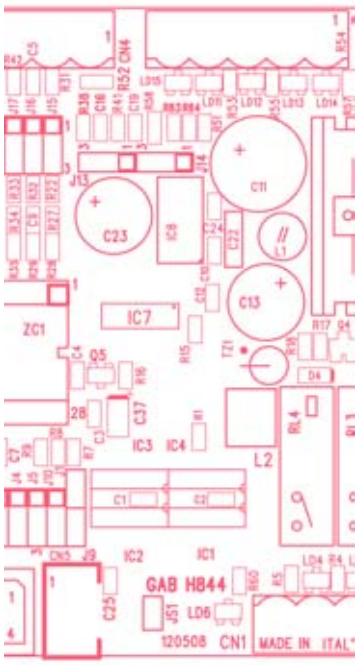
- HW ASYNCHRONOUS SERIAL LINE A IN RS 422 (option .RS 422)

J1, J9	=	(*)	Mini Module	= serial in TTL (#)
J5	=	position 2-3	IC1	= driver SN 75176 or MAX 483
J2	=	position 1-2	IC2	= driver SN 75176 or MAX 483
J3	=	position 1-2	IC3	= no device
J4	=	position 1-2	IC4	= no device

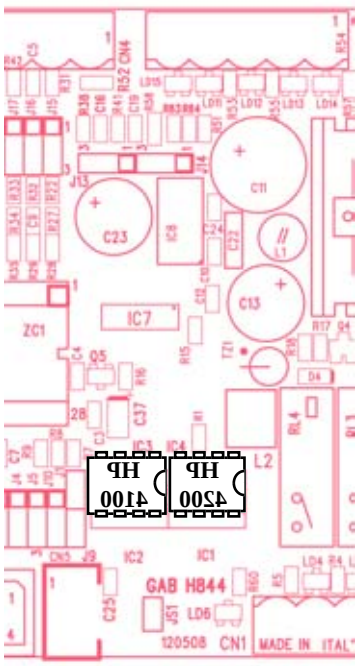
Status of signal DIR (software managed with Mini Module signal MM PIN 24), allows to enable or disable the transmitter:

DIR	= low level	= logic state 0	->	transmitter enabled
DIR	=high level	= logic state 1	->	transmitter disabled

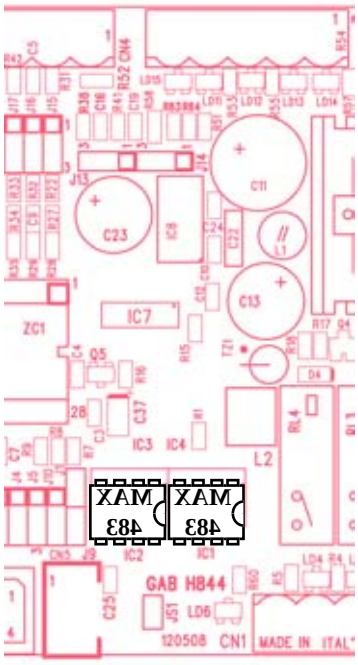
In point-to-point connections, signal DIR can be always kept low (transmitter always enabled), while in multi-point connections transmitter must be enabled only when a transmission is requested.



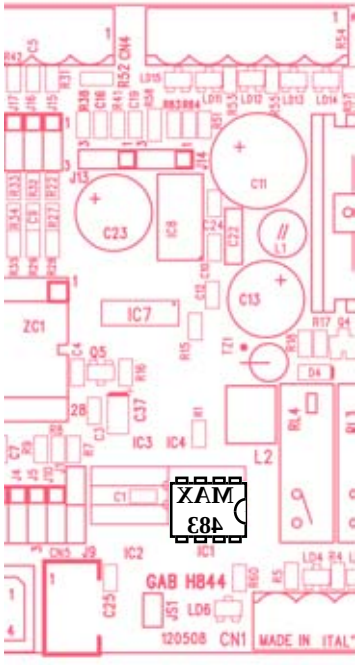
Asynchronous serial in RS 232, TTL



Asynchronous serial in Current Loop



Asynchronous serial in RS 422



Asynchronous serial in RS 485

FIGURE 48: DRIVERS LOCATION FOR ASYNCHRONOUS SERIAL COMMUNICATION

- HW ASYNCHRONOUS SERIAL LINE A IN RS 485 (option .RS 485)

J1, J9	=	(*)	Mini Module	= serial in TTL (#)
J5	=	position 1-2	IC1	= driver SN 75176 or MAX 483
J2	=	position 1-2	IC2	= no device
J3	=	position 1-2	IC3	= no device
J4	=	position 1-2	IC4	= no device

In this modality the signals to use are pins 5 and 6 of connector CN5, that become transmission or reception lines according to the status of signal DIR (managed by software with the MM PIN 24 Mini Module line), as follows:

DIR	=low level	= logic state 0	->	transmitter enabled
DIR	=high level	= logic state 1	->	transmitter disabled

This kind of serial communication can be used for multi-point connections, in addition it is possible to listen to own transmission, so the user is allowed to verify the succes of transmission. In fact, any conflict on the linecan be recognized by testing the received character after each transmission.

- HW ASYNCHRONOUS SERIAL LINE A IN TTL

J1, J9	=	not connected	Mini Module	= serial in TTL (#)
J5	=	indifferent	IC1	= no device
J2	=	position 2-3	IC2	= no device
J3	=	position 2-3	IC3	= no device
J4	=	position 2-3	IC4	= no device

(*) If using the RS 422 or RS 485 serial line, it is possible to connect the terminating and forcing circuit on the line by using J1 and J9. In case of point-to-point connections this circuit must be always connected, while in case of multi-point connections it must be connected olny in the farest boards, that is on the edges of the commmunication line.
During a reset or a power on, signal DIR is at logic level high, so during these phases driver RS 485 is in reception or transmission driver RS 422 is disabled, to avoid confilcts on line.

(#) Serial line of Mini Module installed on **GAB H844** must be configured in order to connect the MM PIN 3 and MM PIN 4 signals with RX and TX signals buffered in RS 232 where "serial RS 232" is needed or RX and TX in TTL mode (for example generated by microcontroller UART) where "serial TTL" is needed.

For further information, refer to figures 11÷20 and 22.

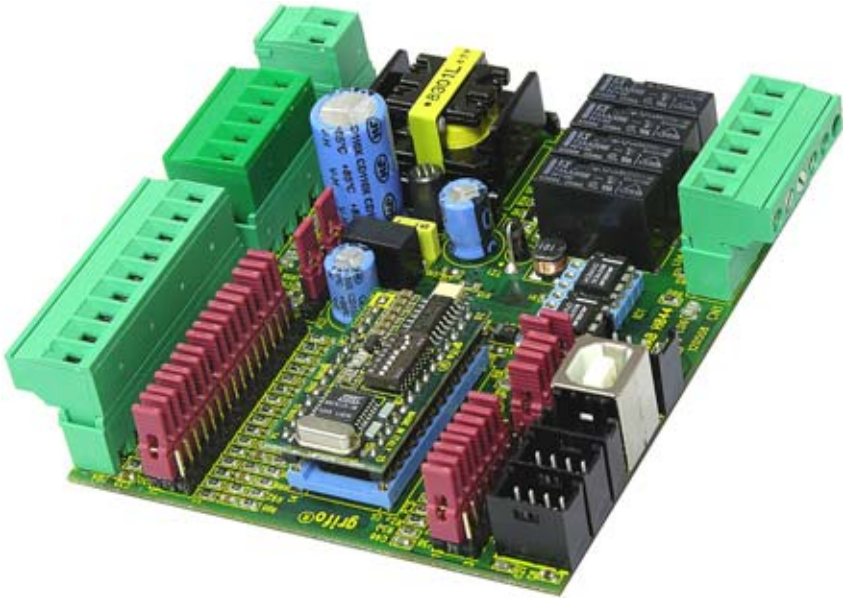


FIGURE 49: GAB H844 WITH 28 PINS GMM 5115 MINI MODULE

FIGURE 50: GAB H844 WITH 40 PINS GMM AM128 MINI MODULE

PERIPHERALS SOFTWARE DESCRIPTION

In the previous paragraphs are described all the connections of the on board resources towards the field and external systems, while in this one there are detailed information on connection of the same resources in confront of used Mini Module. Moreover there are the software management modalities of all the resources, that can be directly used by the customer, to develop his application program. Whenever the chapter documentation is not easy to use, please refer to techical manuals of **GAB H844** + **grifo®** Mini Module pairs.

ANALOG INPUTS

The 8 analog inputs can be acquired by software through the management of 8 analog lines of ZC1 socket with corrispondence reported in figures 23, 31, 32, 33 and summarized below:

AIN1	->	MM PIN 27
AIN2	->	MM PIN 26
AIN3	->	MM PIN 25
AIN4	->	MM PIN 10
AIN5 (if J31 in 1-2)	->	MM PIN 23
AIN6 (if J32 in 1-2)	->	MM PIN 22
AIN7 (if J33 in 1-2)	->	MM PIN 21
AIN8 (if J34 in 1-2)	->	MM PIN 20

The corrispondence between the connected analog signals and acquired numeric combination by software from A/D of Mini Module is reported in ANALOG INPUT SELECTION paragraph.
For analog inputs direct to CN6 and CN9 (without interface circuitery) please refer to next MULTIFUNCTION SIGNALS paragraph.

ASYNCHRONOUS SERIAL LINE

The management of serial line is completely described in the manual of used Mini Module or in data sheet of mounted microcontroller, in the sections relative to asynchronous communication (UART, USART, etc.). In these documents there are the information about management of all physic and logic communication protocols.
The signals used on ZC1 socket are:

RX TTL or RX RS232	->	MM PIN 3
TX TTL or TX RS232	->	MM PIN 4
DIR	->	MM PIN 24

that respectively corresponds to receive data, transmit data and management of activation and direction for RS 422, RS 485 drivers.

RELAYS OUTPUTS

Staus of 4 relays outputs is defined by software management of 4 output lines of the ZC1 socket with the corrispondences reported on figure 28, 29, 30 and below summarized:

OUT A1	->	MM PIN 15
OUT A2	->	MM PIN 13
OUT B1	->	MM PIN 12
OUT B2	->	MM PIN 11

It is important remind that some of the 4 lines from **grifo®** Mini Module installed on ZC1, are not only digital outputs but they have additional functionalities defined by internal hardware peripherals (as PCA, TCU, CCU, etc.); these allow to generate timings, evolved autonomous functions, etc.
When the management signal is set to logic state low (logic 0), the corresponding output is actived (relay contact is connected to its common pin), viceversa when the signal is set to logic state high (logic 1) the corresponding output is deactived (relay contact opened).
During a power on, the 8 used signals are kept at logic 1, so all outputs are disabled during and after these phases.
As previously said, LEDs LD1÷4 give a visual indication of relays outputs status (LED on means output actived).

OPTOCOUPLED OR TTL BUFFERED INPUTS

Status of 4 digital (optocoupled or TTL) inputs can be acquired through software management of 4 input lines of the ZC1 socket with the corrispondences reported on figure 25, 26, 33 and below summarized:

IN1 (if J35 in 1-2) or IN1 AUX (if J35 in 2-3)	->	MM PIN 16
IN2 (if J36 in 1-2) or IN2 AUX (if J36 in 2-3)	->	MM PIN 17
IN3 (if J37 in 1-2) or IN3 AUX (if J37 in 2-3)	->	MM PIN 18
IN4 (if J38 in 1-2) or IN4 AUX (if J38 in 2-3)	->	MM PIN 19

When optocoupled inputs INn are enabled (INn connected to COM1), corresponding signals are at logic state low (logic 0), viceversa when inputs are disabled a logic level high is acquired (logic 1).
For buffered inputs TTL INn AUX the corresponding lines follow the logic state of the connected signal.
As previously said, LEDs LD9÷24 give a visual indication of digital inputs status (LED on means input actived).
All the used lines of Mini Module have been selected in order to take full advantage in software management; in fact the inputs can generate interrupts, be counted by hardware counters, acts as a trigger, or simply acquired.

I2C BUS INTERFACE

The management of I2C BUS line is completely described in the manual of used Mini Module or in data sheet of mounted microcontroller, in the sections relative to synchronous communication (TWI, I2C, SSP, etc.). In these documents there are all the information about management of all physic and logic communication protocols.
The signals used on ZC1 socket are:

SCL	->	MM PIN 6
SDA	->	MM PIN 7

As described in CN8 - I2C BUS LINE CONNECTOR paragraph, please remind that the SDA and SCL signals are provided of 10 KΩ pull up resistors.
When the installed grifo® Mini Module is provided of Real Time Clock section in I2C BUS, also the **A0H** address is used. The user that needs the I2C BUS interface of **GAB H844** can't use these slave addresses and he must connect a proper hardware, and develop a software, taking care of these limits.

TTL DIGITAL I/O LINES

On the **GAB H844** there are some multifunction lines that can be managed by software in order to satisfy the numerous requirements of the users, as external interrupt, counters, PWM, comparators, digital I/O, analog inputs, etc. To manage these peripherals refer to technical manual of the used Mini Module, in the sections relative to timers and counters (TCU, PCA, CCU, etc.), to analog acquisition (A/D, ADC, COMP, etc.), to digital inputs and output (PIO, GPIO, PORT, etc.).
The signals used on ZC1 socket are:

Pin 2 di CN6 (if J33 in 2-3)	->	MM PIN 21
Pin 3 di CN6	->	MM PIN 8
Pin 4 di CN6	->	MM PIN 5
Pin 5 di CN6	->	MM PIN 9
Pin 6 di CN6 (if J31 in 2-3)	->	MM PIN 23
Pin 8 di CN6 (if J32 in 2-3)	->	MM PIN 22
Pin 8 di CN9 (if J34 in 2-3)	->	MM PIN 20

Moreover many signals above listed can perform alternative functions, it depends on the performed software programmation; thus it is suggested to examine with attention, the connection performed on such signals. For example, the pin 4 of CN7 is connected also to LD6 yellow LED and to eventual /INTRTC interrupt signal of the optional Real Time Clock, pin 3 and 5 of CN7 could be also the CAN signals or the USB interface, etc.

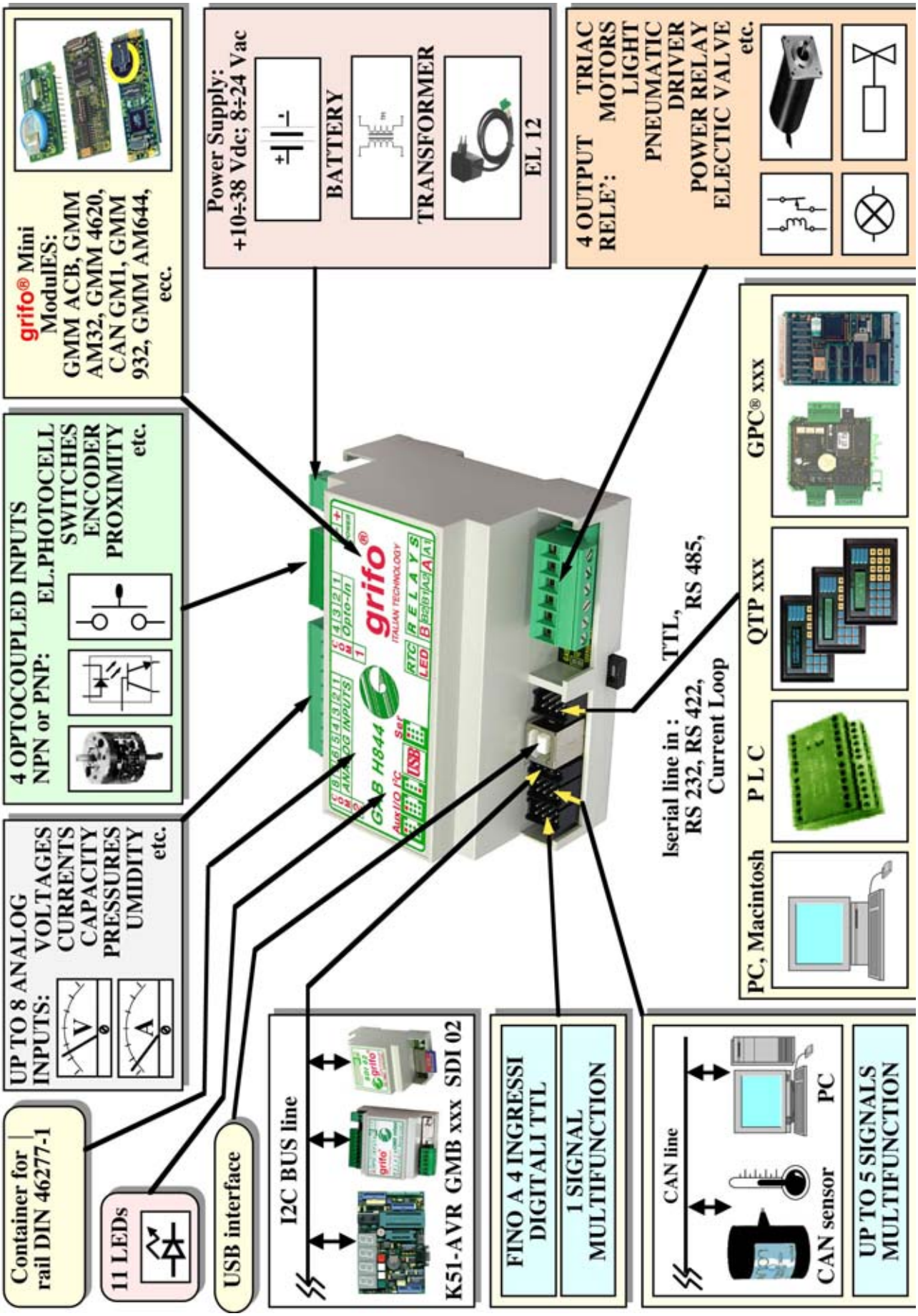


FIGURE 51: POSSIBLE CONNECTIONS DIAGRAM

CAN INTERFACE

Please refer to technical manual of the used Mini Module by assuming that the used signals are:

CANL	->	MM PIN 8
CANH	->	MM PIN 9

These pins are multifunction signals too described in previous paragraphs or USB interface signals.

USB INTERFACE

Please refer to technical manual of the used Mini Module by assuming that the used signals are:

USBL	->	MM PIN 8
USBH	->	MM PIN 9

These pins are multifunction signals too described in previous paragraphs or CAN interface signals.

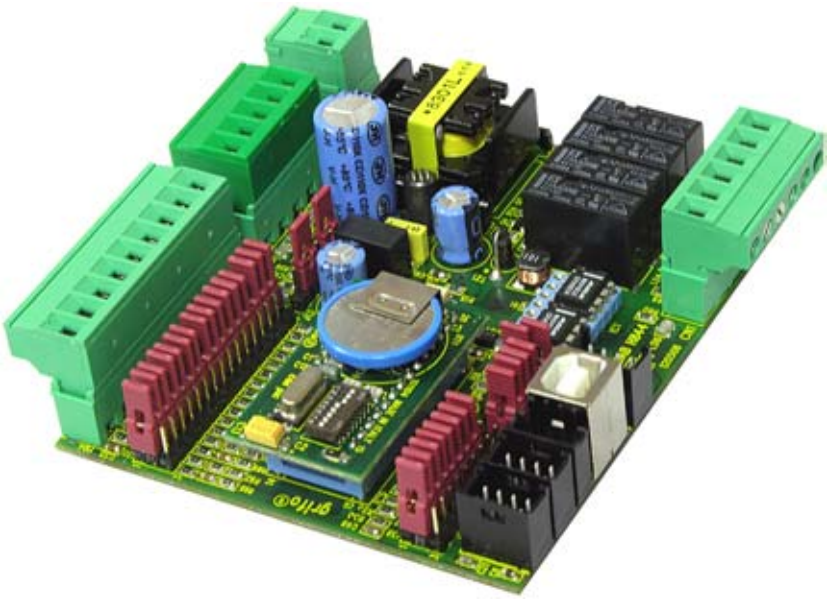


FIGURE 52: GAB H844 WITH 28 PINS CAN PIC MINI MODULE

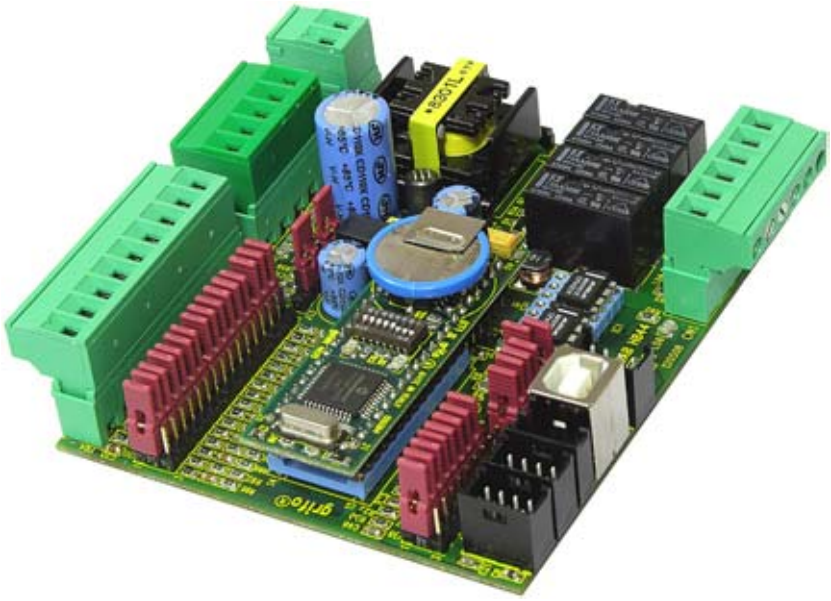


FIGURE 53: GAB H844 WITH 40 PINS GMM 4620 MINI MODULE

BIBLIOGRAPHY

In this chapter there is a complete list of technical books, where the user can find all the necessary documentations on the components mounted on **GAB H844**.

F.T.manual: *Relays index Book*

HEWLETT PACKARD manual: *Optoelectronics Designer's Catalog*

NEWPORT manual: *DC-DC converters*

PHILIPS manual: *I^2C-bus compatible ICs*

S.E.data sheets: *SI series - Switching power supply*

SGS-THOMSON manual: *Small signal transistor - Data Book*

TEXAS INSTRUMENTS manual: *The TTL Data Book - SN54/74 Families*
TEXAS INSTRUMENTS manual: *RS-422 and RS-485 Interface Circuits*

TOSHIBA manual: *Photo couplers - Data Book*

The described manuals can be requested directly to manufacturer or local dealers. Alternatively this information and/or their upgrades can be found in specific internet web pages, of the listed companies.

APPENDIX A: DEFAULT CONFIG., OPTIONS, ACCESSORIES

In corrispondence of the first purchase, or after a reparation, the **GAB H844** is supplied in its base configuration. The features of this configuration has been described many times in the manual (by using also the name default configuration) and in this appendix they are summarized, opportunely divided in the following table.

JUMPER	N°PINS	FUNCTION
J1, J9	2	Connect the termaination and forcig circuitery to the serial line in RS 422, RS 485.
J2, J3, J4	3	Select the signal connection for the serial line of the Mini Module.
J5	3	Configures the serial line for RS 422 or RS 485.
J8	2	Connects the termination circuitery to the CAN line.
J10	3	Gets ready the ZC1 socket for **GMM 93x** Mini Modules.
J11	3	Gets ready the ZC1 socket for **GMM 93x** Mini Modules and defines the connection of Vref of A/D converter of Mini Module.
J13, J14	3	Select the input type between NPN or PNP.
J15, J17, J19, J21, J23, J25, J27, J29	3	Select the connection of a analog adapter on 8 analog inputs and define the range of their connected signals.
J16, J18, J20, J22, J24, J26, J28, J30	3	Configure the 8 analog inputs for signals in current or voltage.
J31	3	Selects the connection of the MM PIN 23 signal.
J32	3	Selects the connection of the MM PIN 22 signal.
J33	3	Selects the connection of MM PIN 21 signal.
J34	3	Selects the connection of MM PIN 20 signal.
J35, J36, J37, J38	3	Select the connection of the 4 buffered digital input signals.
JS1	2	Connects the metallic case of USB CN7 connector to GND.

FIGURE A1: JUMPERS DEFAULT CONFIGURATION

Please remind that the proposed default configuration of jumpers is the one relative to base version of module, that is without any options.

During the order phase the user can add to **GAB H844**, the following features:

OPTION	*DESCRIPTION*
.RS422	RS 422 serial communication line
.RS485	RS 485 serial communication line
.CLOOP	Passive Current Loop serial communication line

FIGURE A2: OPTIONS TABLE

All these options are described in the pragraphs of the manual that illustrate the functionalities and the use of the same additional features. It is suggested to use the final alphabetical index to found these paragraphs in a short time.

In addition there are a list of accessories that simplify and speed up the use of the module. Among these ones we remind:

- **AMP4.Cable** complete cable with 4 coloured wires, 1 metre length, crimped and inserted in female AMP MODU II connector, with 4 pins.

FIGURE A3: AMP4.CABLE CONNECTION ACCESSORY

- **CKS.AMP4** kit composed by female AMP MODU II 4 pins, plus 4 contacts to crimp.

FIGURE A4: CKS.AMP4 CONNECTION ACCESSORY

These components can be acquired directly from AMP dealers by using P/N 280359 and P/N 182206-2.

- **AMP8.Cable** complete cable with 8 coloured wires, 1 metre length, crimped and inserted in female AMP MODU II connector, with 8 pins.

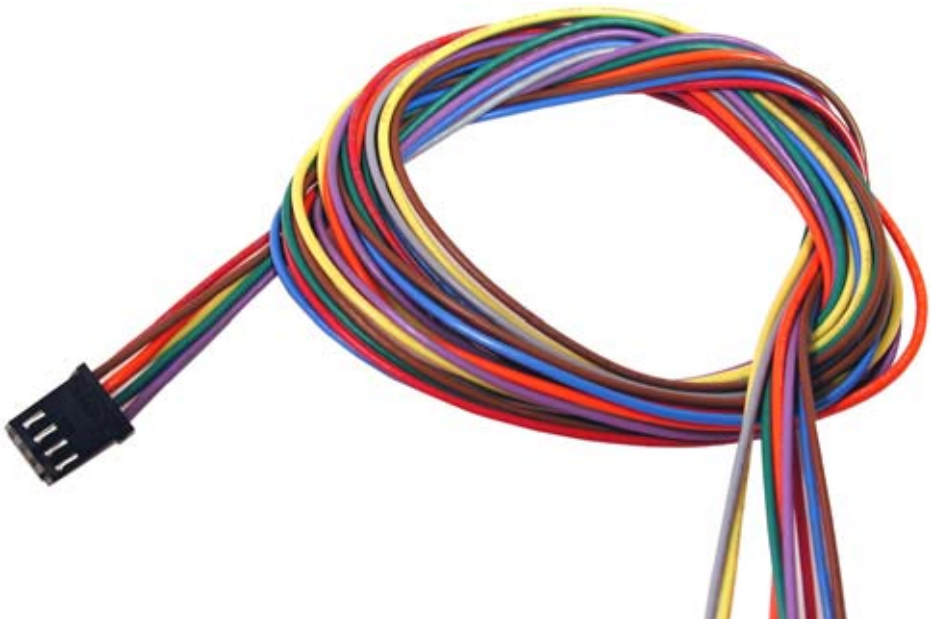


FIGURE A5: AMP8.CABLE CONNECTION ACCESSORY

- **CKS.AMP8** kit composed by female AMP MODU II 8 pins, plus 8 contacts to crimp;

FIGURE A6: CKS.AMP8 CONNECTION ACCESSORY

These components can be acquired directly from AMP dealers by using P/N 280365 and P/N 182206-2.

- **EL 12** power supply for direct connection to mains voltage at 230 Vac, 50 Hz, that generates an output voltage of 12 Vdc compatible for **GAB H844**. The photo of this accessories is already available in previous pages of manual, on figure 37.

APPENDIX B: ALPHABETICAL INDEX

Symbols

A

B

C

D

E

F

G

I

J

L

M

N

O

P

R

S

T

U

V

Z