DAC 212

D/A Converter 2 channels, 12 bits

TECHNICAL MANUAL

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ITALIAN TECHNOLOGY

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DAC 212 Edition 5.00 *Rel. 23 February 2001*

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Powerful peripheral, low price, high resolution, digital to analog converter card; interface for **ABACO® I/O BUS** on **26 pins** standard low profile connector; size: **100x50x40** mm, (110x60x70 mm with container) in **4 type** format; plastic support for **DIN 46277-1** and **DIN 46277-3** Ω rails; one **D/A converter** section, 2 channels **12 bits**, based on **DAC 2815**; output range selectable by hardware through jumpers; available output ranges: **±10V**, **0÷+10V** or amplifier of an external **VRef** signal de coupling **filters** on both analog outputs; **DC/DC** converter for D/A converter section; **One** 4 pins **quick release screw terminal** connectors, for two analog outputs; one **low profile 2 pins** connector for the eventual external VRef; only **4** consecutives Bytes used for card **I/O** addressing; card **I/O** allocation address defined through proper **dip switch**; single power supply voltage: **+5 Vdc, 220 mA**.

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IMPORTANT

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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

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.

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 **DAC 212** card release **240398** and later. The validity of the bring informations is subordinate to the number of the card release. The user must always verify the correct correspondence among the two denotations. On the card the release number is present in more points both board printed diagram (serigraph) and printed circuit (for example near IC3 and C15 on the component side).

GENERAL INFORMATION

The **DAC 212** is a powerful peripheral, low price, high resolution, digital to analog converter card. It is a **4 type** format module, capable to generate two indipendent analog output signals with 12 bits resolution and selectable range.
The electric connection of the card is performed through three confortable connectors: one for the control cards with **ABACO®** I/O BUS, one for an eventual external reference voltage and the last one for the output analog signals; the mechanical mounting is simplified by a proper plastic support for **DIN 46277-1** and **DIN 46277-3** omega rails.
The on board analog circuit can generate signals in a large range of possibility; the output range selection is performed through a set of jumpers that can define several different scales: **±10** Vdc, **0÷10** Vdc and amplifier of an external reference signal.
A galvanically isolated DC/DC converter generates all the required voltages starting from a single power supply of the card.
A wide range of demo programs on how to use this card, allow an immediate use of the same. These programs are available for the whole CPUs of **ABACO®** family. They are duly documented and supplied under "source" form in the many different languages in which **ABACO®** cards can be programmed.

- Interface for **ABACO® I/O BUS** on **26 pins** standard low profile connector.
- Size: **100x50x40** mm, (110x60x70 mm with container) in **4 type** format.
- Plastic support for **DIN 46277-1** and **DIN 46277-3** Ω rails.
- One **D/A converter** section, 2 channels,**12 bits**, based on **DAC 2815**.
- Output range selectable by hardware through jumpers.
- Available output ranges: **±10V**, **0÷+10V** or amplifier of an external **Vref** signal.
- De coupling **filters** on both analog outputs.
- **DC/DC** converter for D/A converter section.
- **One** 4 pins **quick release screw terminal** connectors, for two analog outputs.
- One **low profile 2 pins** connector for the eventual external Vref.
- Only **4** consecutives Bytes used for card **I/O** addressing.
- Card **I/O** allocation address defined through proper **dip switch**.
- Single power supply voltage: **+5 Vdc; 220 mA**.

Here follows a description of **DAC 212** board's functional blocks, with an indication of the operations performed by each one. To easily locate these blocks and verify their connections pleare refer to figure 1.

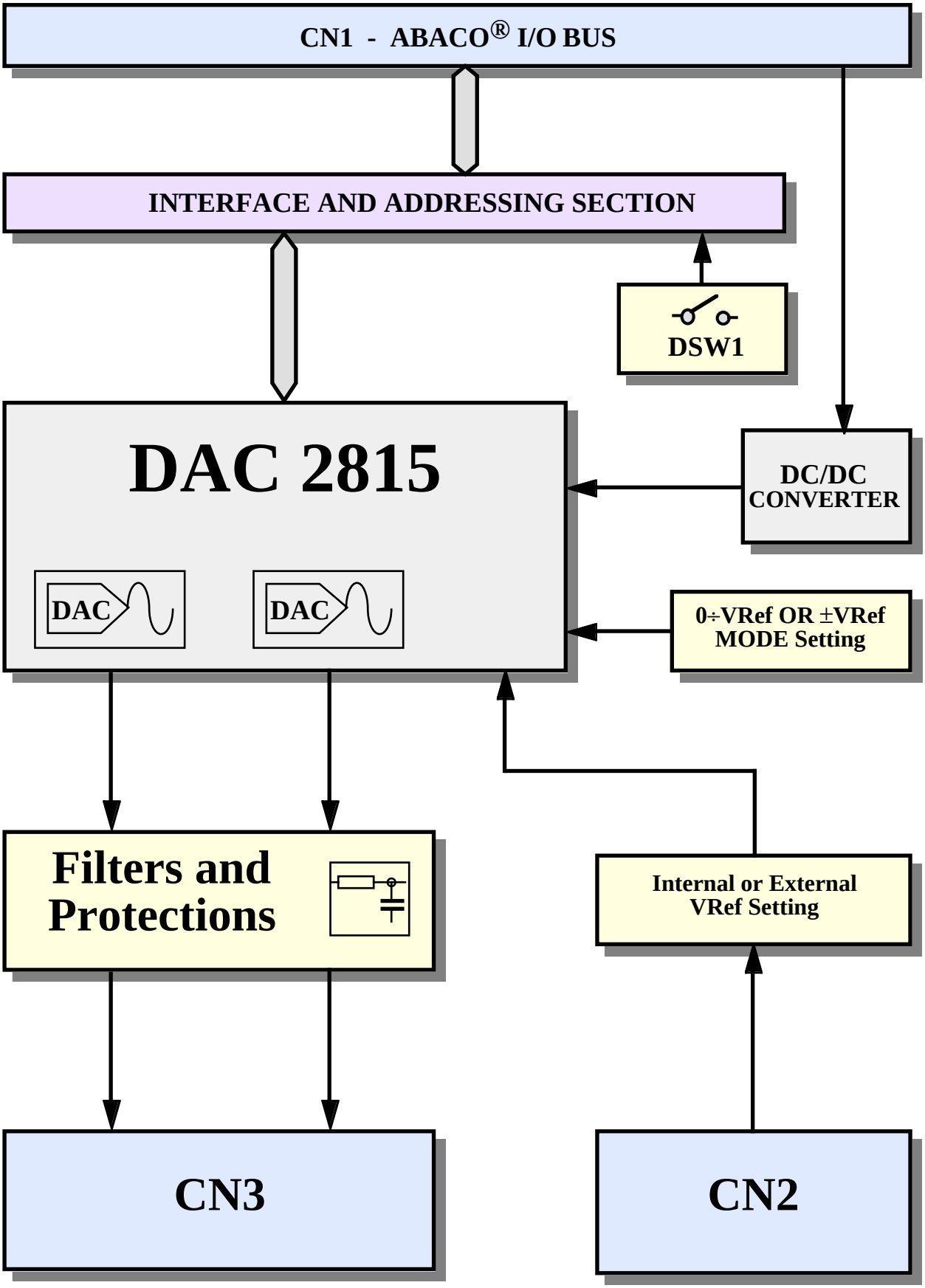


FIGURE 1: BLOCK DIAGRAM

INTERFACING AND ADDRESSING SECTION

This section manages the data exchange between contol logic and command board through **ABACO®** I/O BUS. In particular, all written or read data transit across this section that, in addition, provides the board I/O management, by setting a comfortable dip switch called **DSW1**, and interrupts management.
Physical connection to the control cards is performed by **ABACO®** I/O BUS, but it can be extended to **ABACO®** BUS using specific conversion amodules like **ABB 05** or **ABB03**.
Interfacing and addressing section is based on a programmable logic on some secondary components that warrant the correct working under any operational condition and reduce the board crowding.

D/A CONVERTER

This section features two indipendent D/A Converter signals, based on as many **DAC2815**, warranting a complete separation of the lines. Analog circuitry is capable to generate the signals amongst a wide range of possible choices. The output signal definition range is assured by ta group of jumpers, that allow to select amongst different output values: 0÷10 Vdc; ±10 Vdc or or amplifier of an external **VRef** signal.
The peripheral is software programmed and takes as low as 4 contiguous bytes in the addressing space.
The two analog voltage outputs are provided with protection and de coupling filters, to reduce to the lowest the possibility of damages and/or malfunctioning caused by noises coming from the external world.

DC/DC CONVERTER

A positive booster installed on **DAC 212** board is charged to provide the voltages needed by the digital to analog conversion section. Such DC/DC converter generates two ±15 Vdc voltages starting from the unique +5 Vdc power supply and needs no software management.

TECHNICAL FEATURES

GENERAL FEATURES

On board resources:	2 twelve bits D/A converter (2 analog outputs) 1 six pins Dip-switches to set I/O address
BUS type:	**ABACO®** I/O BUS
Addressing space:	256 Bytes
Bytes taken:	4
On board peripherals:	DAC2815

ELECTRIC FEATURES

Power supply:	+5 Vdc ± 5%
Current consumption:	220 mA
D/A reference voltage:	Selectable: 10 Vdc generated on board or external
D/A voltage outputs range:	Selectable: ±10 Vdc, 0÷10 Vdc, 0÷Vref, ±Vref
D/A maximum output current:	±5 mA
External VRef maximum range:	0÷10 Vdc

PHYSICAL FEATURES

Size:	100 x 50 x 20 mm 110 x 60 x 70 mm	(without DIN containter) (with DIN containter)
Weight:	65 g 125 g	(without DIN containter) (with DIN containter)
Connectors:	CN1: Low profile 26 pins M vertical CN2: Low profile 2 pins M vertical CN3: Quick release screw terminal 4 pins	
Temperature range:	from 0 to 50° C	
Relative humidity:	20% up to 90% (without condensing)	

INSTALLATION

In this chapter there are the information for a right installation and correct use of **DAC 212** card. The user can find the location and functions of each connectors, jumpers, dip switch and some explanatory diagrams.

CONNECTIONS

The **DAC 212** card has 3 connectors that can be linkeded to other devices or directly to the field, according to system requirements. In this paragraph there are connectors pin outs, a short signals description (including the signals direction) and connectors location (please see figure 5), plus some figures that describe how the interface signals are connected on the card.

CN3 - ANALOG OUTPUTS CONNECTOR

CN3 is a 4 pins quick release screw terminal connector.
On CN3 the two analog outputs are available; signals location has been designed to reduce interferences and to easy the connection.

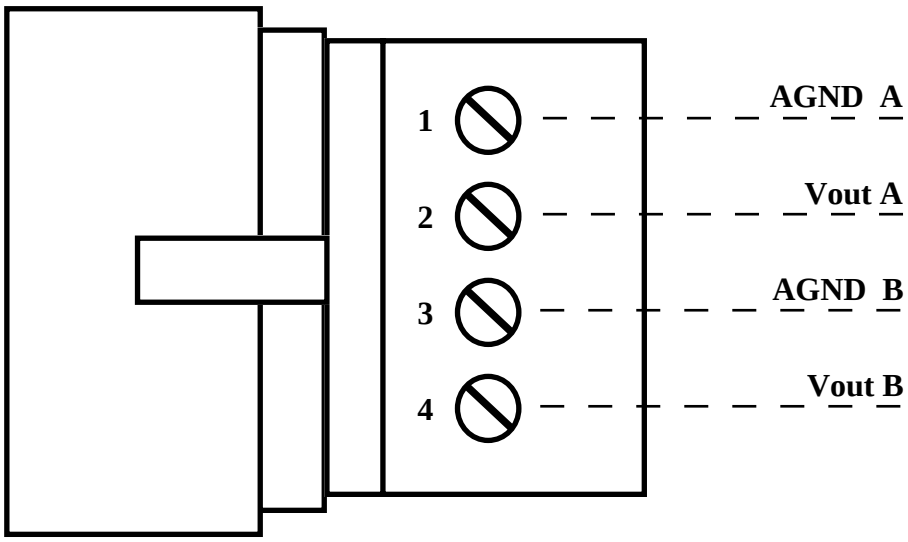
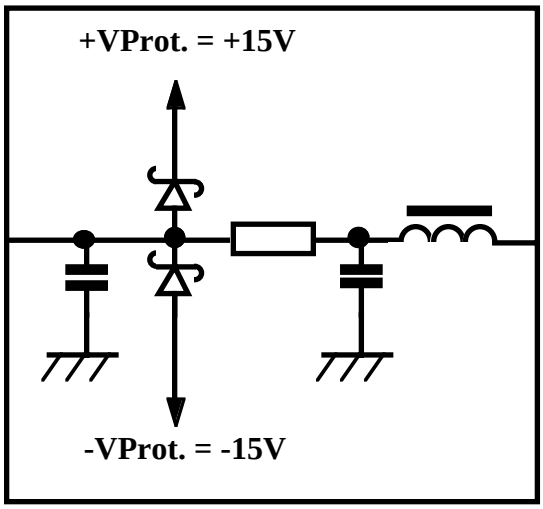


FIGURE 2: CN3 - ANALOG OUTPUTS CONNECTOR

Signals description:

Vout ? = O - Digital to analog converter ?-th output signal.
AGND ? = - Ground of ?-th analog output signal.

FILTER AND PROTECTION



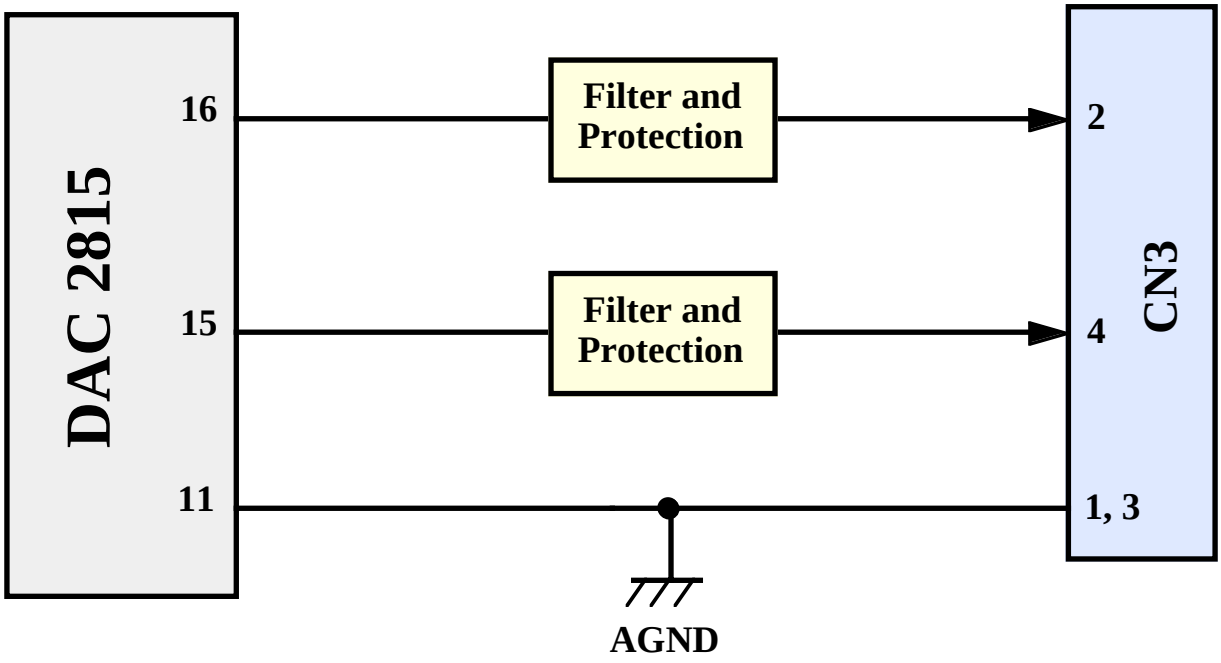


FIGURE 3: ANALOG OUTPUTS BLOCK DIAGRAM

CN1 - ABACO® I/O BUS CONNECTOR

CN1 is a 26 pins, male, vertical, low profile connector with 2.54 mm pitch.
Through CN1 the **DAC 212** card can be connected to external exapnsion modules and to **GPC®** serie intelligent control boards developed by the user or to the numerous **grifo®** boards. All this connector signals are at TTL level and follow the **ABACO®** I/O BUS standard.

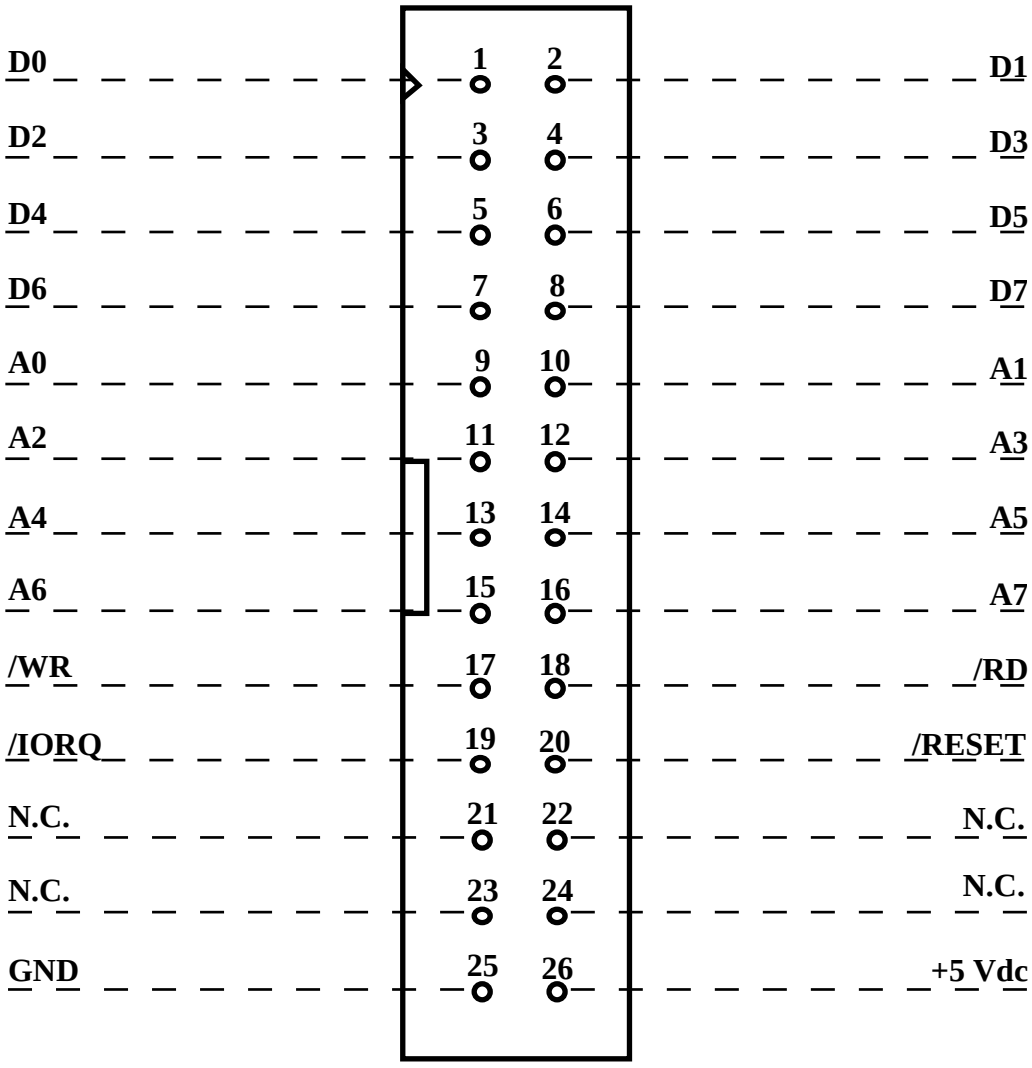


FIGURE 4: CN1 - ABACO® I/O BUS CONNECTOR

Signals description:

A0-A7	=	O	- Address BUS.
D0-D7	=	I/O	- Data BUS.
/IORQ	=	O	- Input output request.
/RD	=	O	- Read cycle status.
/WR	=	O	- Write cycle status.
/RESET	=	O	- Reset.
+5 Vdc	=	I	- +5 Vdc power supply.
GND	=		- Ground signal.
N.C.	=		- Not connected

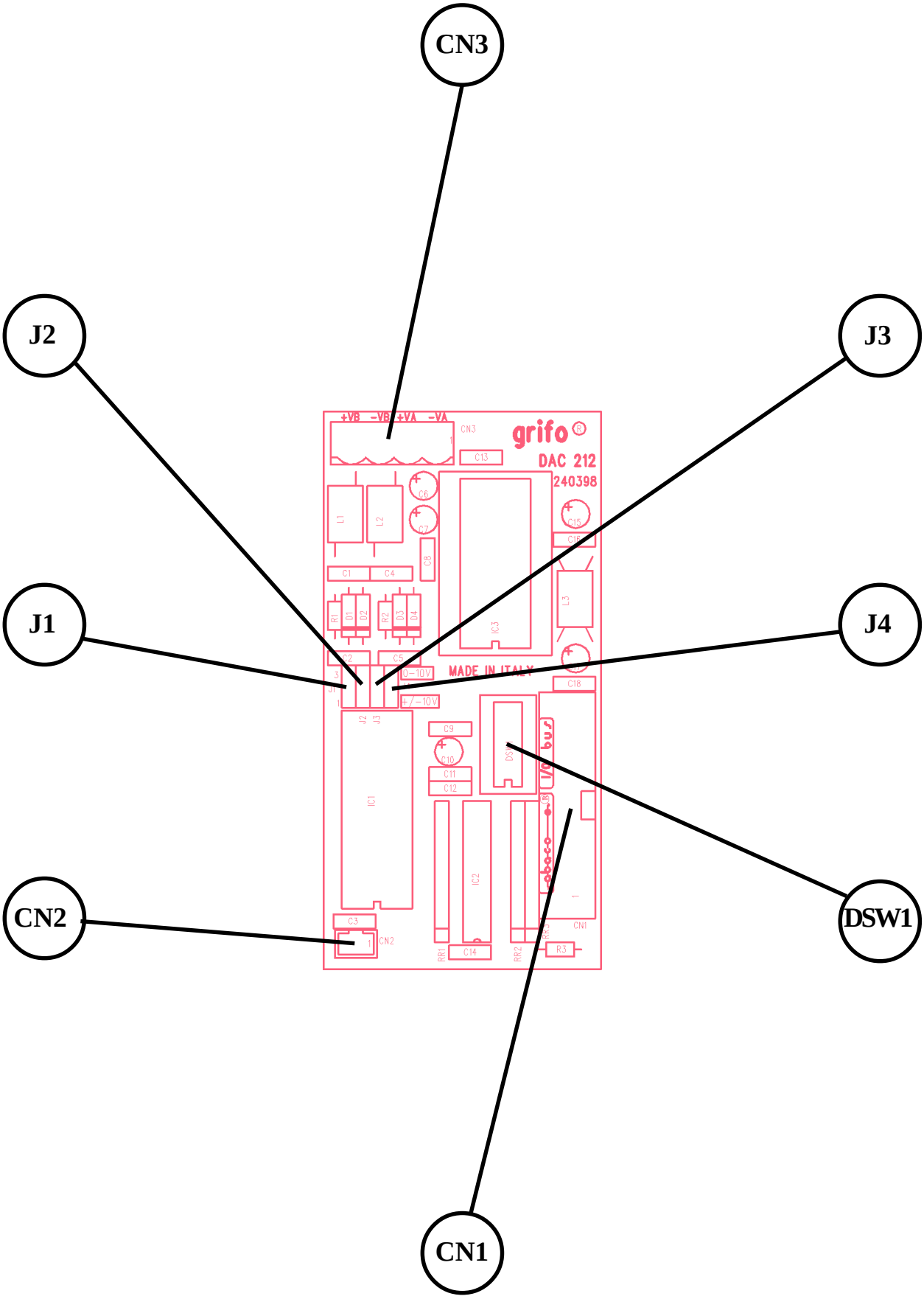


FIGURE 5: JUMPERS, DIP SWITCH, CONNECTORS, ETC. LOCATION

CN2 - EXTERNAL REFERENCE VOLTAGE CONNECTOR

CN2 is a 2 pins low profile vertical male connector, 2.54 mm pitch.
CN2 allows to connect the exteral reference voltage, if the user needs to have a full range voltage different from 10 Vdc. For further information please refer to paragraph “REFERENCE VOLTAGE SELECTION”.

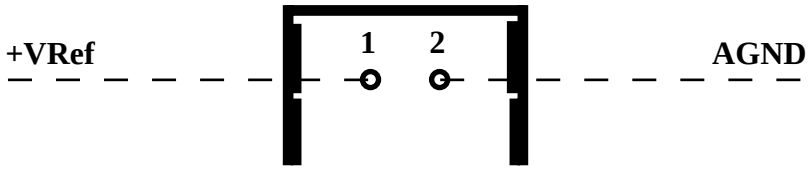


FIGURE 6: CN2 - EXTERNAL REFERENCE VOLTAGE CONNECTOR

Signals description:

+VRef = I - D/A converter external reference voltage.
AGND = - D/A converter analog ground.

FIGURE 7: CARD PHOTO

MECHANICAL MOUNTING

Optionally, the **DAC 212** board can be provided inside a proper plastic container for a direct mounting on DIN 247277-1 and 3 Ω rails (order code **BLOCK.100.50**). If the board is used with some other cards, a single longer container can be used obtaining a single module, so to simplify the mounting and reduce the costs; the described long plastic container code can be ordered to **grifo®**, please call directly for further information.
By selecting this mounting the electric connection between **DAC 212** and other cards is performed with a flat cable that must be really short, as the **FLT.26+26 I/O** for **ABACO®** I/O BUS signals.

JUMPERS

On **DAC 212** board there are 5 jumpers for card configuration. Below there is the jumpers list, location and function.

JUMPERS	N. PIN	FUNCTION
J1	3	It selects SRAM size for IC5.
J4	2	It selects the connection for RUN/DEBUG user input.
J6	5	It selects memory type and size for IC2.
JS1 , JS2	2	They connect the termination and forcing circuit to the RS 422, RS 485 serial line B.
JS3	3	It selects the type of the connection for pin 1 of CN3A.
JS4	3	It selects the type of the connection for pin 1 of CN3B.
JS10	2	It activates the external watch dog circuit.
JS14	2	It connects the on board battery BT1 to the back up circuit.
JS15	3	It selects direction and activation mode for serial line B in RS 422, RS 485.
JS19	3	It connects the power failure circuit to microprocessor interrupts.

FIGURE 8: JUMPERS SUMMARIZING TABLE

The following tables describe all the right connections of **DAC 212** jumpers with their relative functions. To recognize these valid connections, please refer to the board printed diagram (serigraph) or to figures 11 and 12 of this manual, where the pins numeration is listed; for recognizing jumpers location, please refer to figures 5 and 10.
The "*" used in the following tables, 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.

3 PINS JUMPERS

JUMPERS	CONNECTION	PURPOSE	DEF.
J1	position 1-2	Matching with J2, J3 and J4, it sets the working mode of D/A converter DAC 2815 to be the range ±Vref.	*
	position 2-3	Matching with J2, J3 and J4, it sets the working mode of D/A converter DAC 2815 to be the range 0/Vref.	
J2	position 1-2	Matching with J1, J3 and J4, it sets the working mode of D/A converter DAC 2815 to be the range ±Vref.	*
	position 2-3	Matching with J1, J3 and J4, it sets the working mode of D/A converter DAC 2815 to be the range 0/Vref.	
J3	position 1-2	Matching with J1, J2 and J4, it sets the working mode of D/A converter DAC 2815 to be the range ±Vref.	*
	position 2-3	Matching with J1, J2 and J4, it sets the working mode of D/A converter DAC 2815 to be the range 0/Vref.	
J4	position 1-2	Matching with J1, J2 and J3, it sets the working mode of D/A converter DAC 2815 to be the range ±Vref.	*
	position 2-3	Matching with J1, J2 and J3, it sets the working mode of D/A converter DAC 2815 to be the range 0/Vref.	
JS1	position 1-2	Connects the Vref input of D/A converter DAC 2815 to the on board internal reference voltage source (+10 Vdc).	*
	position 2-3	Connects the Vref input of D/A converter DAC 2815 to the connector CN2.	

FIGURE 9: 3 PINS JUMPERS TABLE

NOTE
For a correct working of D/A converter DAC 2815, jumpers J1, J2, J3 and J4 must be always connected in the same position; so they all can be connected in 1-2 or 2-3, no other combination is allowed.

SOLDER JUMPER

The default setting of the solder jumper, called **JS1**, is performed with a small track on the solder side, so if this setting must be changed, first cut the default connection track with a sharp cutter and then connect the required position with a low power solder.

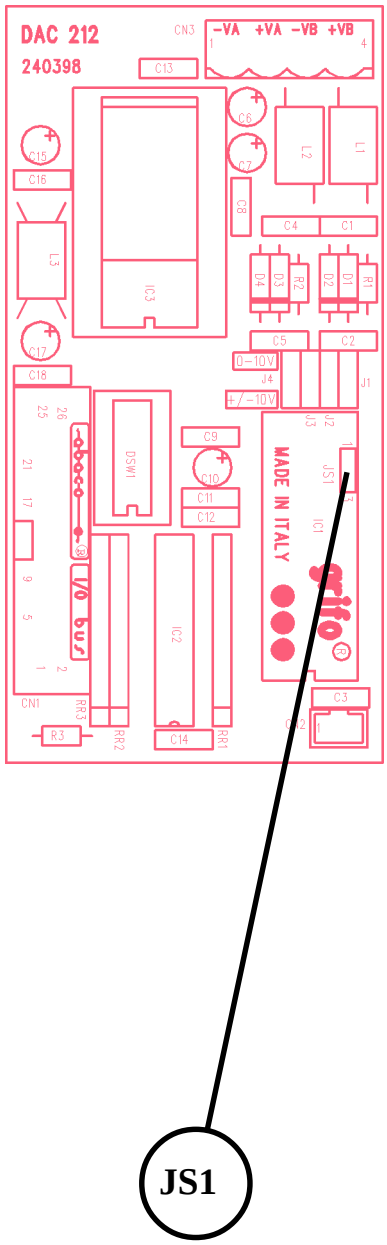


FIGURE 10: SOLDER JUMPER LOCATION

BOARD CONNNECTIONS

To prevent possible connecting problems between **DAC 212** board and the external systems, the user has to read carefully the information of the previous paragraphs and he must follow these instrunctions:

- The analog outputs can erogate a maximum current of ±5 mA; for this reason they must be connected only to external circuits featuring a high impedance, which warrants not to exceed such current limit across the whole output range.
  Eventual connections to power actuators, like power motors, must be made through the specific power driver circuits, like, for exemple, activation or inverter.

- The TTL output signals can be connected directly only to a device featuring the same type of interface. About the correspondance between logic signals and TTL output status, remember that a logic **0** generates a TTL 0 Vdc, while a logic **1** generates a TTL +5 Vdc.

- If an external reference voltage is used, such voltage must be generated by a source noise-free, perfectly stable and indipendent from power supply and temperature.
  To fulfil every one of the above described requirements is essential for the correct working of the whole board. For further information please refer to paragraph “ELECTRIC FEATURES”.

REFERENCE VOLTAGE SELECTION

The solder jumper **JS1**, as previously described, allows to select the source for the Digital to Analog converter DAC 2815 reference voltage.
Such voltage can be the one generated on the DAC 212 board itself (JS1 in position 1-2), that provides +10 Vdc, or can be fetched from an external source through connector CN2 (JS1 in position 2-3).
Such configuration, matched with J1÷J4 jumpers configuration, selects the range of the maximum output voltage for both the D/A channels, in detail:

JS1 in position 1-2 (internal Vref +10 Vdc)

J1÷J4 in position 1-2	->	Vout A, Vout B = ±10V
J1÷J4 in position 2-3	->	Vout A, Vout B = 0÷10V

JS1 in position 2-3 (external Vref)

J1÷J4 in position 1-2	->	Vout A, Vout B = ±Vref
J1÷J4 in position 2-3	->	Vout A, Vout B = 0÷Vref

RESET

When a Reset occours the analog outputs is set to **0 V**, while in the write registers is put the value **0 (000_{HEX})**. For this reason **if the DAC is configured for ±10 Vdc (or ±VRef)** a read operation from DACSET will set the outputs to value -10 Vdc (or -VRef), corresponding to the combination 0.
To prevent this fact the user should initialize the write registers to the value **2048 (800_{HEX})**, which corresponds to the output voltage 0 Vdc.

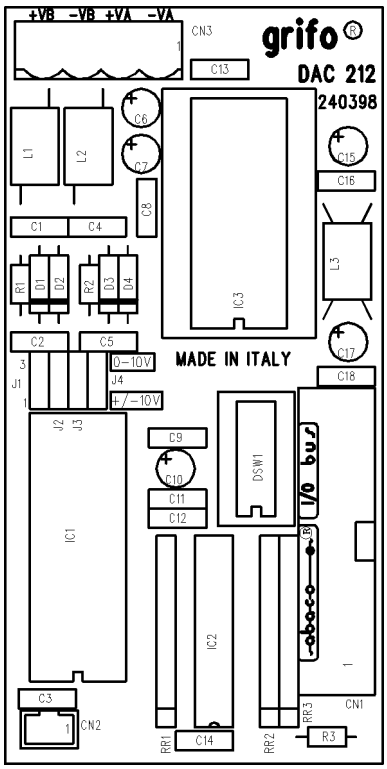


FIGURE 11: COMPONENTS MAP ON COMPONENT SIDE

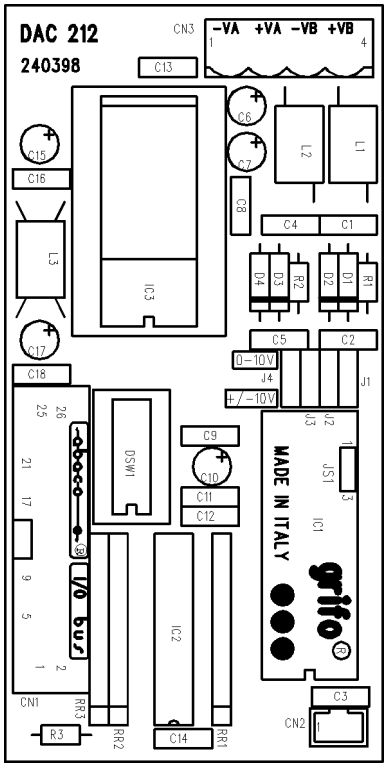


FIGURE 12: COMPONENTS MAP ON SOLDER SIDE

HARDWARE DESCRIPTION

This chapter provides all the hardware informations needed to use **DAC 212** board. Here the User will find informations about I/O card mapping and on board peripheral devices addressing.

BOARD MAPPING

DAC 212 board is mapped into a **4** bytes I/O addressing space that can be mapped starting from different base addresses according to how the board is configured. This feature allows to use several **DAC 212** cards on the same **ABACO®** I/O BUS or **ABACO®** BUS, or to install them on a BUS where other peripheral modules are installed obtaining a structure that can be expanded without any difficulty or modifications to the application software.
These 4 bytes are accessible both in input and in output, so they allow a complete management of the board.
The base address can be defined through the specific BUS interface circuitry on the board itself; this circuitry uses the six pins dip switch called **DSW1**, from which it reads the address set by the user. Here follows the corrispondance between dips configuration and address signals, to easily locate the dip switch please refer to figure 5.

DSW1.1	->	Address A2
DSW1.2	->	Address A3
DSW1.3	->	Address A4
DSW1.4	->	Address A5
DSW1.5	->	Address A6
DSW1.6	->	Address A7

These dips are driven in complemented logic, this means that if a switch is **ON** generates a **logic zero**, viceversa if a switch is **OFF** generates a **logic one**.
As an example, here is reported the configuration of DSW1 that allows to map the board resources from address 48H:

DSW1.1	->	ON
DSW1.2	->	OFF
DSW1.3	->	ON
DSW1.4	->	ON
DSW1.5	->	OFF
DSW1.6	->	ON

INTERNAL REGISTERS ADDRESSING

Indicating the board base address with <**baseaddr**>, that is the address set using DSW1, as indicated in the previous paragraph, **DAC 212** internal registers are addressable as explained in the following table.

DEVICE	REG.	ADDRESS	R/W	MEANING
DAC 2815	DACAL	<baseaddr>+00H	W	Writes low byte into channel A control register.
	DACAH	<baseaddr>+01H	W	Writes high nibble into channel A control register.
	DACBL	<baseaddr>+02H	W	Writes low byte into channel B control register.
	DACBH	<baseaddr>+03H	W	Writes high nibble into channel B control register.
	DACSET	<baseaddr>+00H .... <baseaddr>+03H	R	Both channels A and B are set to the voltage value indicated by the data previously written into the 4 control registers.

FIGURE 13: INTERNAL REGISTERS ADDRESSING TABLE

NOTE
If using several boards on the same **ABACO®** I/O BUS, when setting the boards mapping address the user shold be careful not to allocate more than one board in the same addressing space (consider the base address plus the bytes taken by the board addressing). If this condition is not satisfied a BUS conflict situation will occour, prejudicing the correct working of the whole system.
Please remark that previous table reports the description of the registers available on **DAC 212** card; for a detailed description of all the DAC 2815 Digital to Analog converter internal registers please refer to next chapter.

PERIPHERAL DEVICES SOFTWARE DESCRIPTION

In the previous paragraph allocation addresses of all the peripherals have been reported, here follows a detailed description of function and meaning of internal registers (please always refer to the peripheral mapping tables to understand completely the following informations). Should the present documentaion be inadequate please refer to the component's manufacturer documentation.
In the following paragraphs the indications **D0÷D7** or **D0÷D15** are used to refer the bits of the byte or word involved in the I/O operations.

D/A CONVERTER DAC 2815

Management of 12 bits D/A convertesr DAC 2815 is performed through read or write operations to its specific control registers described in figure 13.
The meaning of the bits in the write registers is:

DACAL.D7	->	bit D7 of channel A	**DACBL.D7**	->	bit D7 of channel B
DACAL.D6	->	bit D6 of channel A	**DACBL.D6**	->	bit D6 of channel B
DACAL.D5	->	bit D5 of channel A	**DACBL.D5**	->	bit D5 of channel B
DACAL.D4	->	bit D4 of channel A	**DACBL.D4**	->	bit D4 of channel B
DACAL.D3	->	bit D3 of channel A	**DACBL.D3**	->	bit D3 of channel B
DACAL.D2	->	bit D2 of channel A	**DACBL.D2**	->	bit D2 of channel B
DACAL.D1	->	bit D1 of channel A	**DACBL.D1**	->	bit D1 of channel B
DACAL.D0	->	bit D0 of channel A	**DACBL.D0**	->	bit D0 of channel B
DACAH.D3	->	bit D11 of channel A	**DACBH.D3**	->	bit D11 of channel B
DACAH.D2	->	bit D10 of channel A	**DACBH.D2**	->	bit D10 of channel B
DACAH.D1	->	bit D9 of channel A	**DACBH.D1**	->	bit D9 of channel B
DACAH.D0	->	bit D8 of channel A	**DACBH.D0**	->	bit D8 of channel B

The meaning of the read register is:

DACSET -> Allows to set the output voltage of channels A and B with the twelve bits values previously set in the four write registers.

The instructions sequence to set an output voltage on a specific channel is:

- Write to opportune register the low byte (bits D7÷D0) of the 12 bits value.

- Write to the bits D0÷D3 of opportune register the high nibble (bits D11÷D8) of the 12 bits value.

- Perform a read operation from the register DACSET to set the output voltage of channels A and B with the twelve bits values previously set in the write register.

The 12 bit data that is written into registers is proportional to the output voltage,according to the relation:

DIGITAL VALUE (Bit D11÷D0)	ANALOG OUTPUTS CONFIGURATION			
	0÷VRef Vdc	**0÷10 Vdc**	**±VRef Vdc**	**±10 Vdc**
4095 = FFF$_{HEX}$	+VRef Vdc	+10 Vdc	+VRef Vdc	+10 Vdc
2047 = 7FF$_{HEX}$	+VRef / 2 Vdc	+5 Vdc	0 Vdc	0 Vdc
0	0 Vdc	0 Vdc	-VRef Vdc	-10 Vdc

FIGURE 14: CORRESPONDANCE BETWEEN DIGITAL VALUE AND ANALOG OUTPUT VALUE

If , for example, the user wants to set the analog output value +6.25 Vdc in channel B of DAC2815, configured for output range 0÷10 Vdc, then he/she must perform the following operations:

- The 12 bit digital value to write into D/A registers is: 2560 ($A00_{HEX}$).
- Write data 10 ($0A_{HEX}$) into register DACBH.
- Write data 0 (00_{HEX}) into register DACBL.
- Read DACSET register to set the voltage output value.

If , for example, the user wants to set the analog output value -1.25 Vdc in channel A of DAC2815, configured for output range ±10 Vdc, then he/she must perform the following operations:

- The 12 bit digital value to write into D/A registers is: 1792 (700_{HEX}).
- Write data 0 (00_{HEX}) into register DACAL.
- Write data 7 (07_{HEX}) into register DACAH.
- Read DACSET register to set the voltage output value.

NOTE

When a Reset occours (signal on pins 20 of CN1) the outputs of the two channels are set to **0 V**, while in the four write registers is put the value **0 (000_{HEX})**.
For this reason if the **DAC is configured for ±10 Vdc (or ±VRef)** a read operation from register DACSET without having opportunely initialized the write registers will cause the output voltages to set to the value -10 Vdc (or -VRef), corresponding to the combination 0.
To prevent this fact the user should initialize the write registers to the value **2048 (800_{HEX})**, which corresponds to the output voltage 0 Vdc.
No one of these operations is required if the DAC is configured for 0÷10 Vdc (or 0÷VRef), in such case a combination 0 already corresponds to 0 Vdc as output voltage.

EXTERNAL CARDS

DAC 212 can be connected to a wide range of block modules and operator interface system produced by **grifo®**, or to many system of other companies.The on board resources can be expanded with a simple connection to the numerous peripheral **grifo®** boards,both intelligent and not, thanks to its standard **ABACO®** I/O BUS connector. Even cards with **ABACO®** BUS can be connected, by using the proper mother boards.
Hereunder some of these cards are briefly described; ask the detailed information directly to **grifo®**, if required.

MB3 01-MB4 01-MB8 01
Mother Board 3, 4, 8 slots
Motherboard featuring 3, 4 or 8 slots of **ABACO®** industrial BUS; pitch 4 TE; standard power supply connectors; LEDs for visual feed-back of power supply; holes for rack docking.

SPB 04-SPB 08
Switch Power BUS 4-8 slots
Motherboard featuring 4-8 slots of **ABACO®** industrial BUS; pitch 4 TE; standard power supply connectors; termination resistances; connector type F for **SPC xxx** supply ; holes for rack docking.

ABB 03
ABACO® Block BUS 3 slots
3 slots **ABACO®** mother board; 4 TE pitch connectors; **ABACO®** I/O BUS connector; screw terminal for power supply; connection for DIN C type and Ω rails.

ABB 05
ABACO® Block BUS 5 slots
5 slots **ABACO®** mother board with power supply. Double power supply built in; 5Vdc 2,5A section for powering the on board logic; second section at 24Vdc 400mA galvanically coupled, for the optocoupled input lines. Auxiliary connector for **ABACO®** I/O BUS. Connection for DIN Ω rails.

SBP 02-xx
Switch BLOCK Power xx version
Low cost switching power supply able to generate voltage from +5 to +40 Vdc and current up to 2.5 A; Input from 12 to 24 Vac; Connection for DIN C Type and Ω rails.

SPC 03.5S
Switch Power Card +5 Vdc
Europe format switching power supply capable to provide +5 Vdc to a load of 4 A; input voltage 12÷24 Vac; power-failure; connector for back-up battery; standard connector for mother board **SPB 0x**.

SPC 512
Switch Power Card +5 Vdc +12 Vdc
Europe format switching power supply capable to provide +5 Vdc 5A and +12 Vdc 2.5 A; input voltage 12÷24 Vac; power-failure; connector for back-up battery; standard connector for mother board **SPB 0x**.

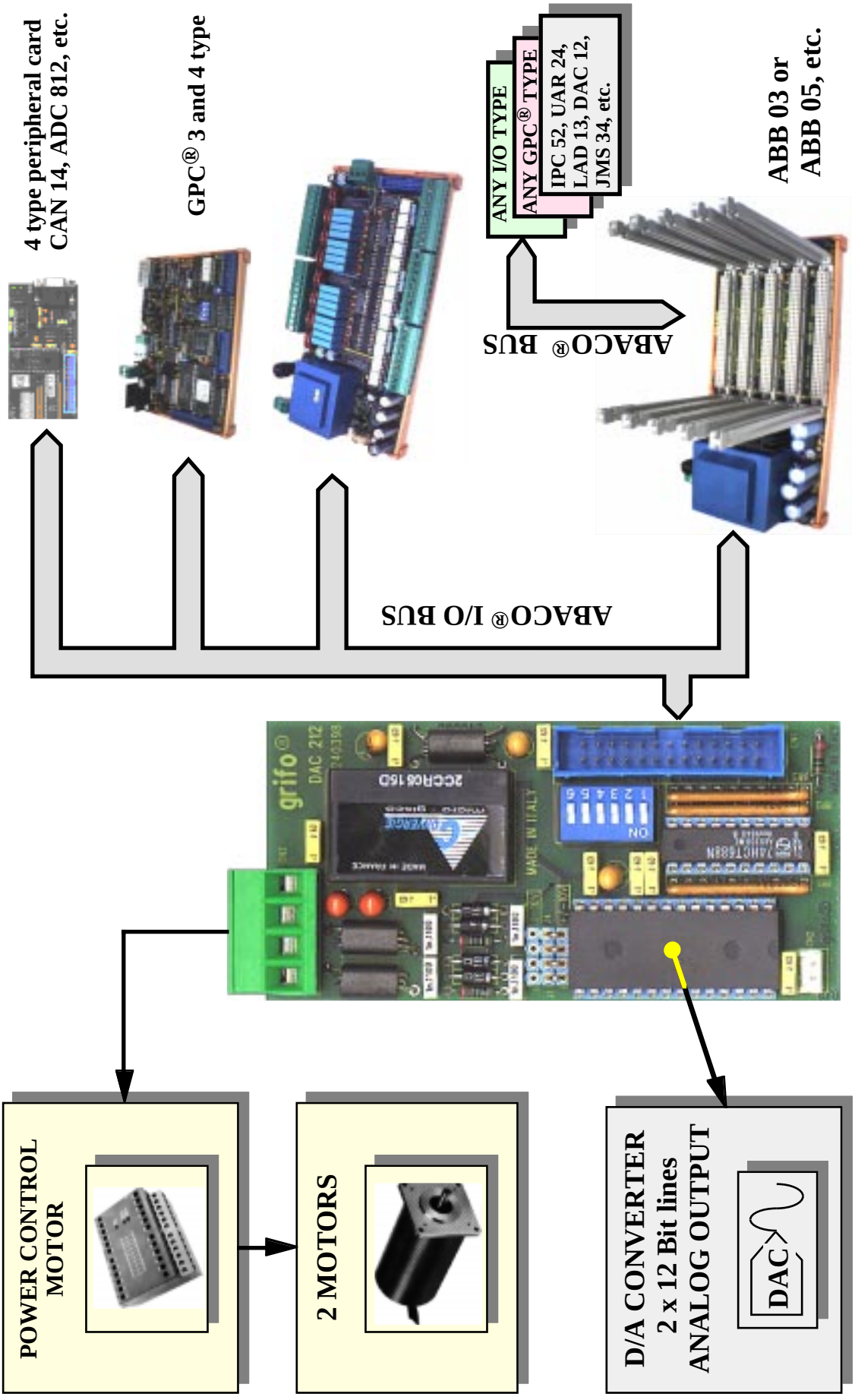


FIGURE 15: POSSIBLE CONNECTIONS DIAGRAM

GPC® 153

General Purpose Controller Z80

84C15 µP, 10÷16 MHz; Full CMOS; 1 RS 232 line; 1 RS 232 or RS 422-485 or Current Loop line; 16 TTL I/O lines; 8 A/D 12 bits lines; 2÷4 Timers Counters; 512K EPROM or FLASH; 512K RAM and RTC backed; 8K serial EEPROM; Buzzer; 1 Activity LED; Watch dog; 8 readable DIPs; LCD Interface.

GPC® 183

General Purpose Controller Z180

Z180 µP, 10÷16 MHz; Full CMOS; 1 RS 232 line; 1 RS 232 or RS 422-485 or Current Loop line; 24 TTL I/O lines; 11 A/D 12 bits lines; 2 Timers Counters; 512K EPROM or FLASH; 512K RAM and RTC backed; 8K serial EEPROM; Buzzer; 2 Activity LED; Watch dog; 4 readable DIPs; LCD Interface.

GPC® 324/D

"4" Type General Purpose Controller 80C32/320

80C32 or 80C320 µP, 14÷22 MHz; Full CMOS; 1 RS 232 line; 1 RS 232 or RS 422-485 or Current Loop line; 4÷16 TTL I/O lines; 3 Timers Counters; 64K EPROM; 64K RAM; 32K RAM backed; 32K DIL E2; 8K serial EEPROM; Watch dog; 1 readable DIP; LCD Interface; Abaco® I/O BUS; 5Vdc Power supply; Size: 100x50 mm.

GPC® 554

General Purpose Controller 80C552

Microprocessor 80C552 at 22 MHz; implementation completely CMOS; 32K EPROM; 32 K SRAM; 32 K EEPROM or SRAM; EEPROM; 2 RS 232 serial lines; 16 I/O TTL; 2 PWM lines; 16 bits Timer/Counter; Watch Dog; 6 signals A/D converter with resolution 10 bit; interface for **ABACO®** I/O BUS.

GPC® 154

"4" Type General Purpose Controller Z80

84C15 µP, 10÷16 MHz; Full CMOS; 1 RS 232 line; 1 RS 232 or RS 422-485 line; 16 TTL I/O lines; 2÷4 Timers Counters; 512K EPROM or FLASH; 512K RAM and RTC backed; 8K serial EEPROM; Watch dog; 2 readable DIPs; LCD Interface; Abaco® I/O BUS; 5Vdc Power supply; Size: 100x50 mm.

GPC® 884

General Purpose Controller Am188ES

Microprocessor AMD Am188ES up to 40 MHz16 bits; implementation completely CMOS; serie 4 format; 512K EPROM or FLASH; 512K SRAM backed with Lithium battery; RTC; 1 RS 232 serial line + 1 RS 232 or RS 422-485 or current loop; 16 I/O TTL; 3 timer/counter; watch dog; EEPROM; 11 signals A/D converter with 12 bit resolution; interface for **ABACO®** I/O BUS.

GPC® 114

General Purpose Controller 68HC11

Microprocessor 68HC11A1 at 8 MHz; implementation completely CMOS; serie 4 format; 32K EPROM; 32K SRAM backed with Lithium battery; 32K EPROM, SRAM, EEPROM; RTC; 1 serial line RS 232 or RS 422-485; 10 I/O TTL; 3 timer/counter; watch dog; 8 signals A/D converter with resolution 8 bit; 1 asunchronous serial line; extremly low power consumption; interface for **ABACO®** I/O BUS.

PBI 01

PNP BLOCK Input

Interface for PNP drivers through NPN inputs; 16 inputs for driver PNP, visualized by LEDs; 16 NPN outputs on **ABACO**® standard input connector; Plastic mount for rails DIN 46277-1 and 3.

FBC 20-120

Flat Block Contact 20 vie

Interface for 2 or 1 mounting cable connectors (low profile 20 pins male) and quick release screw terminal connectors; Plastic mount for rails DIN 46277-1 and 3.

FBC 34

Flat Block Contact 34 vie

Interface for 2 mounting cable connector (low profile 34 pins male) and quick release screw terminal connectors; Plastic mount for rails DIN 46277-1 and 3.

FBC L20

Flat Block Contact LED 20 vie

Interface for 1 mounting cable connector (low profile 20 pins male,featuring **ABACO**® standard Input pin out, and quick release screw terminal connectors; All the signals are visualized through LEDs; Plastic mount for rails DIN 46277-1 and 3.

FBC L34

Flat Block Contact LED 34 vie

Interface for 2 mounting cable connectors (low profile34 and 20 pins male) and quick release screw terminal connectors; featuring **ABACO**® standard Input and Output pin out; All the signals are visualized through LEDs; Plastic mount for rails DIN 46277-1 and 3.

BIBLIOGRAPHY

Here follows a list of manuals and technical notes that the User can read to acquire more informations about **DAC 212** board.

Manual BURR-BROWN: *Integrated circuits data book supplementent - Volume 33c*

Manual TEXAS-INSTRUMENTS: *The TTL Data Book - SN54/74 Families*

Technical Note MICRO-GISCO: *DC-DC Converter 2CCR0515D*

Please connect to the manifactures Web sites to get the latest version of all manuals and data sheets.

APPENDIX A: ALPHABETICAL INDEX

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