



EuroTech

DAQ-1250

User's Manual

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ABOUT THIS MANUAL

This manual is meant for engineers and programmers to assist them in the development of systems based on the Eurotech DAQ-1250 two channel isolated PC/104 DC-servo motor control board. It contains a full technical specification, describes the connectors and main hardware sections as well as documentation on the internal registers and software. Included are instruction on installation, configuration and troubleshooting of your DAQ-1250 module in your system.



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Conventions

The following table lists the conventions that are used throughout this users manual.

Icon	Notice Type	Description
	Information note	Important features or instructions
	Warning	Information to alert you to potential damage to a program, system or device or potential personal injury

Environmental safety



When disposing the equipment, we suggest separating all of its components when possible, and disposing of them in accordance with local waste disposal legislations.
Be sure to dispose of used batteries as required by local waste disposal legislation. Never throw batteries into a fire (risk of explosion) or household garbage can.

Chapter 1 Product Overview

The DAQ-1250 combines on one PC/104 board two LM629 precision DC-servo motion control processors, galvanically isolated full H-bridges, buffered TTL level encoder feedback ports, 24 bit programmable TTL/CMOS level digital I/O and two power MOSFET control outputs. Additionally the board features an external bridge control port and an I2C-bus for system expansion. This board is designed to operate over a wide temperature range required by industrial, automotive and mobile applications. The extensive use of SMD technology increases system reliability. The use of modern FPGA technology allows for high functionality integration as well as flexible customization to meet the requirements of custom applications. Board configuration and settings are stored in an EEPROM and can be freely configured by software making obsolete vast rows of base address and IRQ selection jumper banks.

For a complete description of our standard products and systems please visit our web site: www.eurotech.fi and www.eurotech.it

In the following paragraphs you will find a brief description of the characteristics of the DAQ-1250 board.

DAQ-1250 Block diagram

The figure below shows the functional blocks of the DAQ-1250. The power supplies are omitted for clarity.

Product Description

DAQ-1250 PC/104 Motion controller

- PC/104 Form Factor: 90 X 96 mm (3.6"X3.8"), height:15 mm (0.6")
- Low power consumption - +5V only
- High reliability, wide operating temperature range –40 to +70°C
- Onboard temperature sensor for ambient temperature monitoring
- Operating systems supported: DOS (from 3.0 to 6.22), Windows NT, Windows 2000/XP, WINCE.NET, Linux.

LM629 DC-servo motor controllers

- Two independent motor control channels
- 6MHz clock, 8MHz clock versions available upon request
- Internal 16-bit PID filter
- 32-bit motor position feedback processor with TTL level buffered and filtered encoders
- 32-bit motor command sequencer and trajectory generator
- External H-bridge control port

Motor control H-bridges

- Galvanically isolated from computer and each other up to 500V
- No ground loops through computer ground
- SMD N-channel MOSFETS capable of 6A continuous drive
- 0 to 50VDC bridge drive voltage
- Over voltage and transient protected
- Robust removable screw terminal connectors for motor cabling

Digital I/O

- 24 bit programmable digital I/O - software configurable pull-up/down on digital I/O port in groups of 4 bits
- External interrupt modes
- Input match, compare and change interrupt modes
- Advanced operating modes can be integrated into I/O pins, call Eurotech for details on available options

Bus Interface

- 16-bit bus PC/104bus connector
- 8-bit data bus
- XT and AT interrupt support
- Software configurable interrupt selection, programmable interrupt sharing

FlexiSet™ Configuration

- No Jumpers needed for base addresses or interrupts
- Software configurable board configuration stored in EEPROM
- Board serial number and board type identification
- Base address and interrupt channel stored in memory
- Advanced dialogue program for board parameter configuration
- Support for user data storage in non volatile EEPROM

Chapter 2 Jumper Description

This chapter shows the jumpers layouts and explains how to set up the board correctly. Note that on FlexiSet™ boards “Base address” and “IRQ- jumpers” are not required.

Jumper Layout and Configuration

Described in the figure below, is the general jumper layout of the DAQ-1250 module.

In the below figure, the jumpers are indicated as **RED** followed by the jumper's number, while pin #1 of every jumper is indicated by a square pad.

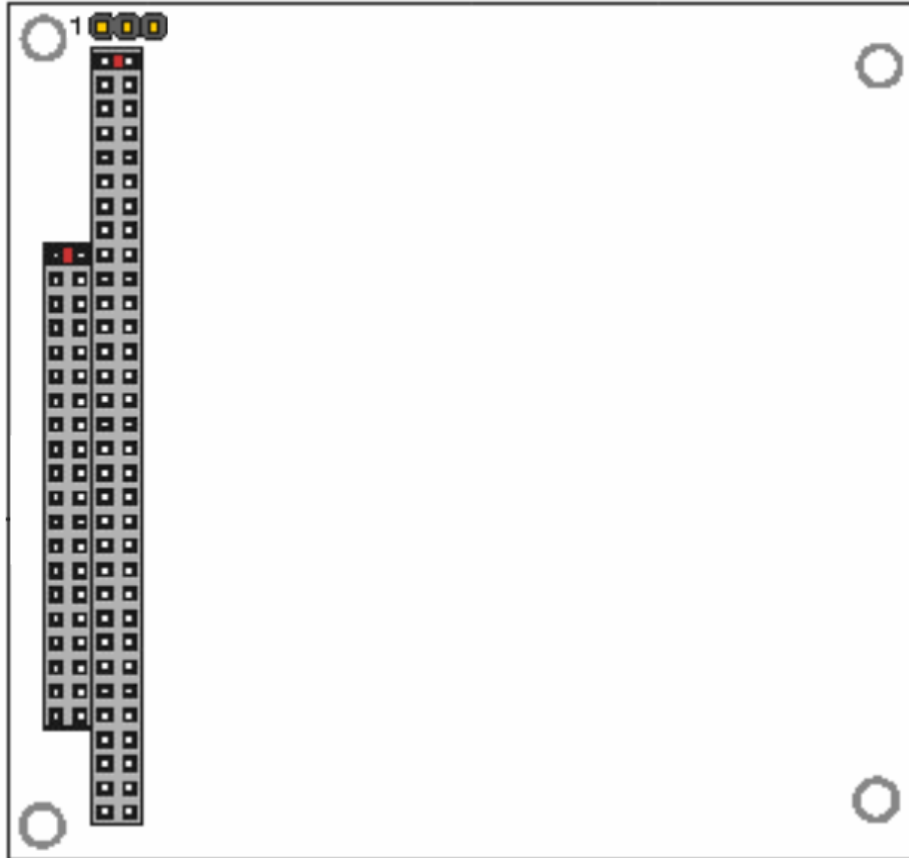


Figure 2. Jumpers and solder jumpers on the DAQ-1250 board

The following jumper is located on the module:

One 3-pin jumper for incremental encoder pull-up or pull-down selection

- +5V -> Encoder signals are pulled high with a 4.7kOhm resistor. NPN type encoder output
- GND -> Encoder signals are pulled low with a 4.7kOhm resistor. PNP type encoder output

The following table provides a quick cross-reference for the DAQ-1250 module's jumpers.

Table 1. Jumper Settings Encoder Termination (factory configured)

LABEL	Type	Function	Default
ENC	3 pin jumper	Selection of encoder signal termination 1-2 : +5V pull-up with 4.7kOhm resistor 2-3: pull-down to GND with 4.7kOhm resistor NO jumper: no termination used	2-3

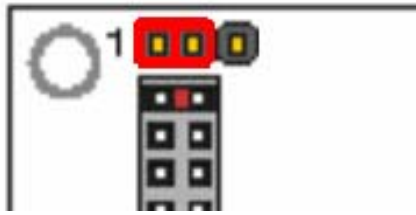


Figure 3. Encoder signals pulled to +5V

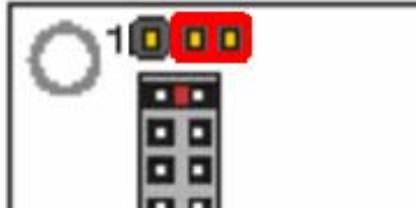


Figure 4. Encoder signals pulled down to GND

Chapter 3 Connector Description

This chapter provides a brief description of the DAQ-1250 connectors, describing their positions and their functionality.

Connector Layout

The figure below highlights the connector positions.

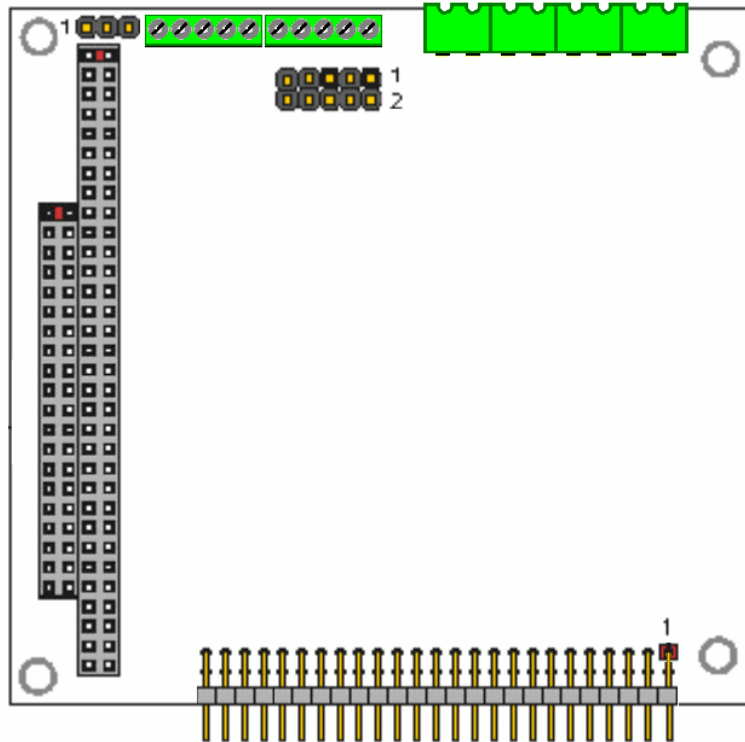


Figure 5. Connector layouts



Note: in the above figure, a red square pad indicates pin 1 of each connector.

Table below lists the name of the connectors with their function and the reference page.

Table 2. Connector Functions

Connector	Function	Page
J1-J2	ISA BUS (PC/XT)	15
J13	Digital I/O Connector	16
ENC	Encoders	18
MOT	Motors	19
UTIL	Utility I/O connector	19

J1 and J2 for the ISA Bus

The ISA BUS

Connectors J1 and J2 contain the signals for the PC/AT ISA-bus. These signals match definitions of the IEEE P996 standard. Below is shown a picture of the PC/104 ISA-bus connector

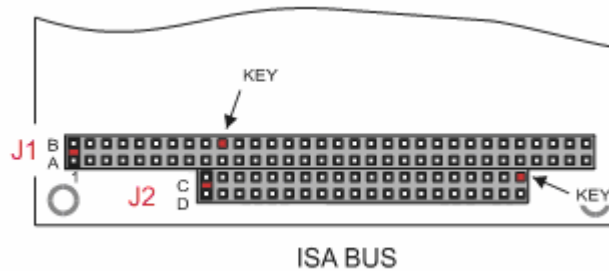


Figure 6. PC/104 BUS layout and definitions

According to PC/104 specifications, two KEYS on the connector are closed on the upper side and the equivalent pin is removed on the bottom side of the bus connector. Keying of the connectors avoids board failure due to wrong insertion in/of another module on the bus.



For further information about the ISA-bus please visit the Eurotech website at (www.eurotech.it), section Industry Standards.

How to connect to the CPU other PC/104 & PC/104 devices: the stack assembly

The ISA Bus connectors of the module are designed to allow the connection onto a stack of other PC/104 and/or PC/104Plus devices. We recommend you to follow the procedure below to ensure that stacking of the modules does not damage any connectors or electronics parts. Failure to follow these instructions may result in irreparable board damage or failure.

1. Turn off all power to the PC/104 computer and its peripheral devices.
2. Touch a grounded metal part of the rack to discharge any accumulation of static electricity.
3. Select and install standoffs to properly position the module on the PC/104 stack.
4. Remove the module from its anti-static bag.
5. Check that keying pins in the bus connector are properly positioned.
6. Check the stacking order; make sure an XT bus card will not be placed between two AT bus cards or it will interrupt the AT bus signals.
7. Hold the module by its edges and orient it so that the bus connector pins line up with the matching connector on the stack.
8. Press evenly the module onto the PC/104 stack.

The picture below shows a typical module stack with 2 PC/104 modules, 1 PC/104 16-BIT module, and 1 PC/104 8-BIT module. The maximum configuration for the PCI bus of PC/104 modules is 4 plus the Host Board. If standard PC/104 modules are used in the stack, they must be the top module(s) because they will normally not include the PCI bus.

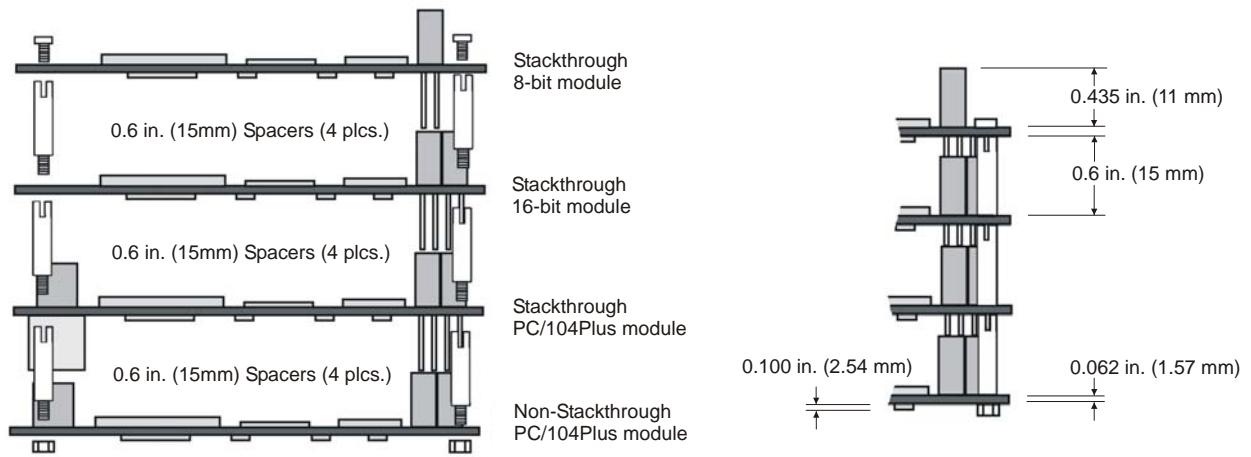


Figure 7. The PC/104 module stack



Do not force any module onto the stack! Wiggling the module or applying too much pressure may damage it. If the module does not readily press into place, remove it, check for bent pins or out-of-place keying pins, and try again.

J13 Digital I/O connector

J13 digital I/O connector is a 50-pin double row 25 x 2 pin with 2.54-mm step connector and allows the connection of up to TTL-level 24 digital I/O signals to the DAQ-1250 board. Additional +5V power and ground pins are available in this connector. Note that the digital I/O signals that are connected to the board may not exceed CMOS/TTL levels under any circumstances. Exceeding these limits may cause permanent damage to the board or system.

J13 Digital I/O connector

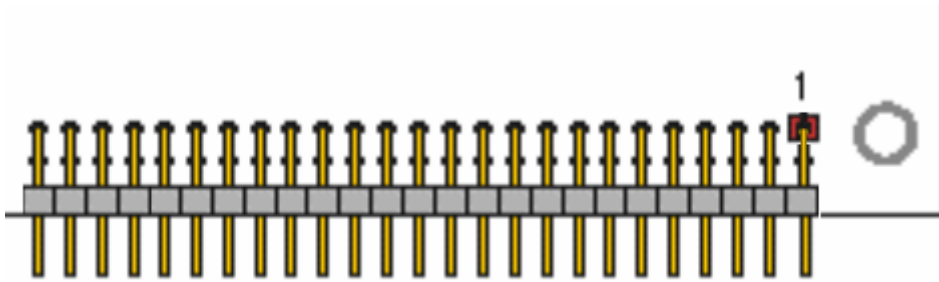


Figure 8. J13 Connector layout

This digital I/O connector implements the following functions:

- Universal Digital I/O
 - 24 bit programmable digital I/O, +3.3V output levels, +5V tolerant inputs
 - Bit-wise programmable direction
 - Programmable pull-up or pull-down in 4 groups of four bits with 10K resistor
 - Multiple ground pins and a +5V pin for external device connection



Note that the general-purpose digital I/O pins are TTL/CMOS tolerant only. Applying over voltage to these pins will cause permanent damage to the DAQ-1250 module. The +5V output is protected with a 2A fuse.

Below is shown the connector pin out:

Table 3. Digital I/O connector

Pin	Signal	Pin	Signal
1	DIO_1	2	EXT-IRQ
3	DIO_2	4	GND
5	DIO_3	6	GND
7	DIO_4	8	GND
9	DIO_5	10	GND
11	DIO_6	12	GND
13	DIO_7	14	GND
15	DIO_8	16	GND
17	DIO_9	18	GND
19	DIO_10	20	GND
21	DIO_11	22	GND
23	DIO_12	24	GND
25	DIO_13	26	GND
27	DIO_14	28	GND
29	DIO_15	30	GND
31	DIO_16	32	GND
33	DIO_17	34	GND
35	DIO_18	36	GND
37	DIO_19	38	GND

39	DIO_20	40	GND
41	DIO_21	42	GND
43	DIO_22	44	GND
45	DIO_23	46	GND
47	DIO_24	48	GND
49	+5V@2A	50	GND

The digital I/O signals can be programmed to inputs or outputs, each channel independently. This allows for maximum flexibility in wiring and system interconnection. The 10K Ohm pull-up or pull-down resistor on these channels can be configured through software in groups of four bits; channels 1-4 share the same mode, either pull-up or pull-down set in a configuration register bit. Other channel groups are channels 5-8, channels 9-12, 13-16, 17-20 and 21 to 24.

Encoder I/O connectors

The DAQ-1250 motor position feedback incremental encoders can be connected to two 5-position screw terminals, one terminal block for each channel. These encoder inputs can be terminated with a 4.7kOhm resistor connected to either +5V or ground. The incremental encoder signals are conditioned with a Schmidt trigger buffer to avoid oscillations and false counting. Note that these encoder signals that are connected to the board may not exceed CMOS/TTL levels under any circumstances. Exceeding these limits may cause permanent damage to the board or system. The motion control chips require the connection of A and B signals; the index pulse can be left disconnected.

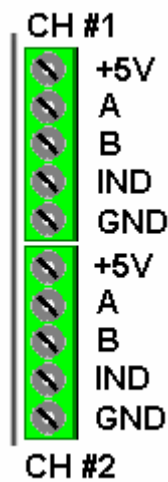


Figure 9. Incremental encoder terminal blocks (side of PCB to the left)

Motor I/O connector

The two DC-servo motors are connected to the DAQ-1250 with robust locking plug-type terminal blocks that can easily be connected and disconnected from the board. The motor supply is connected between the B+ and B- terminals. The motor should be connected between the M+ and the M- terminals. The motor type determines the voltage used to supply the bridge. Typically small to medium power motors use a +12V, +24V or +48V supply voltage. The maximum voltage that may be applied to the DAQ-1250 is 50VDC.

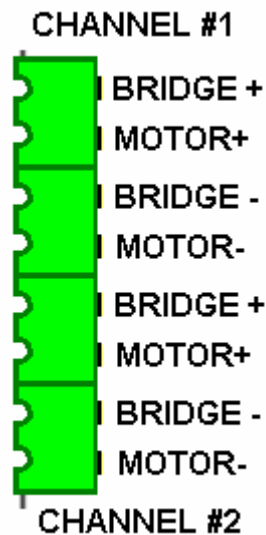


Figure 10. Motor interface connectors

Utility I/O connectors

The DAQ-1250 utility I/O connector includes the following signal functions: Power, I2C-bus, MOSFET outputs and bridge control signals for an external H-bridge. The MOSFET outputs can sink up to 2A or current. These output ports can be used to drive security relays that will disconnect power if an error is encountered, or they can be used to switch solenoids, valves and lamps or to drive a stepper motor.



Figure 11. Utility I/O connector

Table 1.

Pin	Function	Pin	Function
1	+5V	2	GND
3	SIGN#1	4	MAGN#1
5	SIGN#2	6	MAGN#2
7	FET#1	8	FET#2
9	I2C-SCL	10	I2C-SDA

The LM629 motion control chips have each two outputs, sign and magnitude. These signals can be used to control an external power H-bridge. Both channels have their own signals located in the utility connector. The FET1 and FET2 signals are current sinking outputs capable of a 2A drive. The I2C-bus signals are grouped in connector pins #9 and #10. The I2C-bus uses +3.3V logic level drive, but it is +5V level tolerant.

I2C-bus interface

The DAQ-1250 I2C-bus is derived from the I2C-bus controller of the board FPGA. The SCL and SDA signals are pulled high and diode clamped to the +5V supply of the system. External bus signal pull-up is not required. The power and ground pins of the I2C-bus interface can be used to power external +5V devices up to 500mA. The operation of the I2C-bus is designed to be bus-master. The DAQ-1250 controls the external devices and drives the bus clock.

An LM75 I2C-bus temperature sensor is connected to the onboard bus. The device is configured for address 00. The temperature sensor chip can be interrogated by clocking the I2C-bus control lines of the board control register.

Chapter 4 Board Set-up and Configuration

How to use set the board (Configuration using FlexiSet™ program “FX.exe”)

The board configuration is done using the FlexiSet™ configuration software FX.exe. With this software you can configure all the parameters of the board including:

- Base address of the DAQ-1250
- Interrupt channels for the LM629 motion control chips
- Digital I/O pull-up or pull-down configuration
- Direction of the digital I/O channels

These settings are stored on the board in a non-volatile EEPROM. During each startup of the system your DAQ-1250 board is configured automatically once power is applied.

I/O map of the DAQ-1250- board

Table 4. The I/O map of the DAQ-1250 board is as follows:

ADDRESS	FUNCTION	MODE
BASE + 0x00	Access of motion control chip #1	(Read/Write)
BASE + 0x01	Access of motion control chip #2	(Read/Write)
BASE + 0x02	Board control register	(Read/Write)
BASE + 0x03	Direct drive command register	(Read/Write)
BASE + 0x04	Digital I/O port A data/direction	(Read/Write)
BASE + 0x05	Digital I/O port B data/direction	(Read/Write)
BASE + 0x06	Digital I/O port C data/direction	(Read/Write)
BASE + 0x07	Digital I/O control register	(Read/Write)

I/O map of the DAQ-1250

BASE + 0x00h Motion control chip interface register for Channel #1

- READ - Reads data from channel #1 interface register
- WRITE - Writes data to channel #1 interface register

BASE + 0x01h Motion control chip interface register for Channel #2

- READ - Reads data from channel #2 interface register
- WRITE - Writes data to channel #2 interface register

The interface register of the motion control chips is used to pass data and commands to and from the LM629 controller chips. The mode of the interface register is selected by the board configuration register located in BASE + 0x03h.

BASE + 0x02h Board control register

- READ - Returns the status of the board control register
- WRITE - Writes to the board control register

Bit - 00	Host reset-enable	0 – Host reset clears LM629 chips 1 – Host reset blocked
Bit - 01	Direct drive enable #1	0 – LM629 control 1 – direct drive enables (0 after reset)
Bit - 02	Direct drive enable #2	0 – LM629 control 1 – direct drive enables (0 after reset)
Bit - 03	PS	0 – Data or 1 – Command mode of interface register
Bit - 04	SDA drive	0 – drive low 1 – High impedance state
Bit - 05	SCL drive	0 – drive low 1 – High impedance state
Bit - 06	SDA state	logical state of SDA line
Bit - 07	SCL state	logical state of SCL line

To pass a command/data to the LM629 chips you must first configure the mode of the interface register by correctly setting the PS signal that is directly connected to the LM629 chips. The PS signal must be set correctly for both read and write accesses to the appropriate motion control chip interface register.

BASE + 0x03h Direct drive command register

- READ - Reads data direct drive command register
- WRITE - Writes data to direct drive command register

Bit - 00	HEN1	High side bridge control channel #1
Bit - 01	HEN2	High side bridge control channel #2
Bit - 02	IN1	PWM control of motor channel #1
Bit - 03	IN2	PWM control of motor channel #2
Bit - 04	FET1	Control of MOSFET #1
Bit - 05	FET2	Control of MOSFET #2



Only use the direct drive command register bits for motor testing purposes to avoid damage to machinery or operating people. The direct drive command register will directly control the motor bridge MOSFETS and motor behaviour may dangerous if these control signals are incorrectly used.

BASE + 0x04h Digital I/O Port A data/direction (Channels 1-8)

- READ - Reads data from Port A
- WRITE - Writes data to Port A

BASE + 0x05h Digital I/O Port B data/direction (Channels 9-16)

- READ - Reads data from Port B
- WRITE - Writes data to Port B

BASE + 0x06h Digital I/O Port C data/direction (Channels 17-24)

- READ - Reads data from Port C
- WRITE - Writes data to Port C

BASE + 0x07h Digital I/O Port A,B,C data/direction selection

- READ - Reads data from Port A
- WRITE - Writes data to Port A

Bit - 00	MODE-A	0 – Port A data 1 – Port A direction
Bit - 01	MODE-B	0 – Port B data 1 – Port B direction
Bit - 02	MODE-C	0 – Port C data 1 – Port C direction

These bits define the function of the associated port registers. These registers can store bit-wise direction information or input/output data. Port direction register is defines as bit defined as an input if the direction bit is set to "1" and an output if the direction bit is set to "0".

“Hardware collision” Error Message when using FX.exe

Definition of the following message:

Read: 0xFC from 0x209
Invalid return value basic from 0x208
Possible hardware collision
Press any key to exit...

Each card has two kinds of addresses as follows:

CONFIGURATION base address
It's the same for all the cards and is only active if FX.exe is running
FUNCTIONAL base address(s)
Like 3f8, 2f8 etc of the serial boards

CONFIGURATION base address

When using the FX.exe program, it will detect all the Eurotech FlexiSet™ modules in the system using the CONFIGURATON base address, and communicates with them through the CONFIGURATION BASE to CONFIGURATION BASE+3 I/O window.

The default CONFIGURATION base address is 0x208 (so the FX.exe programme uses the 0x208-0x20B I/O window to access the configuration for all the boards in the system)

In some cases the default address (0x208) is used by another card in the system as a FUNCTIONAL base address blocking access to the FlexiSet™ configuration I/O window. Another address window must then be used. At first the FX.exe program runs it tries to check the range 0x208-0x20B to verify if there are other peripherals devices in this I/O window.

So the error message below indicates an address collision:

Read: 0xFC from 0x209 (There was a collision)

In this case it will be necessary to tell the FX.exe programme to use a different CONFIGURATION base address rather than 0x208. This can be done using the following command line instruction with the new base address as the argument:

FX 300

This will attempt to reconfigure the FlexiSet™ cards to use 0x300 as the CONFIGURATION base address; this alternative I/O window can be mapped into the range 0x200 to 0x3FC. The required window size is four consecutive bytes.

FUNCTIONAL base address

The FUNCTIONAL base address is just the normal base address that you would set using jumpers on older types of card, it has nothing to do with the CONFIGURATION base address.

A potential problem may arise is if you set using the FX.exe configuration program with the default parameters (0x208 as CONFIGURATION base address) and in the configuration you define the FUNCTIONAL base address for a card overlapping with this reserved I/O space. Doing this can halt your system, and also disables the ability to use the FX.exe using that default configuration base address. In this case, you will have to rerun the FX.exe program using a different CONFIGURATION base address as described above.

Configuring the DAQ-1250 using FX FlexiSet™ configuration tool software

The following passage will illustrate how to change the settings of your DAQ-1250 module. The configuration of the DAQ-1250 is performed completely under software control and stored in a non-volatile EEPROM memory. Board reconfiguration and board resource management is easy even after the system is completely built.



Note that FX.EXE runs under DOS operating system. DOS is preinstalled on your Eurotech CPU module.

The pictures below illustrate the different menu options supported by the program:

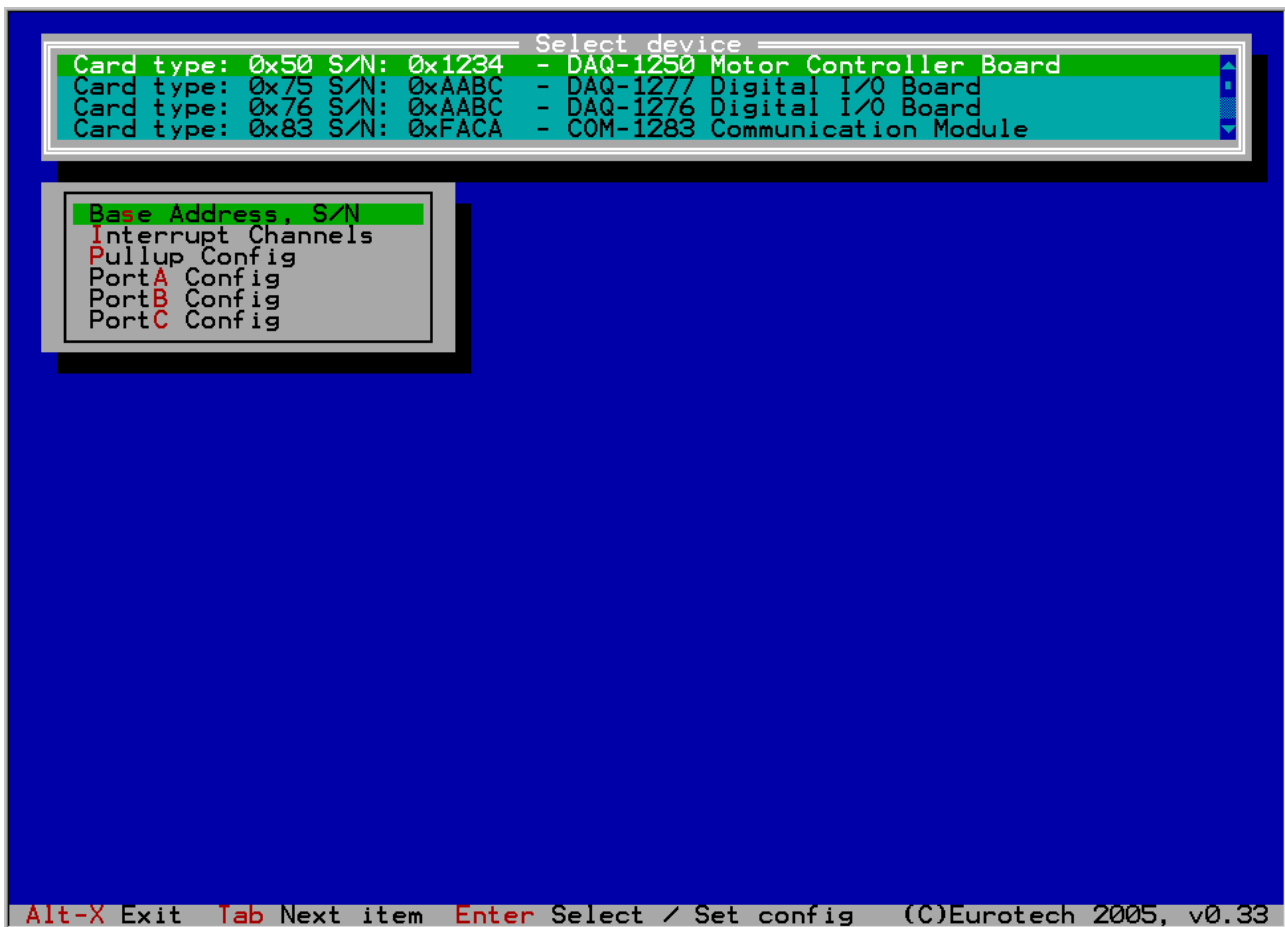


Figure 12. Startup screen

The start-up screen pops up after FX successfully finds valid FlexiSet™ compatible boards on the CPU module bus. Select first the board you want to configure. The example screenshot illustrates multiple boards found in the stack. Once you have selected the board for configuration press <TAB> to move to the configuration menus.

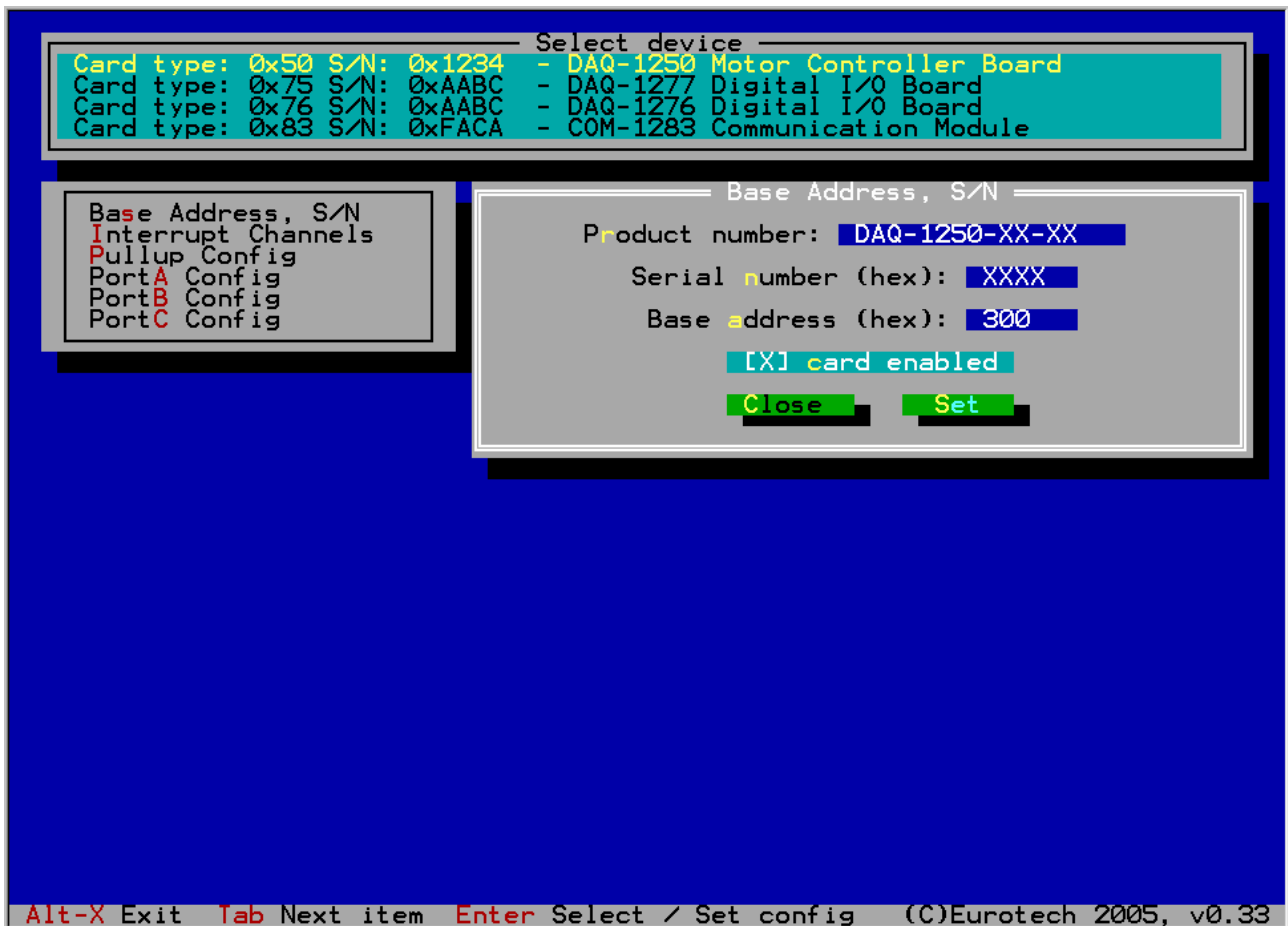


Figure 13. Board base address screen

This dialogue box shows the board type and its identifier serial number. These values are used and set by Eurotech. Use this dialogue box to enable board as shown above. Select "SET" to store data before moving on or "Close" if you wish not to save.

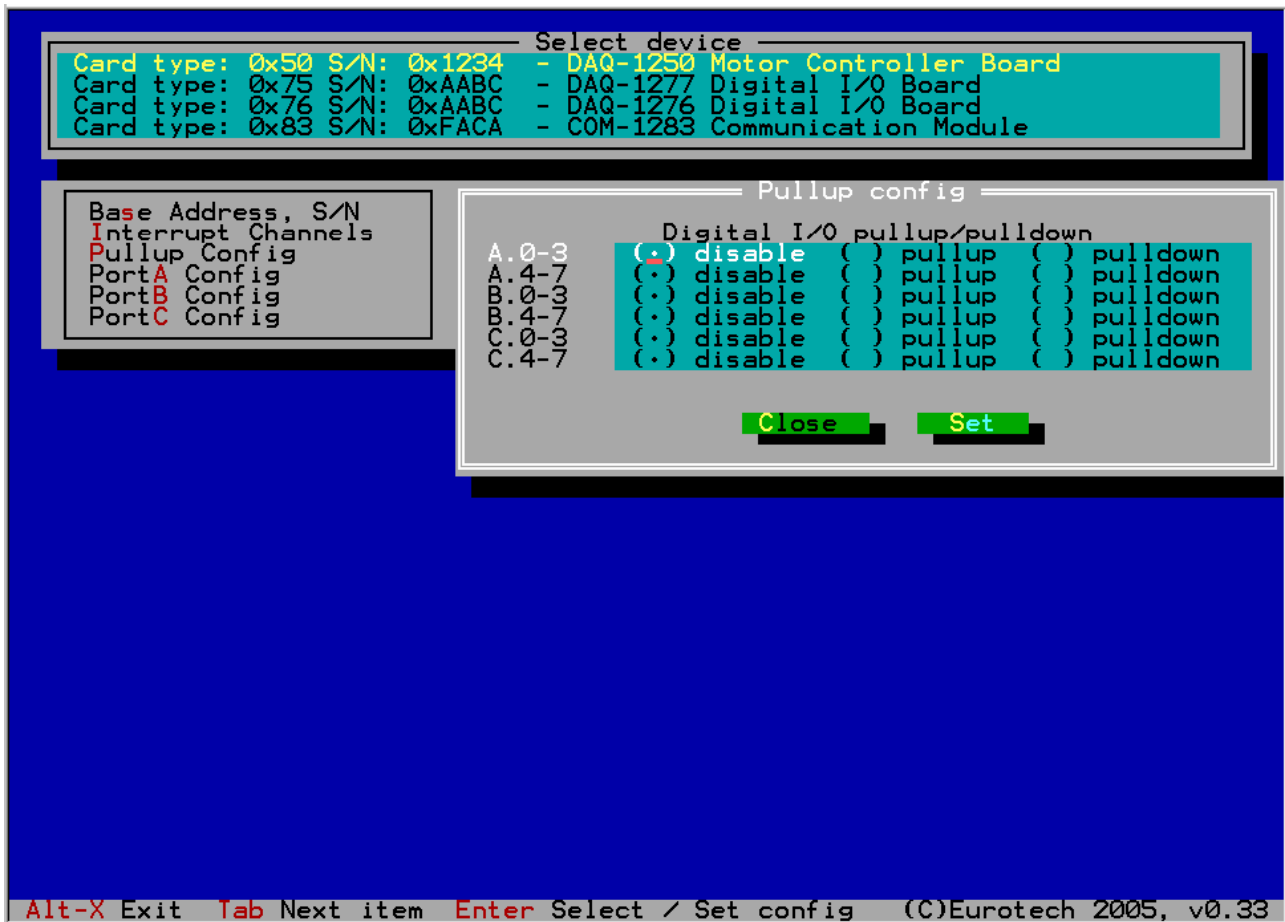


Figure 14. Digital I/O pull-up / pull-down configuration

The dialogue above lets you configure the following:

- Digital I/O pullup/pulldown selection in groups of 4 channels. Option includes free I/O channel. The pull-up /dn resistor is 10Kohms.

Select "SET" to store data before moving on or "Close" if you wish not to save.

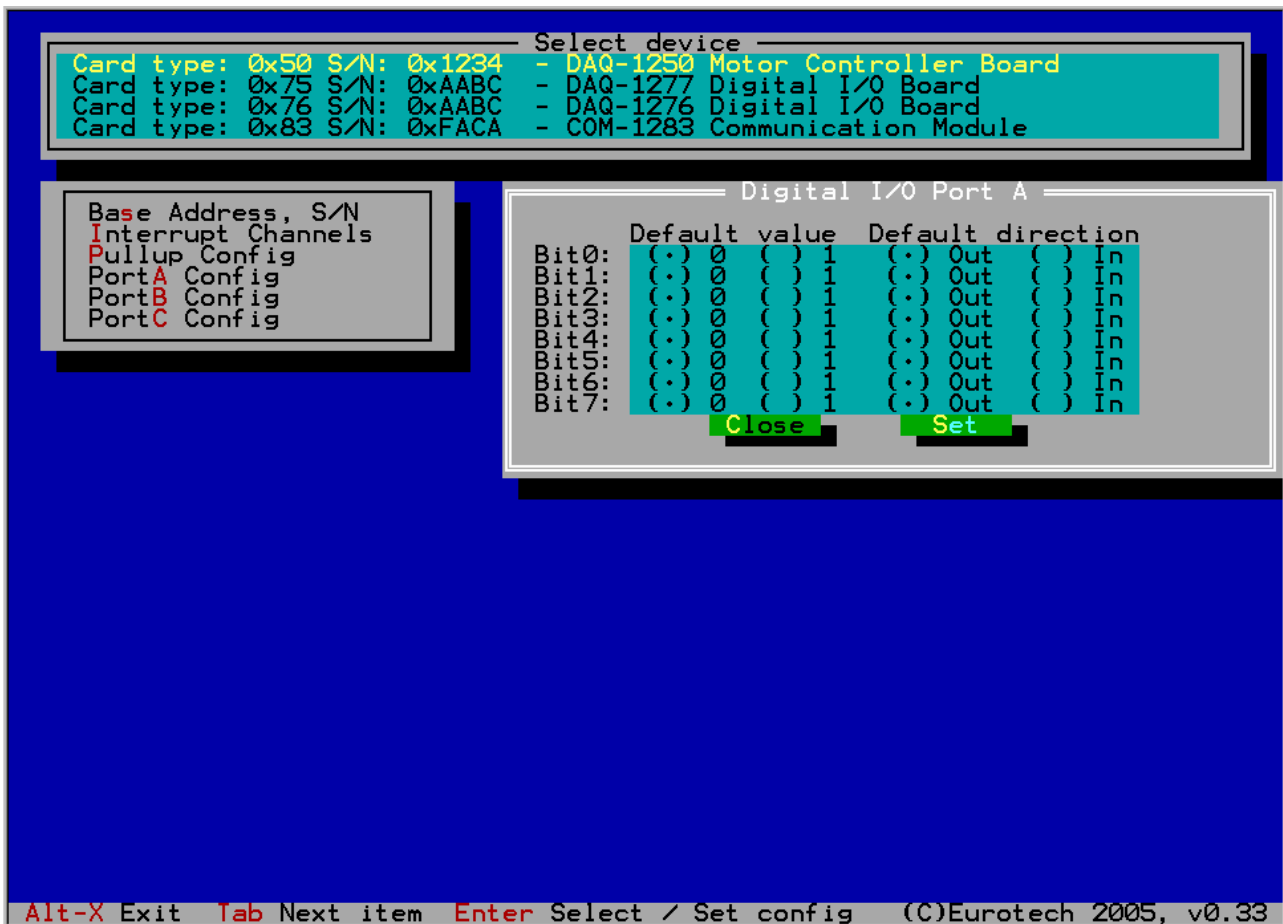


Figure 15. Digital I/O direction and power-up state configuration

The dialogue above lets you configure the following:

- Digital I/O direction control as well as power-up default value if the channel is configured as an output. The default value has no meaning if the channel is set to be an input. Port A includes digital I/O channels 1-8, Port B includes channels 9-16 and Port C channels 17-24. All these configurations can also be changed by writing to the associated digital I/O control registers.

Select "SET" to store data before moving on or "Close" if you wish not to save.

Note that Port B and Port C configuration menus are identical.

Setting up your DAQ-1250 board for motor control operation

Incremental encoder set up

The DAQ-1250 can connect to several different types of incremental encoder interfaces. There are two different options to terminate your encoder signals. Pull-up to +5V or pull down to ground. A 74HCT14 schmidt trigger buffer conditions the encoder signals and will condition the pulses to avoid false counting due to slow rise times. The termination impedance is 4.7kOhms. You can connect your sensors directly to the encoder connection terminal blocks on the side of the board. Make sure you connect your encoder correctly as the motor can perform unpredictably if the encoder is not connected or wired incorrectly. Typical encoder resolutions are 100 to 1000 pulses per revolution.

A +5V supply on the encoder connector terminal block can be used to power the incremental encoder. Make sure you only use +5V encoders, excessive voltage levels from +12V or +24V sensors will cause permanent damage to your board.

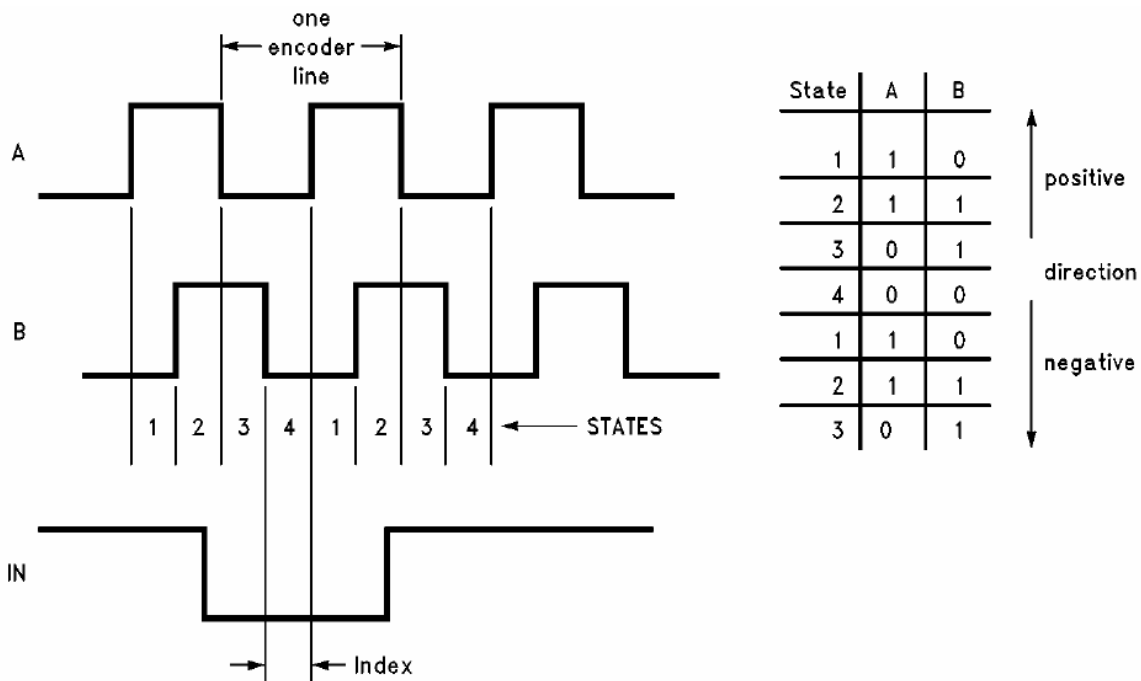


Figure 16. Incremental encoder operation and direction sensing

LM629 Motion control chip set up

The picture below describes the control scheme of the LM629 motion control chips.

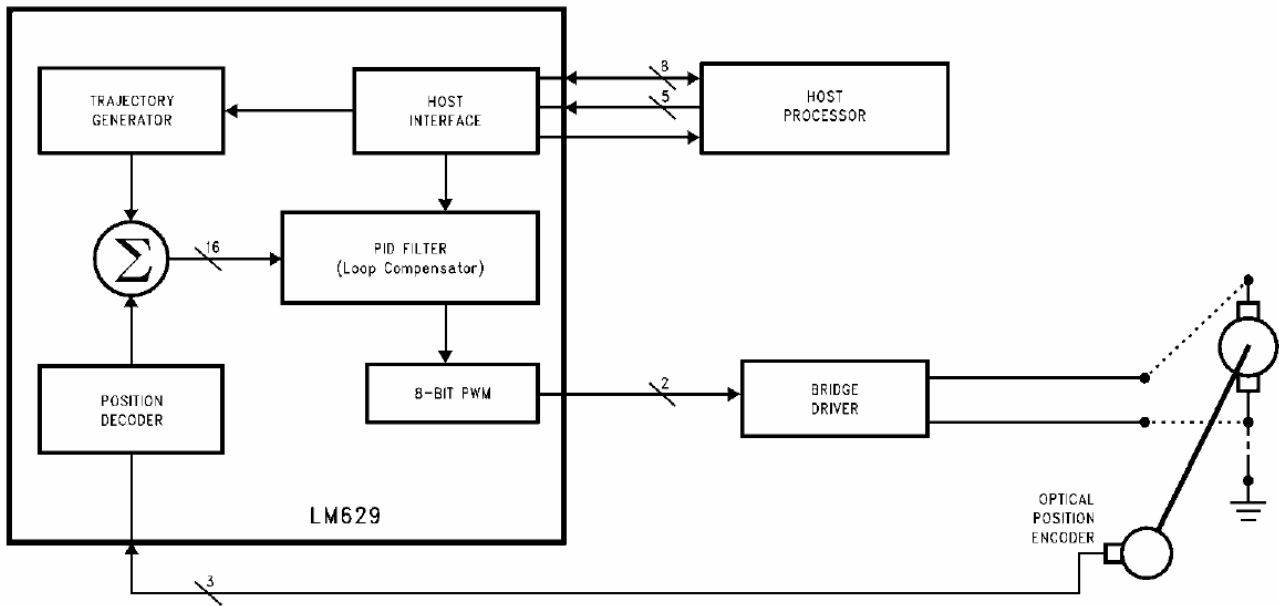


Figure 17. LM629 motion controllers

The DAQ-1250 is based on commonly used LM629 motion control chips. These chips use the PWM control mode and a full H-bridge for motor control. There are several command registers inside the chip that define the control properties of the motor such as the PID-controller, trajectory parameters, velocity and acceleration. These variables can be changed while the trajectory is being processed. The table below lists the internal commands of the LM629 motion control processor. The commands listed in the table below illustrate the available commands. These commands are written to the LM629 controller chip interface register when the PS-signal controlled by the board configuration register is in "Command"-mode.

Both of the servo motor controllers are clocked with a 6MHz clock. This must be taken into consideration when PID constants and other control variables are tuned.

Table 2. LM629 command set

Command	Type	Description	Hex	Data Bytes
RESET	Initialize	Reset LM628	00	0
PORT8	Initialize	Select 8-Bit Output	05	0
PORT12	Initialize	Select 12-Bit Output	06	0
DFH	Initialize	Define Home	02	0
SIP	Interrupt	Set Index Position	03	0
LPEI	Interrupt	Interrupt on Error	1B	2
LPES	Interrupt	Stop on Error	1A	2
SBPA	Interrupt	Set Breakpoint, Absolute	20	4
SBPR	Interrupt	Set Breakpoint, Relative	21	4
MSKI	Interrupt	Mask Interrupts	1C	2
RSTI	Interrupt	Reset Interrupts	1D	2
LFIL	Filter	Load Filter Parameters	1E	2 to 10
UDF	Filter	Update Filter	04	0
LTRJ	Trajectory	Load Trajectory	1F	2 to 14
STT	Trajectory	Start Motion	01	0
RDSTAT	Report	Read Status Byte	None	1
RDSIGS	Report	Read Signals Register	0C	2
RDIP	Report	Read Index Position	09	4
RDDP	Report	Read Desired Position	08	4
RDRP	Report	Read Real Position	0A	4
RDDV	Report	Read Desired Velocity	07	4
RDRV	Report	Read Real Velocity	0B	2
RDSUM	Report	Read Integration Sum	0D	2

Motor interfacing



Note: Connecting the motors incorrectly may cause danger or personal injury. Be careful to check the motor interface and wiring carefully before applying power to the motor control bridge. Eurotech assumes no responsibility for damage or injury occurring from motor use or interfacing using the DAQ-1250 board.

If you connect the Motor + and – terminals in reverse in relationship with the DAQ-1250 board you will have the motor running in the opposite direction to the position feedback and the motor will rush without control.

Close to the center in the middle of the board is a temperature sensor that can be used to monitor ambient temperature in the near proximity of the motor control bridges. This device can be used to increase the reliability of your system in high temperature installations or when using motors close to full load.

The figure below shows a conceptual connection scheme of a motor to the DAQ-1250.

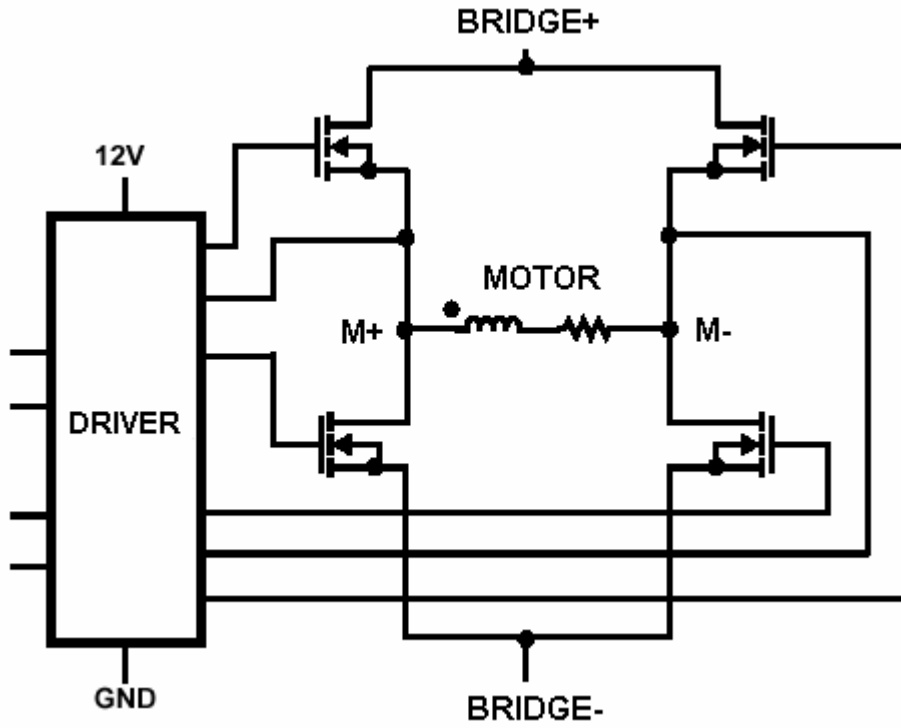


Figure 18. Motor connection scheme

Common Problems and Solutions

The following table lists some of the common problems that you may encounter while using your DAQ-1250 module, and suggests possible solutions. If you are having problems with your DAQ-1250 module, please review this table *before* contacting technical support.

Table 5. Common problems and solutions

Board does not work	In some cases if the +5V power supply rises slowly the FPGA will not initialize properly. The status LED on the board will be lit if the FPGA is correctly booted. If the LED is not illuminated you must recycle power OFF-ON.
Motor rushes even though encoder is connected for feedback	Motor may be connected in “reverse”. Check the connection of the motor + and – terminals to match the equivalent signals of the DAQ-1250. Alternatively the encoder pulses A and B may be reversed.
Board is not detected using FX	If you are using a Eurotech CPU-145X or CPU-146X series CPU the PCI to ISA bridge must be configured to be able to access the ISA bus I/O resources that are used by the board. 0x279 + 4 consecutive bytes for automatic board identification 0x208 ... 0x20B if you use FX.exe with default board CONFIGURATION base address to address EEPROM 0x280 ... 0x283 if you use FX.exe 280 with 0x280 as new set CONFIGURATION base address to address EEPROM

Troubleshooting a PC/104 System

If you have reviewed the preceding table and still cannot isolate the problem with your DAQ-1250 module, please try the following troubleshooting steps. Even if the resulting information does not help you find the problem, it will be very helpful if you contact technical support.

- **Simplify the system.** Remove items one at a time and see if one particular item seems to cause the problem.
- **Swap components.** Try replacing items in the system one-at-a-time with similar items.

Technical/Sales Assistance

If you have a technical question, please call Eurotech Customer Support Service at one of the numbers below, or e-mail our technical support team at:

- Email: support@eurotech.fi
- Phone: +358 477 888 0
- Fax: +358 477 888 99

If you have a sales question, please contact your local Eurotech Sales Representative or the Regional Sales Office for your area.

Additional and latest information is available at Eurotech website, located at:

<http://www.eurotech.fi> and <http://www.eurotech.it>

Returning For Service

Before returning any of Eurotech's products, you must phone Eurotech at **+39-0433-485411** and **obtain a Returned Material Authorization (RMA) number.**



Note. You must have the RMA number in order to return any product for any reason!

The following information is needed to expedite the shipment of a replacement to you:

- Your company name and address for invoice
- Shipping address and phone number
- Product I.D. number
- The name of a technically qualified individual at your company familiar with the mode of failure on the board
- A detailed description of the problem and of the current configuration including OS and software loaded.

If the unit is out of warranty, service is available at a pre-designated service charge. Contact Eurotech for pricing and please supply a purchase order number for invoicing the repair.

Pack the board in anti-static material and ship in a sturdy cardboard box with enough packing material to adequately cushion it.



Warning! Any product returned to Eurotech improperly packed will immediately void the warranty for that particular product!

Appendix



A.1 Electrical and Environmental Specifications

The following section provides tables and illustrations showing the electrical, mechanical and environmental specifications for the DAQ-1250 module.

In the following tables you will find:

- Operating Characteristics
 - Electrical operating characteristics
 - Operating temperature Range
 - Battery backup characteristics
- Absolute maximum ratings
- MTBF
- Power Consumption

Operating Characteristics

Electrical Operating Characteristics

Table 6. DC Operating Characteristics

Supply Voltage	V _{CC} =+5V±5% (4.75V to 5.25V).
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Note. This module is not warranted against damage caused by overheating at temperatures in the excess of +85°C

For proper operation of the DAQ-1250 module, the ambient air temperature must remain within the temperature range: -40°C to +85°C

Absolute Maximum Ratings

Table 7. Absolute Maximum Ratings

Supply Voltage:	V _{CC} : 0.00 to 5.40V
Storage Temperature Range:	-45°C to +85°C
Non-Condensing Relative Humidity:	<95% at 40°C (+104°F)
Operating Temperature Range:	-40°C to +85°C



Warning! Stressing the device beyond the “Absolute Maximum Ratings” may cause permanent damage. These are stress ratings only. Operation beyond the “Operating Conditions” is not recommended. Extended exposure beyond the “Operating Conditions” may affect device reliability.

MTBF

Hours: 166.000

Standard: mil std 217 ground benign

Temperature: 25.0 °C

Power Consumption

Table 8. Power Consumption

TBD		

A.2 Mechanical Dimensions

Board Dimensions

The DAQ-1250 module’s mechanical dimensions are shown in the following picture:

- Dimensions: 90 X 96 mm (3.6”X3.8”), height:15 mm (0.6”)

A.3 Safety Summary

The following general safety precautions must be observed during all phases of operation, service, and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the equipment. Eurotech SpA assumes no liability for the customer's failure to comply with these requirements.

The safety precautions listed below represent warnings of certain dangers of which Eurotech is aware. You, as the user of the product, should follow these warnings and all other safety precautions necessary for the safe operation of the equipment in your operating environment.

Ground the Instrument

To minimize shock hazard, the equipment chassis and enclosure must be connected to an electrical ground. The equipment is supplied with a three-conductor ac power cable; the power cable must be plugged into an approved three-contact electrical outlet, with the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet. The power jack and mating plug of the power cable meet International Electro technical Commission (IEC) safety standards.

Do Not Operate in an Explosive Atmosphere

Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

Keep Away From Live Circuits

Operating personnel must not remove equipment covers. Only Factory Authorized Service Personnel or other qualified maintenance personnel may remove equipment covers for internal subassembly or component replacement or any internal adjustment. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

Do Not Substitute Parts or Modify Equipment

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification of the equipment. Contact Eurotech technical staff or your local representative for service and repair to ensure that safety features are maintained.

Observe Dangerous Procedure Warnings

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed. You should also employ all other safety precautions, which you deem necessary for the operation of the equipment in your operating environment.

Flammability

All Eurotech PCBs (printed circuit boards) are manufactured by UL-recognized manufacturers, with a flammability rating of UL-V0.

EMI Caution

This equipment generates, uses and can radiate electromagnetic energy. It may cause or be susceptible to electromagnetic interference (EMI) if not installed and used in a cabinet with adequate EMI protection.

CE Notice

This product complies with the EMC Directive (89/336/EEC). Compliance with this directive implies conformity to the following European Norms:

- EN55022 (CISPR 22) Radio Frequency Interference
- EN50082-1 (IEC801-2, IEC801-3, IEC801-4) Electromagnetic Immunity

The product also fulfills EN60950 (product safety), which is essentially the requirement for the Low Voltage Directive (73/23/EEC).

This product was tested in a representative system to show compliance with the above-mentioned requirements. A proper installation in a CE-marked system will maintain the required EMC/safety performance.

Disclaimer of Warranty

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Reliability

Eurotech has taken extra care of product design in order to ensure reliability. The two major ways in which reliability is achieved are:

- The product is designed in top-down fashion, utilizing the latest in hardware and software techniques, so unwanted side effects and unclear interactions between parts of the system are eliminated.
- Eurotech tests each board by exercising its functions, burns it in under power, and retests it to ensure that the infant mortality phase is passed before the product is shipped.

Life Support Policy

Eurotech products are not authorized for use as critical components in life support devices or systems without the express written approval of the president of Eurotech.

Technical & Sales Assistance

If you have a technical question, please contact the Eurotech Customer Support Service

support@eurotech.fi

Other information can be found at:

www.eurotech.it
www.eurotech.fi
www.eurotech.com.cn

If you have a sales question, please contact your local Eurotech Sales Representative or the Regional Sales Office for your area.

Additional and latest information is available at Eurotech website, located at:

<http://www.eurotech.fi>