

REF. 0501

HARDWARE CONFIGURATION

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PRELIMINARY WARNINGS



MACHINE SAFETY

It is up to the machine manufacturer to make sure that the safety of the machine is enabled in order to prevent personal injury and damage to the CNC or to the products connected to it.

On start-up and while validating CNC parameters, it checks the status of the following safety elements:

- *Feedback alarm for analog axes.*
- *Software limits for analog and sercos linear axes.*
- *Following error monitoring for analog and sercos axes (except the spindle) both at the CNC and at the drives.*
- *Tendency test on analog axes.*

If any of them is disabled, the CNC shows a warning message and it must be enabled to guarantee a safe working environment.

FAGOR AUTOMATION shall not be held responsible for any personal injuries or physical damage caused or suffered by the CNC resulting from any of the safety elements being disabled.



HARDWARE EXPANSIONS

FAGOR AUTOMATION shall not be held responsible for any personal injuries or physical damage caused or suffered by the CNC resulting from any hardware manipulation by personnel unauthorized by Fagor Automation.

If the CNC hardware is modified by personnel unauthorized by Fagor Automation, it will no longer be under warranty.



COMPUTER VIRUSES

FAGOR AUTOMATION guarantees that the software installed contains no computer viruses. It is up to the user to keep the unit virus free in order to guarantee its proper operation.

Computer viruses at the CNC may cause it to malfunction. An antivirus software is highly recommended if the CNC is connected directly to another PC, it is part of a computer network or floppy disks or other computer media is used to transmit data.

FAGOR AUTOMATION shall not be held responsible for any personal injuries or physical damage caused or suffered by the CNC due a computer virus in the system.

If a computer virus is found in the system, the unit will no longer be under warranty.

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The CNC is ready to be used in industrial environments especially on milling machines, lathes, etc.

It allows controlling the machine movements and devices.

Technical information

Refer to this manual for technical information about the CNC hardware.



Do not get into the inside of the unit. Only personnel authorized by Fagor Automation may manipulate the inside of this module.



Install the CNC away from coolants, chemical products, etc. that could damage it.

Place the power supply breaker easily accessible and at distance between 0.7 m (2 ft) and 1.7 m (5 ft 7") from the floor.

The external 24 Vdc power supply must be stabilized.

Safety conditions

In order to avoid personal injuries and damage to this product or to those connected to it, read carefully the section on safety conditions in the introduction to this manual.



Do not handle the connectors with the unit connected to AC power. Before doing it, make sure that the unit is disconnected.

Start-up

Before starting the CNC up, read the indications of this chapter of the manual.



Check that the machine where this CNC is installed meets the directive 89/392/CEE.

1 CNC structure

CPU (Central Unit) / Monitor

The central unit is located on the rear of the monitor. There are 10" and 12" LCD monitors depending on the type of central unit.

	PCI	PC104
Dimensions (without monitor)	(294 x 206 x 117.5) mm (11.57 x 8.11 x 4.62) inch	(376.5 x 280 x 121.75) mm (14.82 x 11.02 x 4.79) inch
Monitor size	12" LCD	10" LCD 12" LCD Without monitor
HD	Yes	Yes
Compact flash	No	Option
Battery for emergency turn-off	No	Option
Ethernet	T base 10/100Mhz	T base 10/100Mhz
Modem / Fax	56K	56K
USB ports	No	2
Battery of the CMOS	CR2032	CR2450 (access from the outside)

The PC104 central unit is available without monitor, thus being possible to install it remotely. A standard off-the-shelf VGA monitor may be used. In this case, the maximum cable length is 10 meters.

Keyboard and operator panel

The keyboard and the operator panel may go separately or integrated into a single keyboard-operator-panel.

The keyboard and the operator panel may also be integrated into the monitor.

Peripherals

Such as floppy disk drives, CD-ROM drive or mouse. They may be connected to the CNC through specific cables.

CNC structure



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1.1 Possible configurations

Basic hardware

The hardware elements described in this manual are identified as follows.

PCI	PCI central unit.
PC104	PC104 central unit.
LCD-10	10" LCD monitor.
LCD-10K	10" LCD monitor with integrated keyboard and operator panel.
LCD-12	12" LCD monitor.
OP-Panel-H/E	Keyboard with integrated operator panel. Available either with an electronic handwheel (OP-Panel-H) or with an emergency stop button (OP-Panel-E).
Key Board Panel H	Keyboard.
Jog Panel	Operator panel.

Additional hardware

- "E-stop + handwheel" unit.
- Mouse unit.
- Floppy disk drive.

Emergency battery

Optional when having a PC104 central unit.

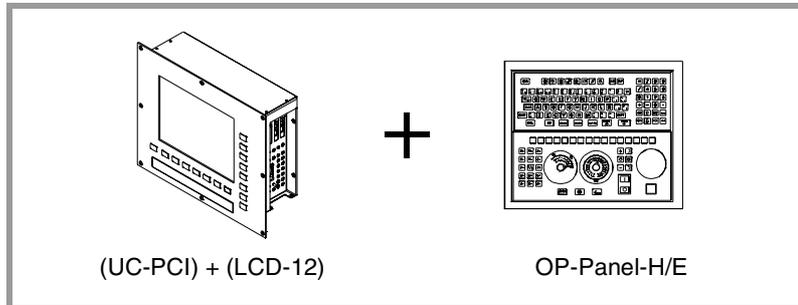
It ensures proper operation of the CNC when there is a mains outage. In those cases, the CNC stops the machine and the CNC turns off in a controlled manner.

CNC structure

(UC-PCI) + (LCD-12) + (OP-Panel-H/E)

The central unit offers access from the front panel to the floppy disk drive and to the connectors for the keyboard and the mouse through a PS-2 connector.

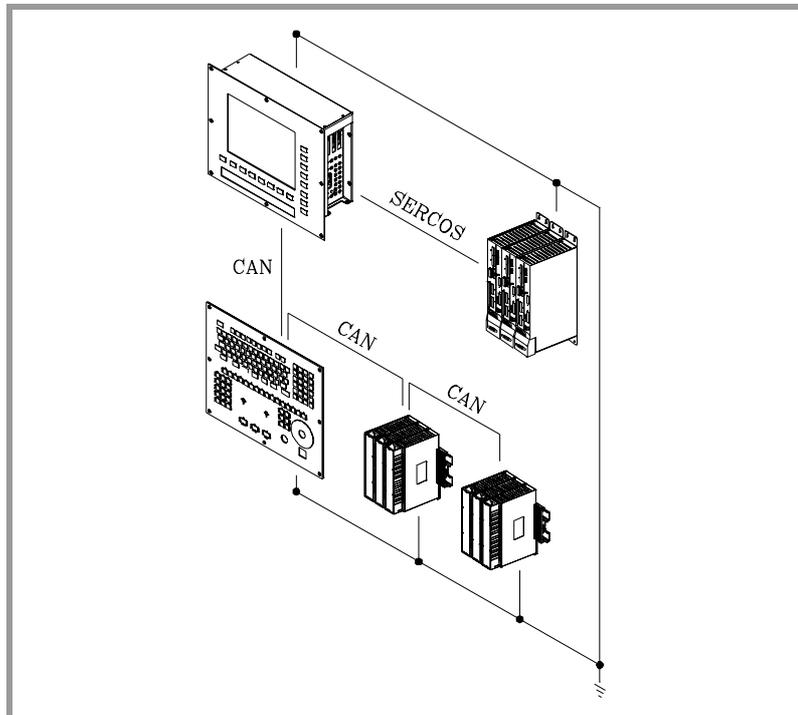
The keyboard and the operator panel are a single module. The operator panel may have either an emergency button (E-stop) or a handwheel.



For further information about the central unit and the monitor, refer to section **"3 PCI central unit."** For further information about the keyboard, refer to section **"8 Set of keyboard and operator panel (OP-Panel-H/E)".**

Basic connection

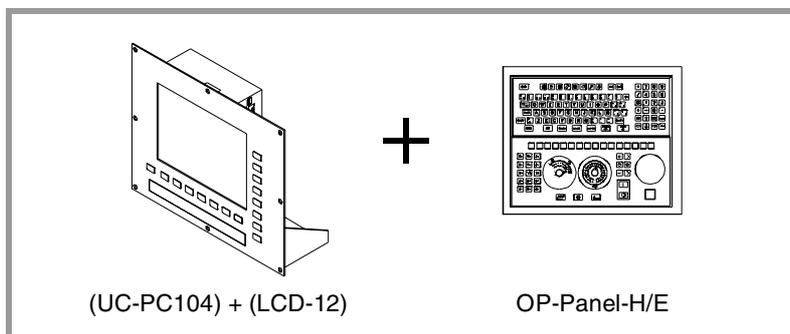
- The CAN bus is used to connect the various elements that make up the CNC.
- The Sercos® bus is used to communicate with FAGOR drives. It is also possible to communicate with analog drives using the CAN bus.



Remember that the ground terminals of all the elements making up the system must be connected to a single ground point.

▼ (UC-PC104) + (LCD-12) + (OP-Panel-H/E)

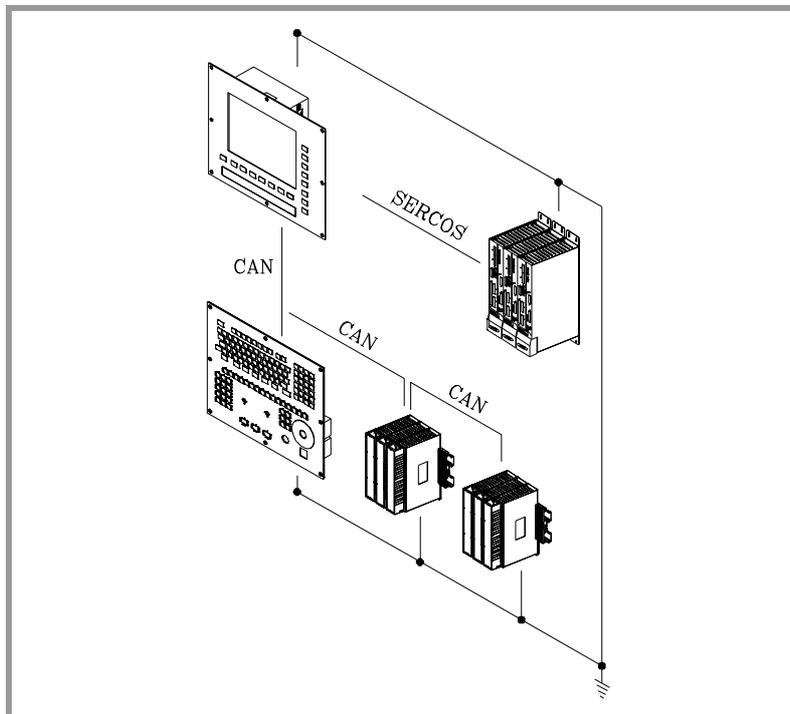
The keyboard and the operator panel are a single module. The operator panel may have either an emergency button (E-stop) or a handwheel.



For further information about the central unit and the monitor, refer to section **"7 PC-104 central unit with LCD-12 monitor"** For further information about the keyboard and the operator panel, refer to section **"8 Set of keyboard and operator panel (OP-Panel-H/E)"**.

Basic connection

- The CAN bus is used to connect the various elements that make up the CNC.
- The Sercos® bus is used to communicate with FAGOR drives. It is also possible to communicate with analog drives using the CAN bus.



Remember that the ground terminals of all the elements making up the system must be connected to a single ground point.

CNC structure

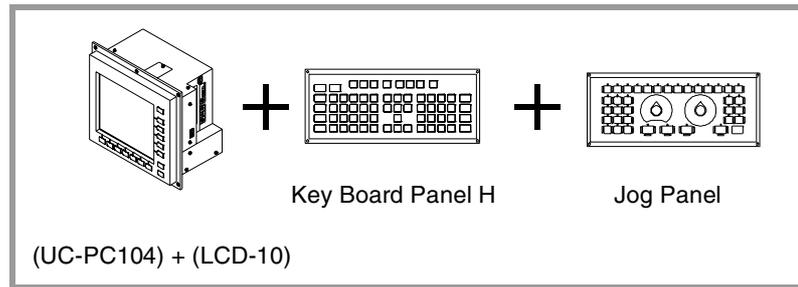


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(UC-PC104) + (LCD-10) + (Key Board Panel H) + (Jog Panel)

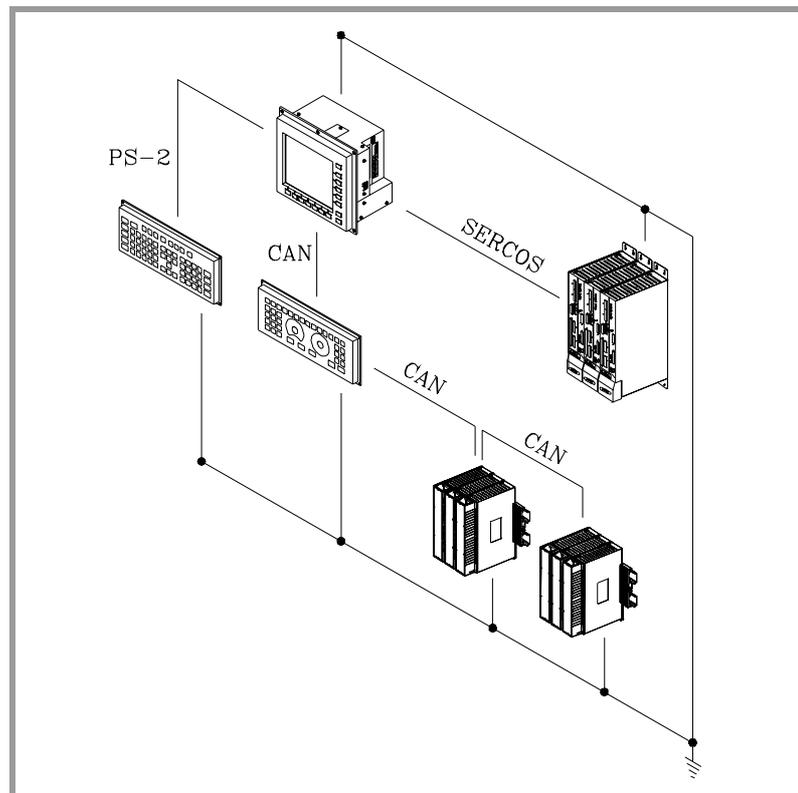
The keyboard and the operator panel are independent modules.



For further information about the central unit and the monitor, refer to section **"5 PC-104 central unit with LCD-10 monitor"**. For further information about the keyboard, refer to section **"9 Keyboard (Key Board Panel H)"**. For further information about the operator panel, refer to section **"10 Operator panel (Jog panel)"**.

Basic connection

- ❑ The keyboard is connected through the PS-2 port. The CAN bus is used to connect the rest of the elements that configure the CNC.
- ❑ The Sercos® bus is used to communicate with FAGOR drives. It is also possible to communicate with analog drives using the CAN bus.



Remember that the ground terminals of all the elements making up the system must be connected to a single ground point.

CNC structure

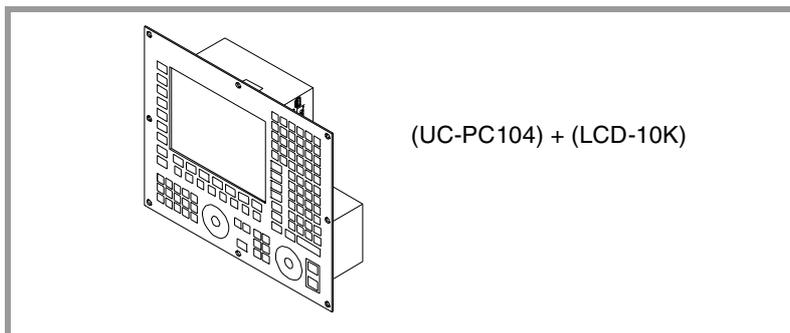


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▼ (UC-PC104) + (LCD-10K)

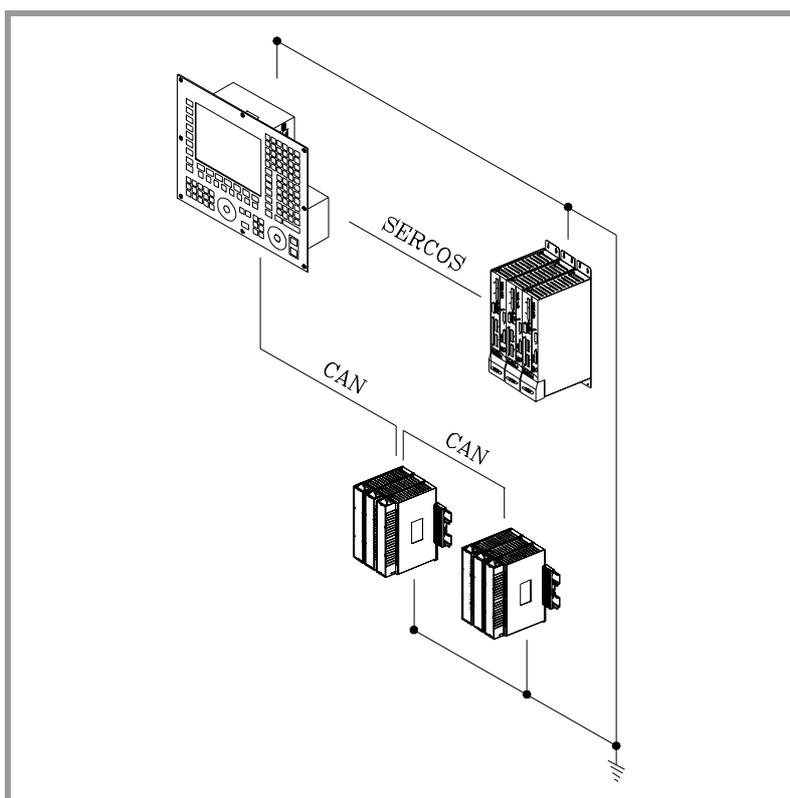
The keyboard and the operator panel are integrated into the monitor.



For further information about the central unit and the monitor, refer to section **"6 PC-104 central unit with LCD-10K monitor"**

Basic connection

- ❑ The CAN bus is used to connect the various elements that make up the CNC.
- ❑ The Sercos® bus is used to communicate with FAGOR drives. It is also possible to communicate with analog drives using the CAN bus.



Remember that the ground terminals of all the elements making up the system must be connected to a single ground point.



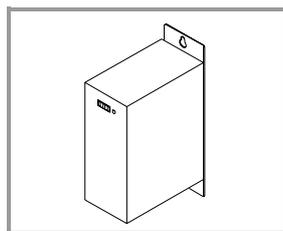
CNC structure



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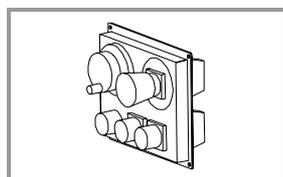
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1.2 Additional hardware



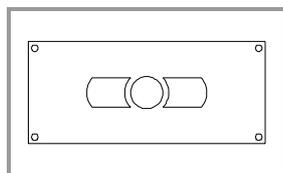
Emergency battery.

See ["14 Emergency battery"](#)



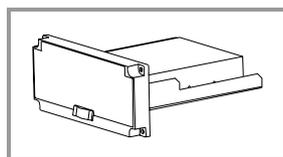
Emergency button and handwheel.

See ["11 "Handwheel + E-stop button" module"](#).



Mouse.

See ["12 Mouse module"](#).



Floppy disk drive.

See ["13 Floppy disk drive."](#)

CNC structure

2 Heat dissipation. Central unit (cpu) enclosure

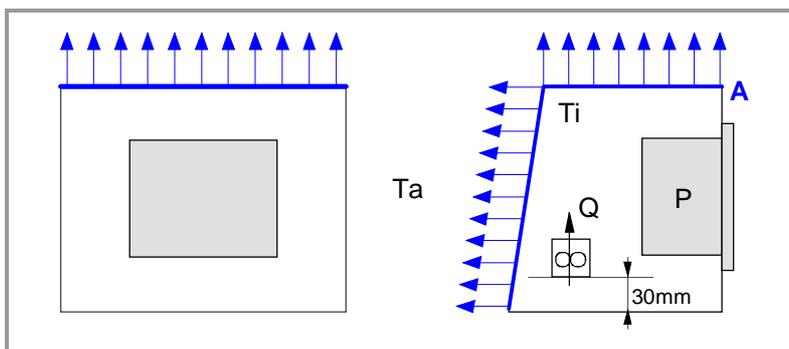
The working temperature of the central unit enclosure must not exceed 45°C (113°F). To ensure that it does not exceed this temperature, the enclosure must meet the following requirements:

- Have enough surface inside to evacuate the heat generated inside and keep the ambient conditions within the working temperature range.
- Respect the minimum distances recommended between the enclosure walls and the central unit. See "**3.3 PCI. Characteristics of the enclosure**". See "**4.3 PC104. Characteristics of the enclosure**".

Calculation of the surface needed for heat dissipation

The expressions have been obtained for an enclosure having a 2 mm wall and made out of aluminum. When using internal ventilation, the fan must be located 30 mm off the bottom.

To calculate the total surface required for the enclosure, in order to dissipate the heat generated in it, the following data must be considered.



- A (m²) Required total surface.
- P (W) Total power dissipated by all the elements that generate heat inside the enclosure, including the power supply and the fan, if there is one.
- Ta (°C) Ambient temperature (outside the enclosure).
- Ti (°C) Temperature inside the enclosure.
- Δt (°C) Temperature difference (Ti-Ta).
- Q (m³/h) Air flow supplied by the fan, if there is one.

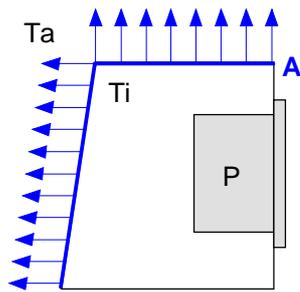
Dissipating surface

Only surfaces dissipating heat by convection will be considered, the top and the rear of the enclosure. The rest of the surfaces are not to be considered when calculating the total surface.

Power dissipated by the CNC

The maximum power dissipated by the central unit PCI and PC104 are 100 watts.

Heat dissipation by natural convection



Unpainted surface.

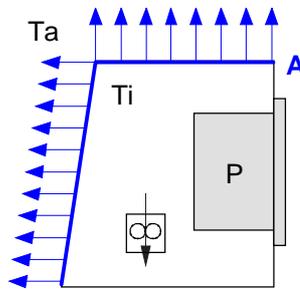
$$A = \frac{P}{5 \cdot \Delta T}$$

Surface with smooth metallic enamel.

$$A = \frac{P}{5,7 \cdot \Delta T}$$

Heat dissipation by forced convection with internal fan

Fan whose air flow $Q = 13.6 \text{ m}^3/\text{h}$ facing down.



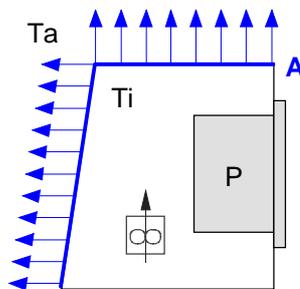
Unpainted surface.

$$A = \frac{P}{5,6 \cdot \Delta T}$$

Surface with smooth metallic enamel.

$$A = \frac{P}{7,6 \cdot \Delta T}$$

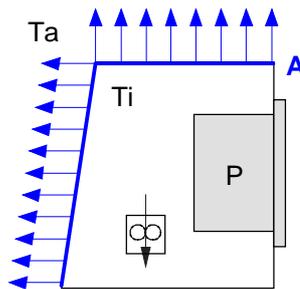
Fan whose air flow $Q = 13.6 \text{ m}^3/\text{h}$ facing up.



Unpainted surface.

$$A = \frac{P}{5,8 \cdot \Delta T}$$

Fan whose air flow $Q = 30 \text{ m}^3/\text{h}$ facing down.



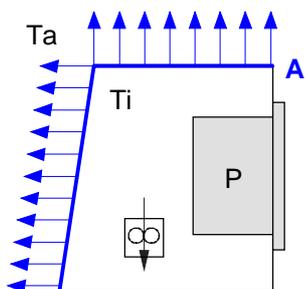
Unpainted surface.

$$A = \frac{P}{6,75 \cdot \Delta T}$$

Surface with smooth metallic enamel.

$$A = \frac{P}{9,1 \cdot \Delta T}$$

Fan whose air flow Q = 102 m³/h facing down.



Unpainted surface.

$$A = \frac{P}{7,5 \cdot \Delta T}$$

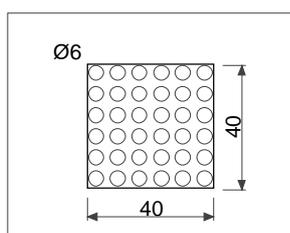
Surface with smooth metallic enamel.

$$A = \frac{P}{9,8 \cdot \Delta T}$$

Heat dissipation by air flow to the outside using a fan

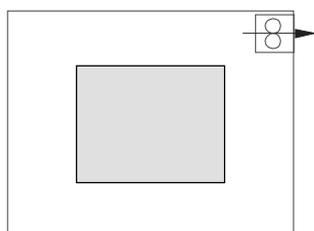
Heat dissipation by forced convection with hot air flow to the outside using a fan and ambient air intake through the holes located at the bottom of the enclosure.

For this case, the volume of air flow is calculated necessary to evacuate the heat generated inside the enclosure. The fan's air flow is calculated according to the power dissipated by the CNC and the fan itself as well as the inside and outside temperatures.



Unpainted surface.

$$V = \frac{3,8 \cdot P}{\Delta T}$$

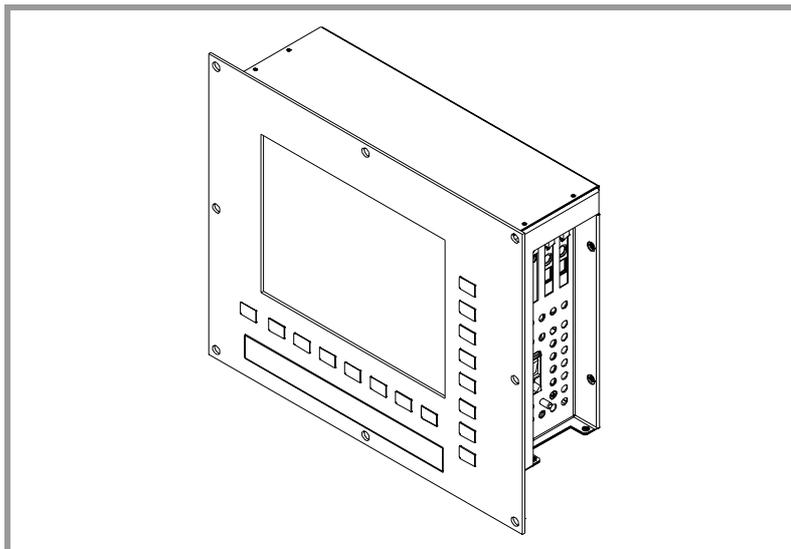


Bear in mind that this air flow through the unit extracts hot air to the outside, but it allows dirt into the enclosure. Thus, a filter should be installed to maintain the ambient conditions allowed.

Heat dissipation. Central unit (cpu) enclosure

3 PCI central unit.

PCI central unit.



Monitor

12.1" LCD monitor (18-bit color). Resolution 800x600.

Description

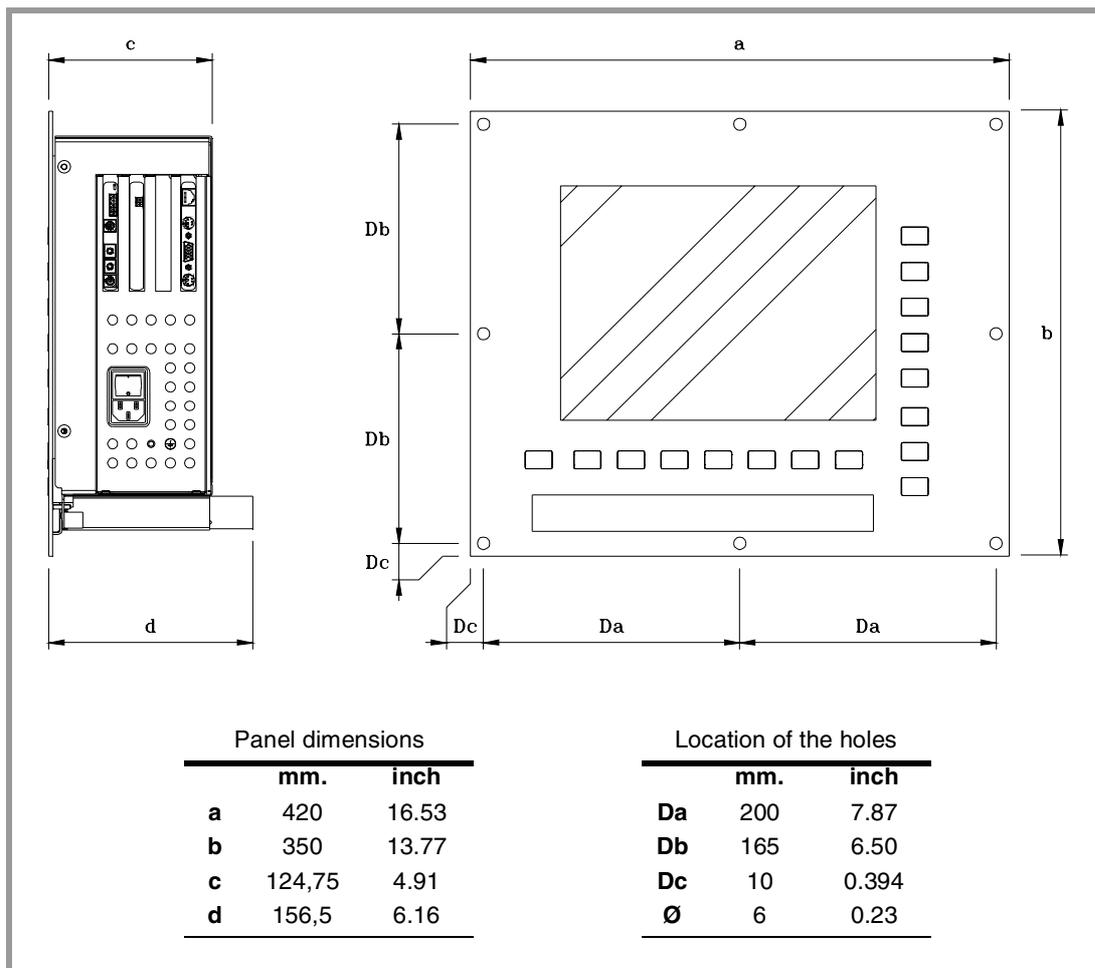
It has the following elements:

- 3.5" floppy disk drive.
- It may be accessed from the front panel for peripherals.
- CAN and Sercos® communications board.
- Board for connecting to Ethernet and peripherals (PC-compatible keyboard, mouse with PS-2 connector and PC monitor).
- It is possible to connect a PC-compatible keyboard or mouse using a PS-2 connector from the front panel.

Power supply

Universal AC power supply. Connect it through a separate shielded 110 VA transformer with an output voltage between 84Vac and 264 Vac.

3.1 PCI. Dimensions



PCI central unit.

3.2 PCI. Technical characteristics

PCI central unit.

Electrical characteristics

- Universal AC power supply.
Connect it through a separate shielded 110 VA transformer with an output voltage between 84Vac and 264 Vac.
- Mains frequency:
50 - 60 Hz $\pm 1\%$ and $\pm 2\%$ for very short periods.
- Power outages:
Meets the EN 61000-4-11 regulation. It can withstand microsurges of up to 10 milliseconds at 50 Hz starting at 0° and 180° (two polarities, positive and negative).
- Harmonic distortion:
Less than 10% of the total rms voltage between conductors under power (sum of the 2nd and 5th harmonics).

Vibrations

- Operating:
10-57 Hz with an amplitude of 0.0375 mm at constant speed.
57-200 Hz with 0.5g of constant acceleration.
- Packaging: Meets EN 60068-2-32 standard
- Free fall packaged according to Fagor regulations: 0.5 meters.

Ambient conditions

- Relative humidity: 5-85% without condensation.
- Work temperature: 5-40°C with an average lower than 35°C.
- Storage temperature: Between -25°C and +70°C (77°F and 158°F).
- Maximum work altitude: Meets the IEC 1131-2 standard.

Degree of protection

- Front panel: It meets the protection standard IP54.
- Rear panel: It meets the protection standard IP 2X.
- Accessible parts inside: It meets the protection standard IP 1X.

The machine manufacturer must comply with the EN 60204-1 (IEC-204-1) regulation regarding electrical shocks in case of defective input/output pins with external power supply when not plugging this connector before turning the power supply on.



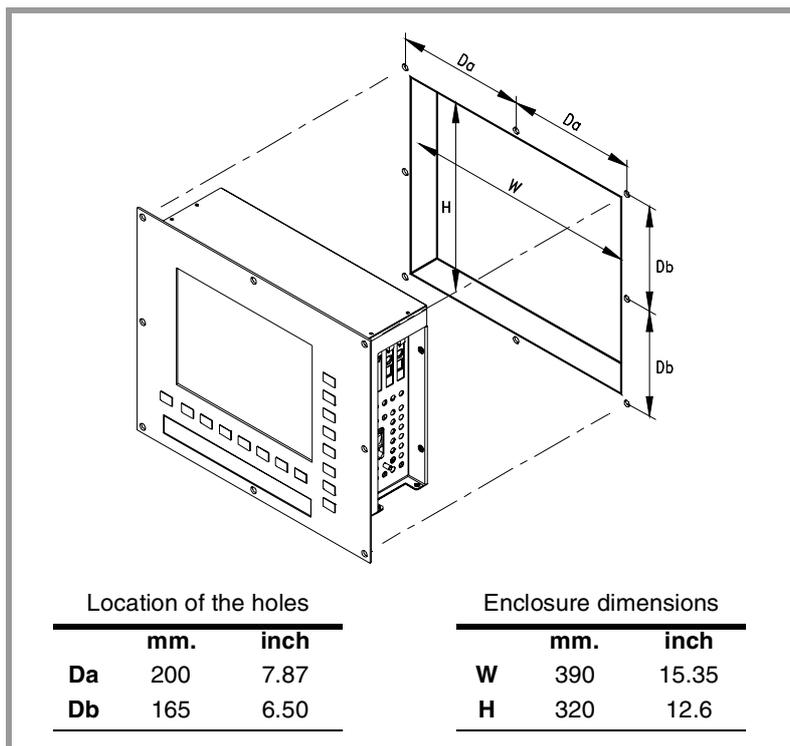
This unit MUST NOT be opened by unauthorized personnel. Only personnel authorized by Fagor Automation may manipulate the inside of this module.

3.3 PCI. Characteristics of the enclosure

Securing the unit

The central unit must be installed in a proper enclosure that may be located on the machine or on an external support. To insert the unit into the enclosure, it must have a big enough hole to allow to insert it easily, without obstacles and without forcing the unit.

Once the unit has been inserted into the enclosure, secure it from the outside with the screws. To properly secure it, use the mounting holes on the front panel of the unit.



PCI central unit.



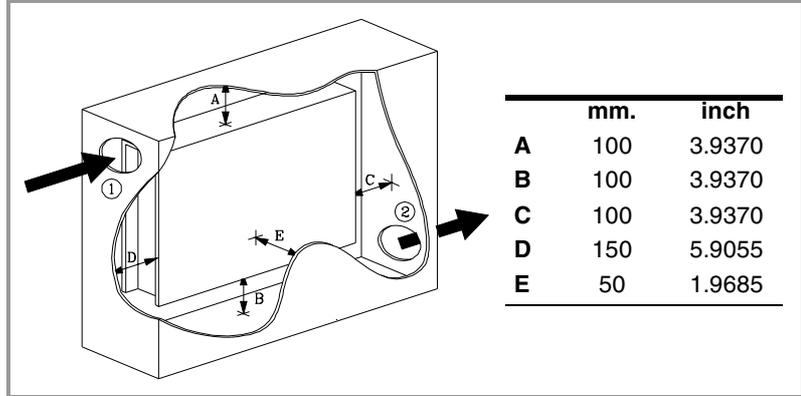
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PCI central unit.

Characteristics of the enclosure

The working temperature of the enclosure must not exceed 45°C (113°F). To ensure that it does not exceed this temperature, respect the recommended minimum gap between the sides of the enclosure and the central unit.



To ensure the required ambient conditions, the enclosure must have an air input next to the cables and an air output next to the fan. In this case, install fans to ventilate the enclosure and keep the temperature within the allowed limits.

Keep the enclosure clean. Anti-dust filters should be installed at the air inputs and outputs.

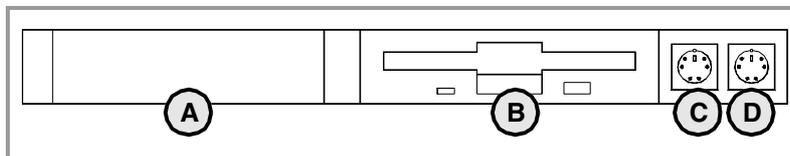
Room reserved for cables

Reserve some room for the cables in the connector area. This space makes it possible to bend the cables for the CPU connection with the recommended bending radius. Special care must be taken with the Sercos® connection because bending the optic fiber too much could break it.

3.4 PCI. Elements (connectors)

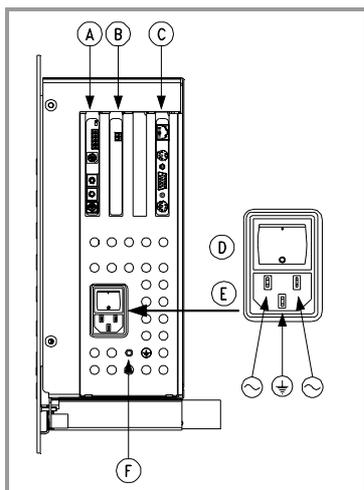
Front connectors

The little compartment under the screen has the following elements.



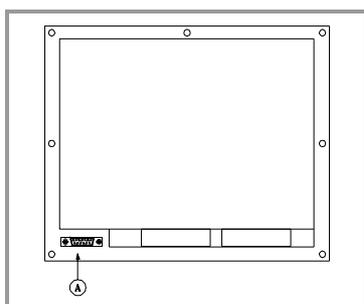
- A. Enclosure reserved for optional devices:
PCMCIA card, CD ROM, Floppy disk, etc.
- B. 3½" floppy disk drive.
- C. Connector for a PC-compatible keyboard.
- D. Connector for a serial mouse with a PS-2 connector.

Side connectors



- A. Communications board
See **"3.5 PCI. CAN and Sercos® communications board."**
- B. Relay for the emergency chain.
See **"3.7 PCI. Relay for the emergency chain"**.
- C. CPU board.
See **"3.6 PCI. CPU board connectors"**.
- D. Power switch.
- E. Mains connection.
- F. Ground connection.

Rear connectors



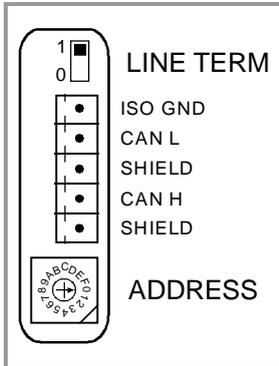
- A. Connector for the CPU keys with the CNC keyboard.
Maximum cable length is 1 meter.

PCI central unit.

3.5 PCI. CAN and Sercos® communications board.

CAN communications board

PCI central unit.

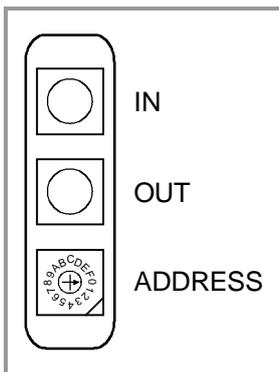


It is used to connect the various elements that make up the system.

- Keyboard and operator panel
- Remote modules.

For further information on how to configure the connection of the elements to the CAN bus, refer to section **"16 CAN connection"**.

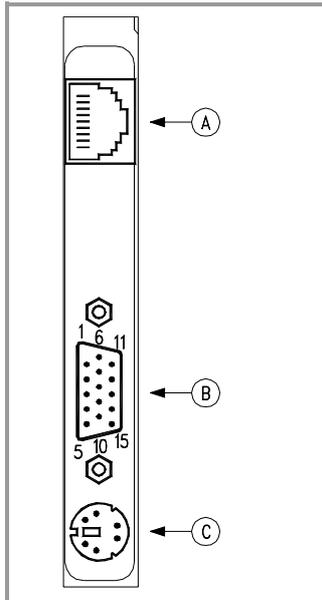
CAN and Sercos® communications board.



It is used to communicate with Fagor digital drives.

For further information on how to configure the connection of the elements to the Sercos® bus, refer to section **"17 Sercos® Connection"**.

3.6 PCI. CPU board connectors



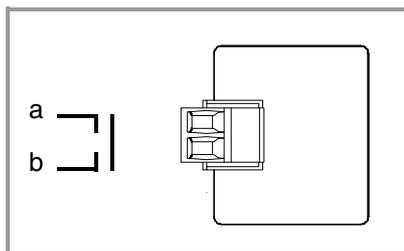
The CPU board allows connecting the unit to an Ethernet network. It also allows connecting the following peripherals to the unit.

- A.** To connect the CNC to an Ethernet network.
- B.** PC monitor.
- C.** PC-compatible keyboard.

The mouse and the PC keyboard may also be connected from the front of the unit.

PCI central unit.

3.7 PCI. Relay for the emergency chain

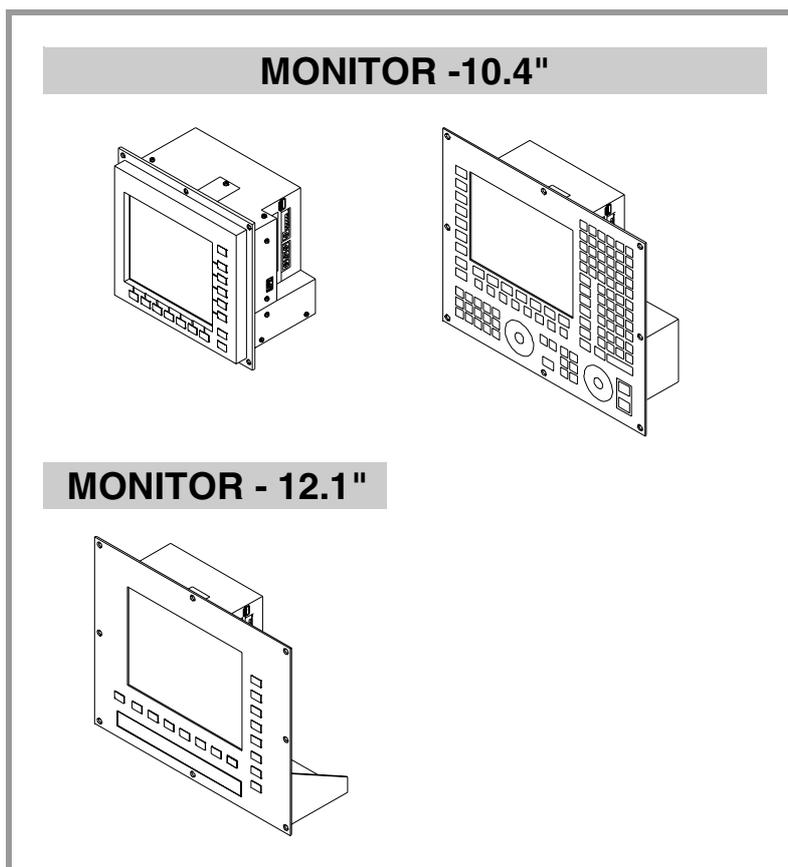


It is a normally open contact that closes when the CNC is turned on and it is running properly. It opens when turning the CNC off or due to an internal failure

This relay withstands up to 1A at 24V.

PCI central unit.

4 PC104 central unit. General description



Monitor

The following monitors are available.

- 12.1" LCD monitor (18-bit color). Resolution 800x600.
- 10.4" LCD monitor (18-bit color). Resolution 800x600.

Optionally, it is also available without monitor, thus being possible to install it remotely.

External connection

This base unit has the following elements:

- CAN and Sercos® communications board.
- Connection to Ethernet and standard peripherals (PC-compatible keyboard, mouse with PS-2 connector and VGA monitor).
- Two serial communication port (COM1, COM2).
- A parallel communications port (LPT1).
- Connector for FLOPPY disk drive.
- Connector for IDE device (CD-ROM, DVD, hard disk, etc).

Power supply

Universal DC power supply. Power with a 24 Vdc $\pm 10\%$ and 3.5A power supply.

Hardware configuration

Processor	Pentium III 800 Mhz
RAM memory	256 Mb
HD	Yes
Compact flash	Optional
Monitor	10.4" LCD 10.4" LCD (with keyboard) 12.1" LCD
Ethernet	T base 10/100Mhz
Modem / Fax	56K
Battery of the CMOS	CR2450 (access from the outside)

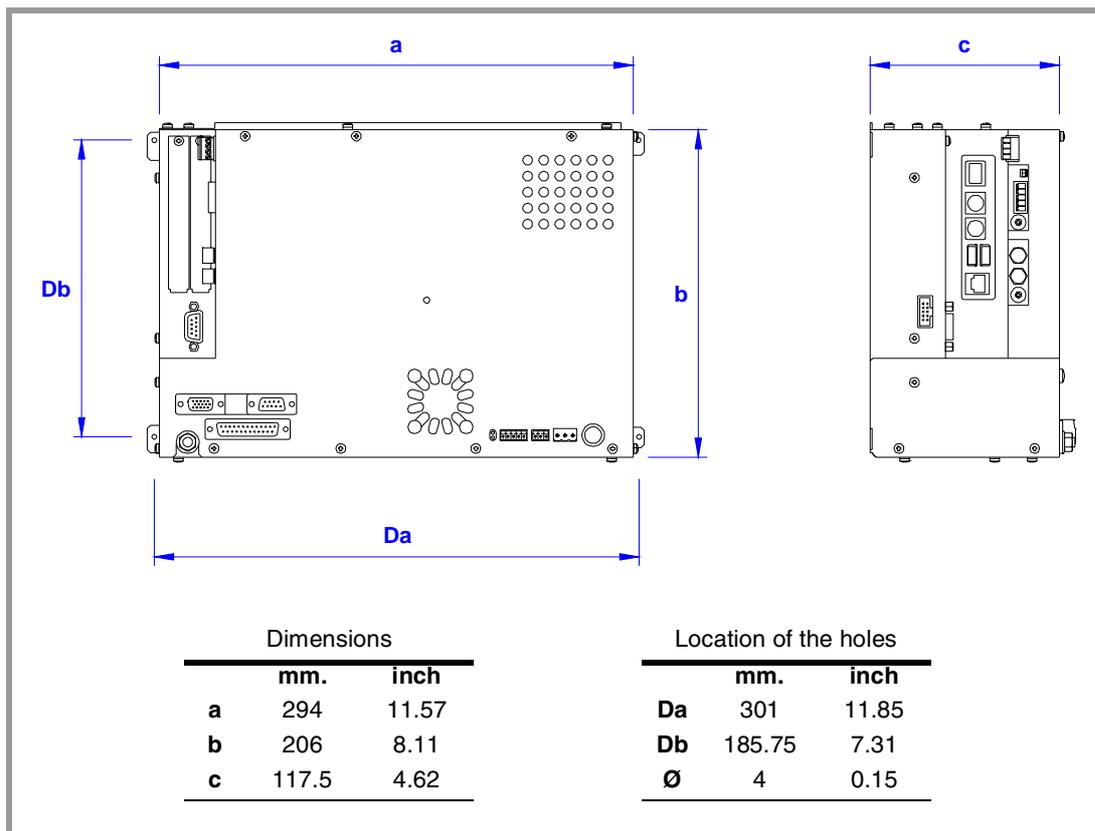
PC104 central unit. General description



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4.1 PC104. Dimensions of the central unit without monitor



PC104 central unit. General description

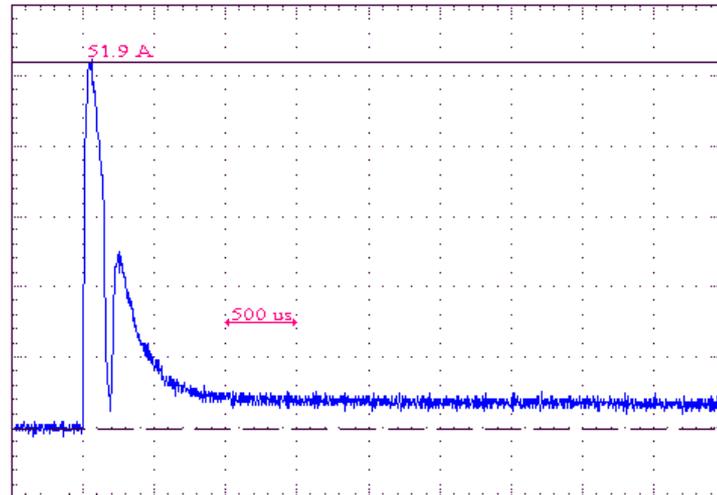
4.2 PC104. Technical characteristics

Electrical characteristics

- Universal DC power supply.

Power with a 24 Vdc $\pm 10\%$ and 3.5A power supply.

Current peak of 51.9 A on power-up.



- Protection against over-voltage and reverse voltage.

It has a fuse that may be accessed from the outside as protection against over-voltage. Greater than 36 Vdc or 25 Vac.

It is also protected against reverse connection of the power supply, preventing it from starting up.

- Protection against over-current.

An over-current activates the safety device inside the power supply. The central unit has an LED that turns on when this device is active. To reactivate the power supply after an over-current, just press the button for it. If the led comes back on, call the Technical Service.

The power supply may be reactivated by disconnecting it for 30 seconds.

- Power outages.

Meets the EN 61000-4-11 regulation. It can withstand microsurges of up to 10 milliseconds

Vibrations

- Operating:

10-57 Hz with an amplitude of 0.0375 mm at constant speed.

57-200 Hz with 0.5g of constant acceleration.

- Packaging: Meets EN 60068-2-32 standard.

- Free fall packaged according to Fagor regulations: 0.5 meters.

Ambient conditions

- ▣ Relative humidity: 5-85% without condensation.
- ▣ Work temperature: 5-40°C with an average lower than 35°C.
- ▣ Storage temperature: Between -25°C and +70°C (77°F and 158°F).
- ▣ Maximum work altitude: Meets the IEC 1131-2 standard.

Degree of protection

- ▣ Front panel: It meets the protection standard IP54.
- ▣ Rear panel: It meets the protection standard IP 2X.
- ▣ Accessible parts inside: It meets the protection standard IP 1X.

The machine manufacturer must comply with the EN 60204-1 (IEC-204-1) regulation regarding electrical shocks in case of defective input/output pins with external power supply when not plugging this connector before turning the power supply on.



*This unit **MUST NOT** be opened by unauthorized personnel. Only personnel authorized by Fagor Automation may manipulate the inside of this module.*

PC104 central unit. General description



8070 CNC

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4.3 PC104. Characteristics of the enclosure

PC104 central unit. General description

Securing the unit

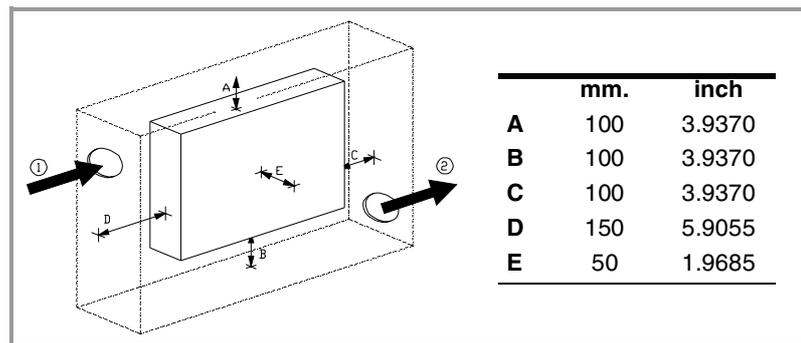
The central unit must be installed in a proper enclosure that may be located on the machine or on an external support. To insert the unit into the enclosure, it must have a big enough hole to allow to insert it easily, without obstacles and without forcing the unit.

Once the unit has been inserted into the enclosure, secure it from the outside with the screws. To properly secure it, use the mounting holes on the front panel of the unit.

The dimensions of the enclosure depend on the type of monitor that comes with the central unit.

Characteristics of the enclosure

The working temperature of the enclosure must not exceed 45°C (113°F). To ensure that it does not exceed this temperature, respect the recommended minimum gap between the sides of the enclosure and the central unit.



To ensure the required ambient conditions, the enclosure must have an air input next to the cables and an air output next to the fan. In this case, install fans to ventilate the enclosure and keep the temperature within the allowed limits.

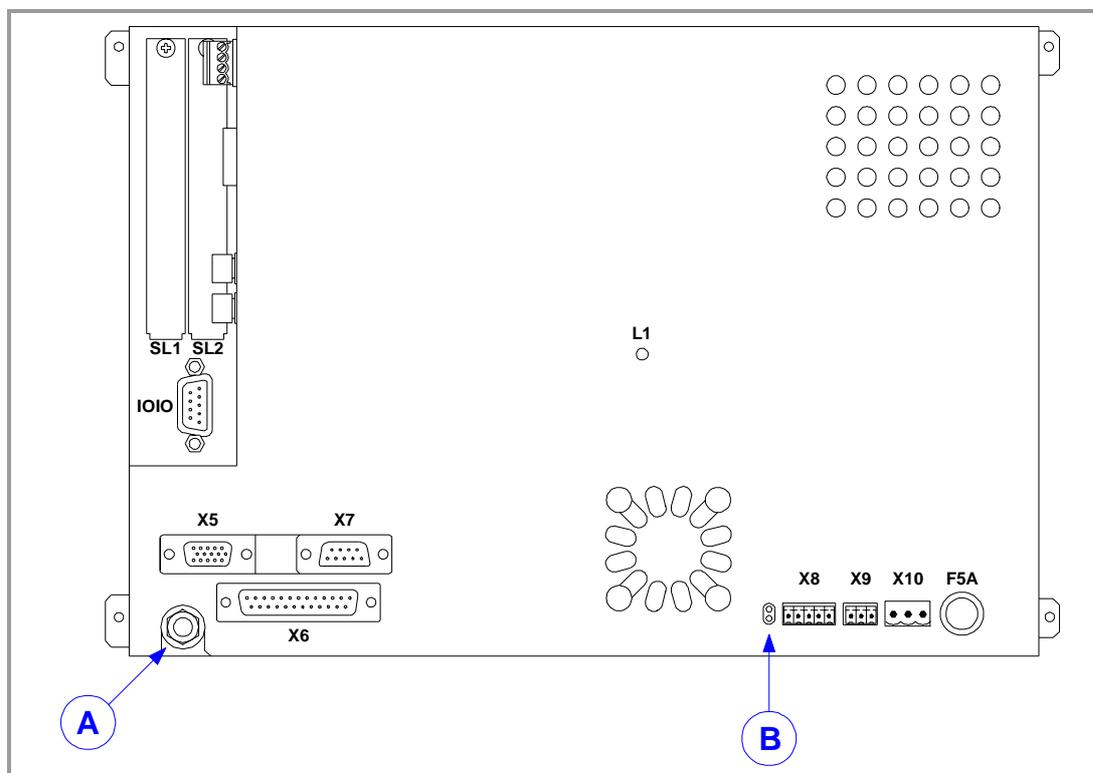
Keep the enclosure clean. Anti-dust filters should be installed at the air inputs and outputs.

Room reserved for cables

Reserve some room for the cables in the connector area. This space makes it possible to bend the cables for the CPU connection with the recommended bending radius. Special care must be taken with the Sercos® connection because bending the optic fiber too much could break it.

4.4 PC104. Elements (connectors)

Rear connectors



SL1 Connector for floppy disk drive.

To connect a floppy disk drive to the central unit. See ["13 Floppy disk drive."](#)

SL2 Connector for IDE device (CD-ROM).

IOIO Serial line (COM1).

X5 VGA output.

X6 Parallel port (LPT1).

X7 Serial line (COM2).

X8 Emergency battery.

X9 Output to supply voltage to the operator panel.

X10 Universal DC power supply.

For further information on how to connect the power supply, see ["4.5 PC104. Power supply and battery"](#) For further information about the electrical characteristics of the unit, see ["4.2 PC104. Technical characteristics"](#).

PC104 central unit. General description

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F5A Over-voltage protection fuse.

It is possible to connect an external battery to the central unit to ensure that the CNC will keep running if there is a power outage. See **"4.5 PC104. Power supply and battery"**.

L1 Indicator for the proper operation of the COMPCI.

Green LED blinks if the COMPCI is working fine.

Other elements

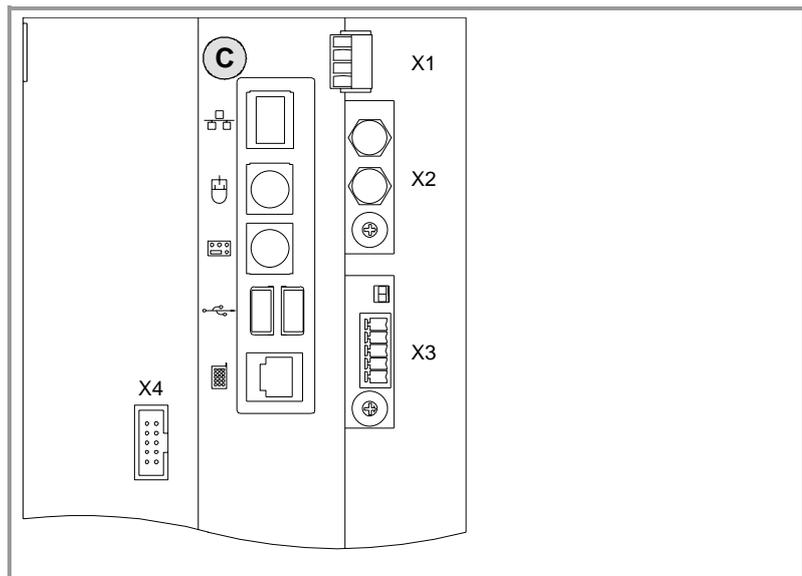
A. Ground terminal. All ground terminals of the machine must be connected to this terminal.

B. Over-voltage indicator on the power supply.

It has a red LED and a push-button. The LED turns on when there is over-current at the power supply. The button may be used to reactivate the power supply after an over-current.

For further information about the electrical characteristics of the unit, see **"4.2 PC104. Technical characteristics"**.

Side connectors



X1 Relay for the emergency chain.

See **"4.9 PC104. Relay for the emergency chain"**.

X2 - X3 Communications board

See **"4.6 PC104. CAN and Sercos® communications board."**

X4 Connection of the CPU keys with the CNC keyboard. Maximum cable length is 1 meter.

Other elements

C. CPU board for connecting peripherals.

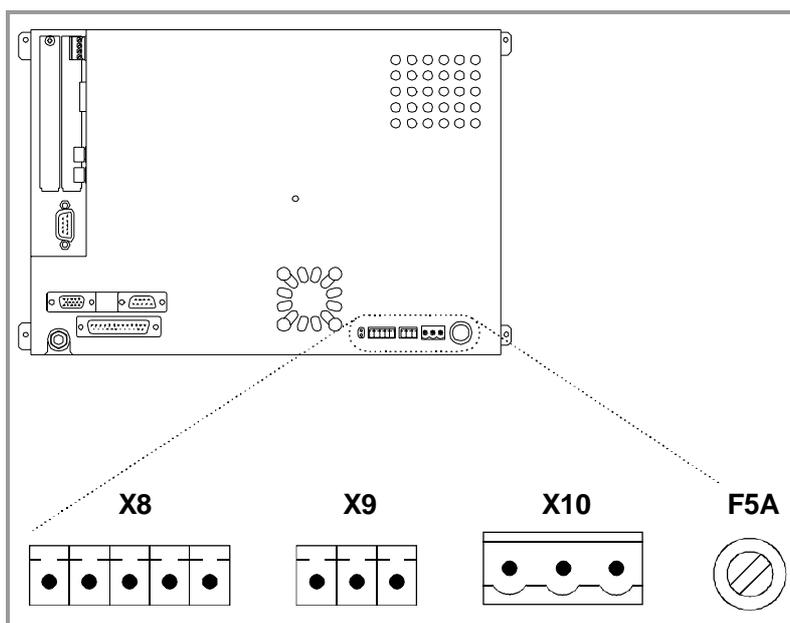
See **"4.7 PC104. CPU board connectors"**.

4.5 PC104. Power supply and battery

The central unit is powered by an external DC power supply. See "[4.2 PC104. Technical characteristics](#)".

It is also possible to connect an external battery that ensures the proper operation of the unit under AC power outages. When that happens, the central unit responds as follows:

- If the supply is interrupted for less than 2 seconds.
The screens shows the corresponding warning and the system recovers fine.
- If the supply is interrupted for more than 2 seconds.
After the 2 seconds, the screen shows the corresponding error and it initiates the automatic turn-off sequence.



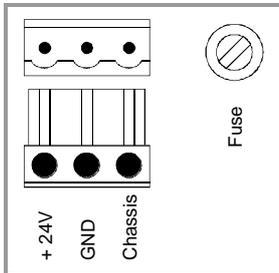
- X8** Emergency battery.
- X9** 24V output to supply voltage to the operator panel.
- X10** Power supply.
- F5A** Fuse.

PC104 central unit. General description

Connector X10: Universal 24V power supply



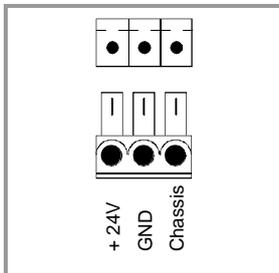
Consult the electrical characteristics of the central unit before connecting the power supply. See "4.2 PC104. Technical characteristics".



3-pin male Phoenix connector (7.62 mm pitch).

It has a fuse that may be accessed from the outside to protect against over-voltage (greater than 36 Vdc or 25 Vac).

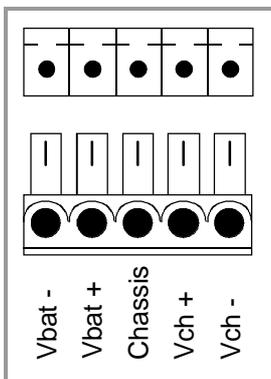
Connector X9: Power supply for the operator panel



3-pin male Phoenix minicombicon connector (3.5 mm pitch).

This connector offers the possibility to supply voltage from the central unit to the operator panel. It is mainly oriented to those configurations where the operator panel is integrated into the monitor (e.g. LCD-10K) or close to it.

Connector X8: Power supply with a battery.

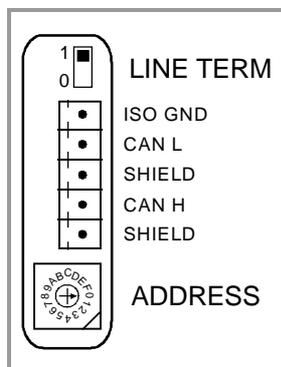


5-pin male Phoenix minicombicon connector (3.5 mm pitch).

Signal	Description
Vbat - / Vbat +	Central unit powered by the battery.
Chassis	System ground connection
Vch - / Vch +	Charge the battery.

4.6 PC104. CAN and Sercos® communications board.

▼ CAN communications board

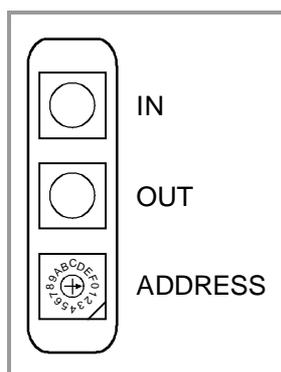


It is used to connect the various elements that make up the system.

- Keyboard and operator panel
- Remote modules.

For further information on how to configure the connection of the elements to the CAN bus, refer to section **"16 CAN connection"**.

▼ CAN and Sercos® communications board.



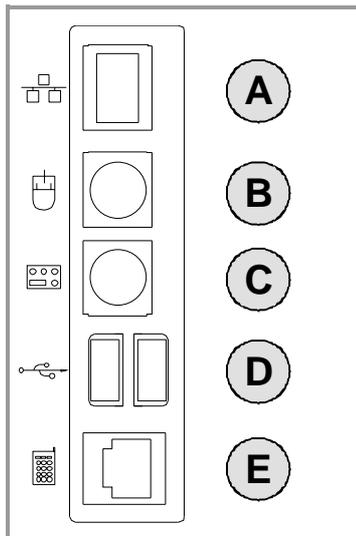
It is used to communicate with Fagor digital drives.

For further information on how to configure the connection of the elements to the Sercos® bus, refer to section **"17 Sercos® Connection"**.

PC104 central unit. General description

4.7 PC104. CPU board connectors

PC104 central unit. General description

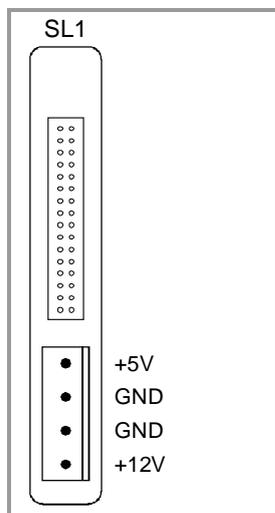


With the CPU board, it is possible to connect the most common PC peripherals, even a modem, to the CNC. It also has an Ethernet connector to integrate the CNC into a network.

- A.** Ethernet connector.
- B.** Mouse with PS-2 connector.
- C.** PC-compatible keyboard.
- D.** USB ports.
- E.** Modem.

4.8 PC104. Connectors for a floppy disk drive or IDE

Connector SL1. Connection of a floppy disk drive

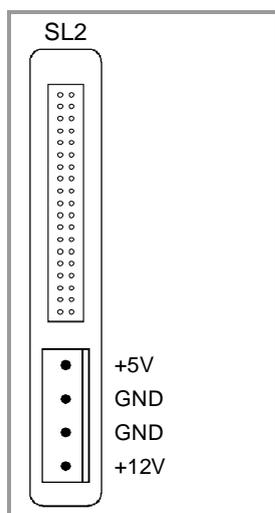


For connecting a floppy disk drive to the central unit using the floppy disk interface. See "[13 Floppy disk drive.](#)".

To access the connectors, remove the connector protecting plate. The compartment has these two connectors.

- Connector for the data cable.
Male Header type connector with 2x17 pins and 1 inch x 1 inch (25.4 mm x 25.4 mm) pitch.
- Connector for the power cable of the peripheral device.
Molex 5273 male connector-NA with 4 pins and 2.96 mm pitch.

Connector SL2. Connection of an IDE device

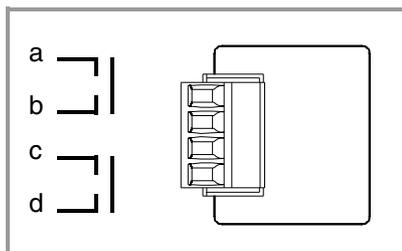


For connecting a CD-ROM drive or another device that uses an IDE interface to the central unit.

To access the connectors, remove the connector protecting plate. The compartment has these two connectors.

- Connector for the data cable.
Male Header type connector with 2x20 pins and 1 inch x 1 inch (25.4 mm x 25.4 mm) pitch.
- Connector for the power cable of the peripheral device.
Molex 5273 male connector-NA with 4 pins and 2.96 mm pitch.

4.9 PC104. Relay for the emergency chain



They are two normally open contacts that close when the CNC is turned on and it is running properly. They open again when turning the CNC off or due to an internal failure

These relays withstand up to 1A at 24V.

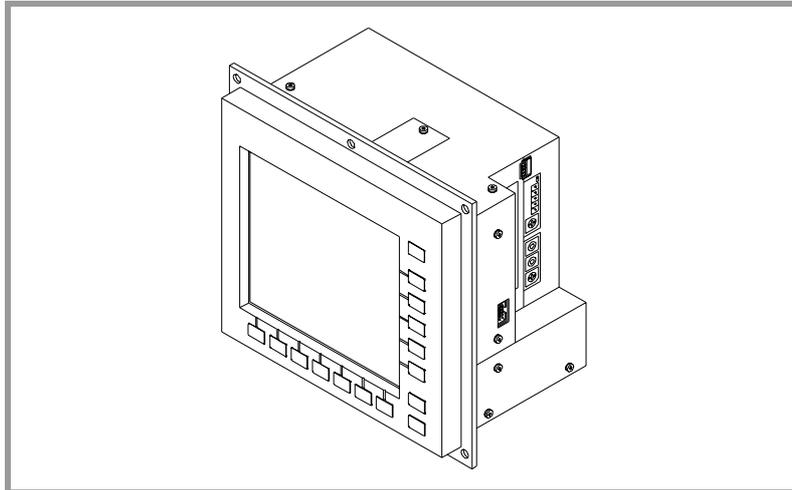
PC104 central unit. General description

5 PC-104 central unit with LCD-10 monitor

This chapter shows specific data for the central unit with this type of monitor. For further information on the central unit, refer to section **"4 PC104 central unit. General description"**.



Before installing the central unit or manipulating the connectors, carefully read the information detailed in section "4 PC104 central unit. General description" of this manual.



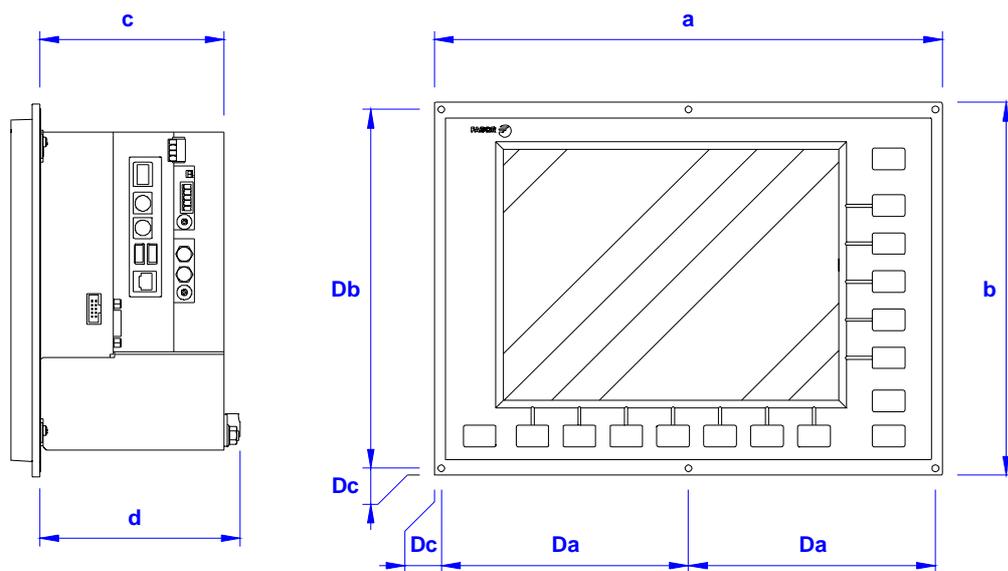
Type of monitor

10.4" LCD monitor (18-bit color). Resolution 800x600.

PC-104 central unit with LCD-10 monitor

5.1 LCD-10. Dimensions

PC-104 central unit with LCD-10 monitor



Dimensions

	mm.	inch
a	325	12.80
b	240	9.45
c	117.8	4.63
d	128	5.04

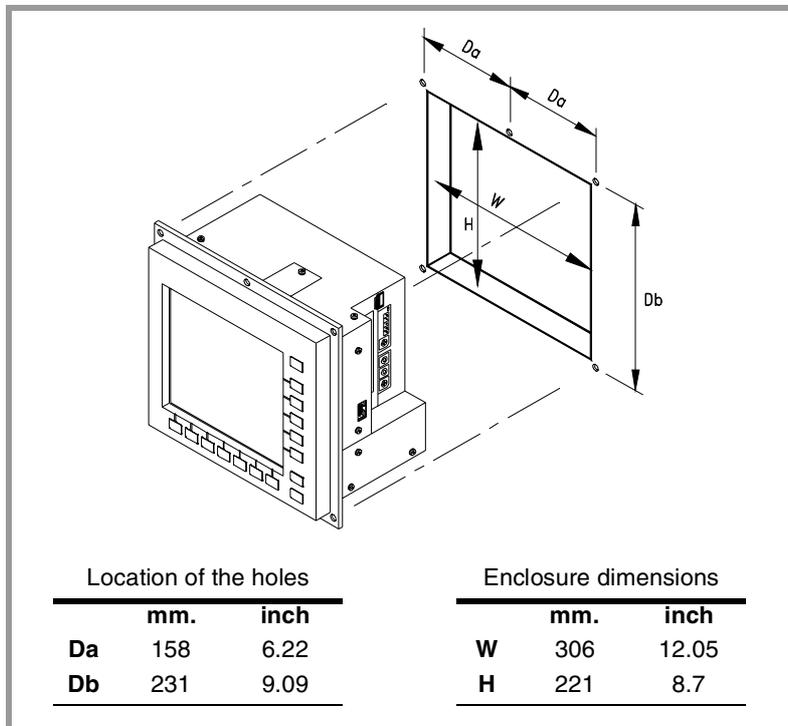
Location of the holes

	mm.	inch
Da	158	6.22
Db	231	9.09
Dc	4.5	0.18
Ø	4.5	0.18

5.2 LCD-10. Characteristics of the enclosure

Securing the unit

To properly secure it, use the mounting holes on the front panel of the unit.



Characteristics of the enclosure

The working temperature of the enclosure must not exceed 45°C (113°F). To ensure that it does not exceed this temperature, respect the recommended minimum gap between the sides of the enclosure and the central unit. See "[4.3 PC104. Characteristics of the enclosure](#)".

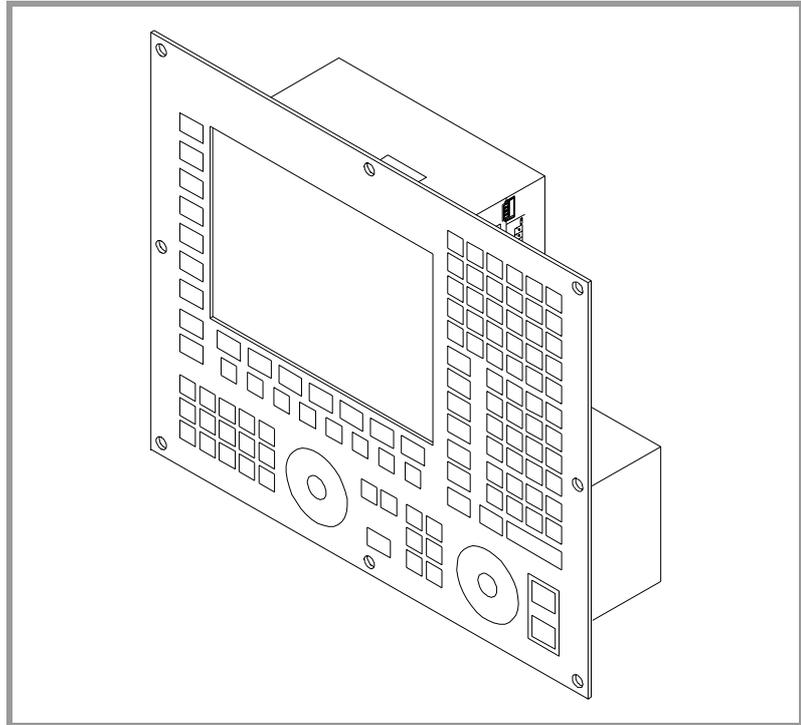
PC-104 central unit with LCD-10 monitor

6 PC-104 central unit with LCD-10K monitor

This chapter shows specific data for the central unit with this type of monitor. For further information on the central unit, refer to section **"4 PC104 central unit. General description"**.



Before installing the central unit or manipulating the connectors, carefully read the information detailed in section "4 PC104 central unit. General description" of this manual.



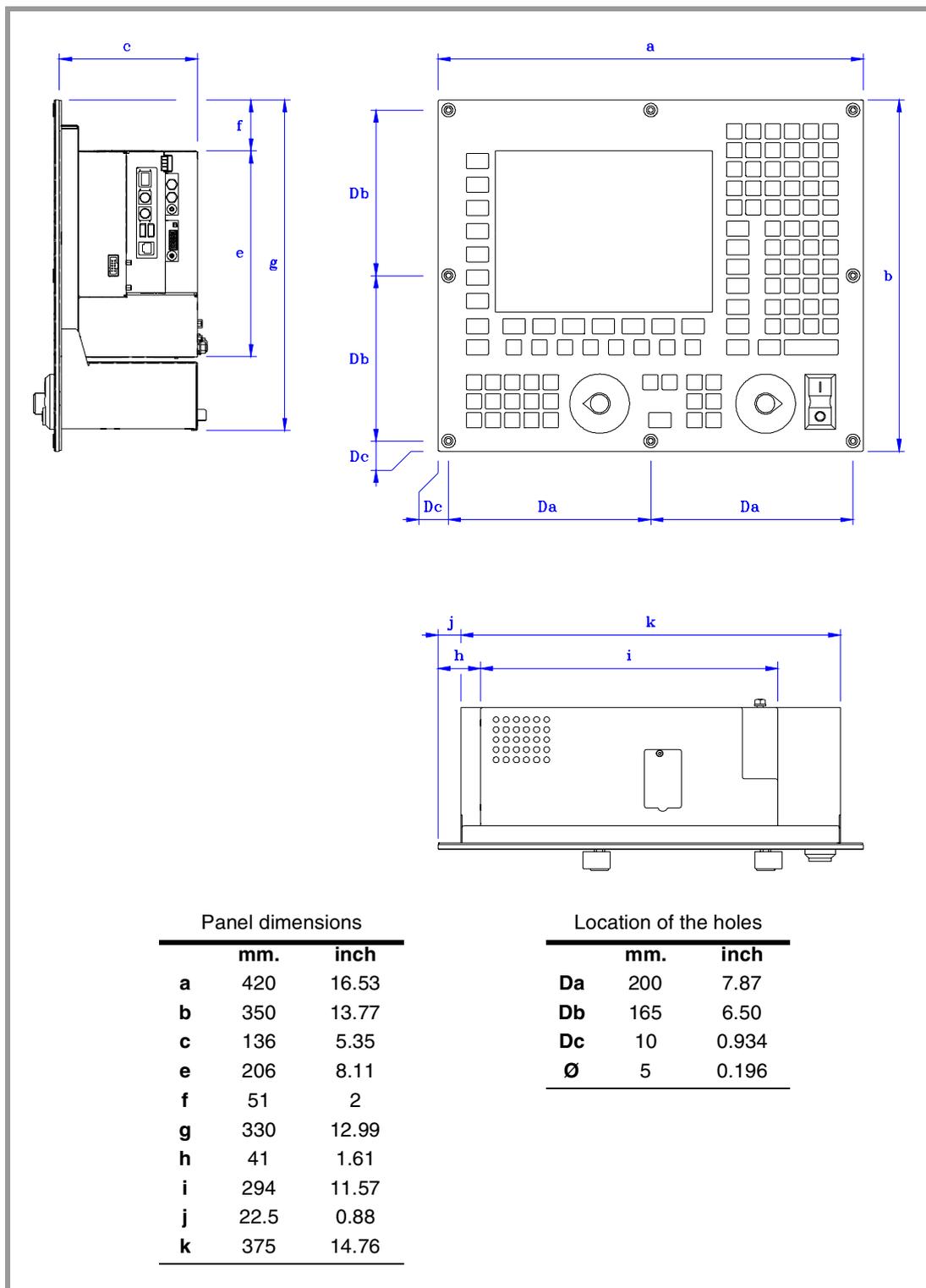
Type of monitor

10.4" LCD monitor (18-bit color). Resolution 800x600.

The monitor has an alpha-numeric keyboard and an operator panel integrated into it.

PC-104 central unit with LCD-10K monitor

6.1 LCD-10K. Dimensions



PC-104 central unit with LCD-10K monitor



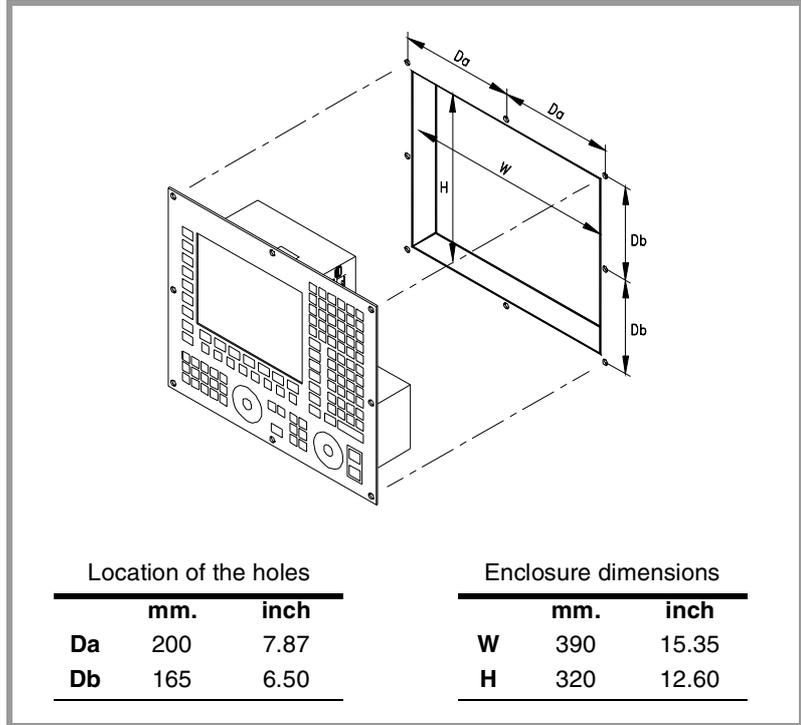
8070 CNC

REF. 0501

6.2 LCD-10K. Characteristics of the enclosure

Securing the unit

To properly secure it, use the mounting holes on the front panel of the unit.



Characteristics of the enclosure

The working temperature of the enclosure must not exceed 45°C (113°F). To ensure that it does not exceed this temperature, respect the recommended minimum gap between the sides of the enclosure and the central unit. See ["4.3 PC104. Characteristics of the enclosure"](#).

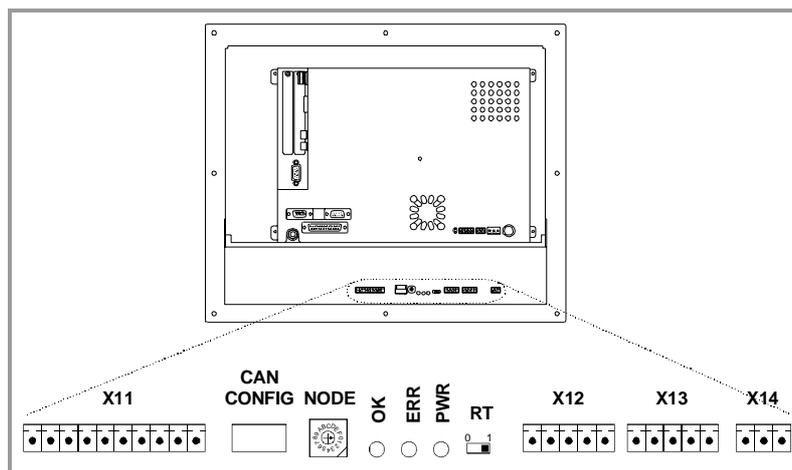
PC-104 central unit with LCD-10K monitor

6.3 LCD-10K. Elements (connectors)

We now describe the specific connectors for this type of monitor: For further information on the connectors of the central unit, refer to section "4.4 PC104. Elements (connectors)".

Rear connectors

Besides the connectors of the central unit, the connectors of the operator panel are in the rear.



X11 Handwheel connection.

CAN CONFIG CAN bus configuration.

NODE Operator panel address selector on the CAN bus.

OK Green LED. It turns on when the bus is working fine.

ERR Red LED. It turns on when there is an error at the bus.

PWR Red LED. It turns on when the operator panel is under voltage.

RT Line termination switch for the CAN bus.

X12 Connector for the CAN bus.

X13 Connector for the CAN bus.

X14 Power supply.

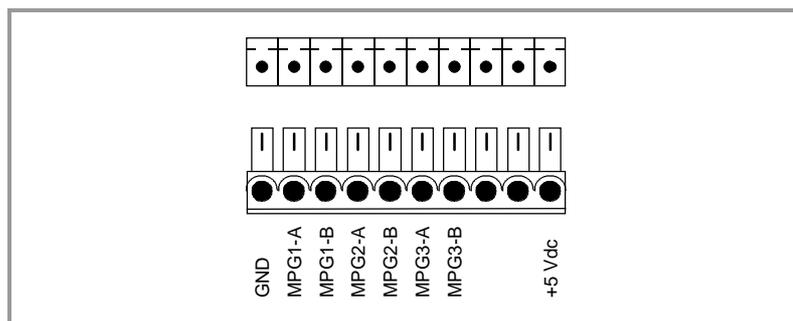
For further information on how to connect and configure the CAN bus, see section "16 CAN connection" of this manual.

PC-104 central unit with LCD-10K monitor

PC-104 central unit with LCD-10K monitor

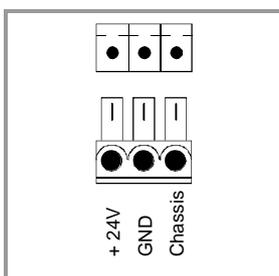
Connector X11: Handwheel connection

10-pin male Phoenix minicombicon connector (3.5 mm pitch).



Connector X14: Power supply

3-pin male Phoenix minicombicon connector (3.5 mm pitch).

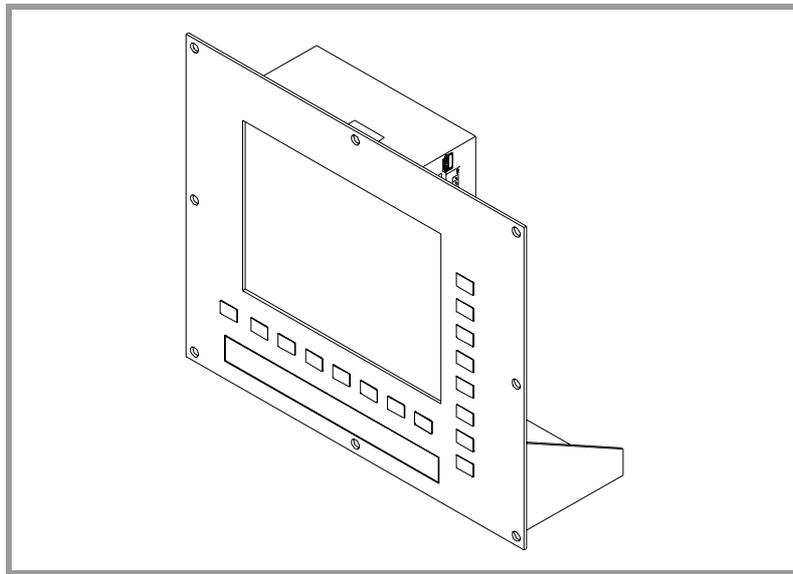


7 PC-104 central unit with LCD-12 monitor

This chapter shows specific data for the central unit with this type of monitor. For further information on the central unit, refer to section **"4 PC104 central unit. General description"**.



Before installing the central unit or manipulating the connectors, carefully read the information detailed in section "4 PC104 central unit. General description" of this manual.



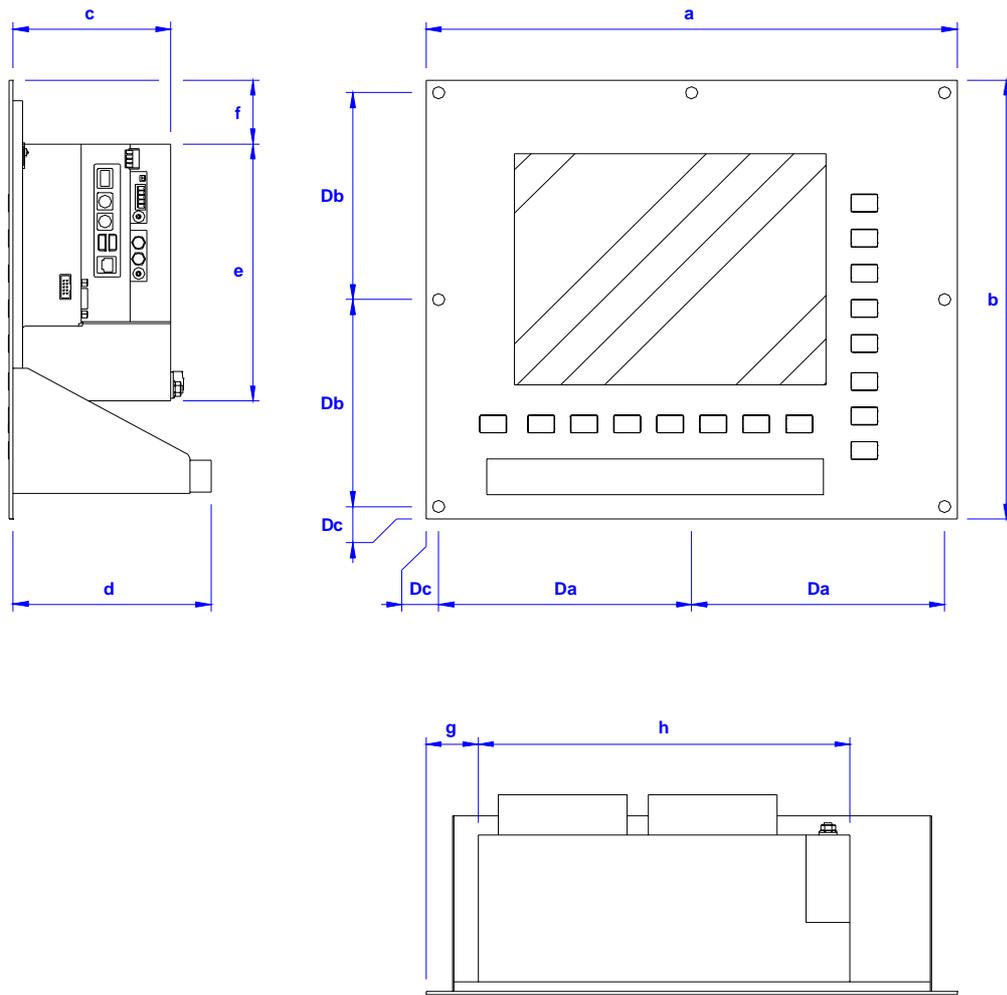
Type of monitor

12.1" LCD monitor (18-bit color). Resolution 800x600.

PC-104 central unit with LCD-12 monitor

7.1 LCD-12. Dimensions

PC-104 central unit with LCD-12 monitor



Dimensions

	mm.	inch
a	420	16.53
b	350	13.77
c	144.8	5.7
d	173	6.81
e	206	8.11
f	52	2.04
g	41	1.61
h	294	11.57

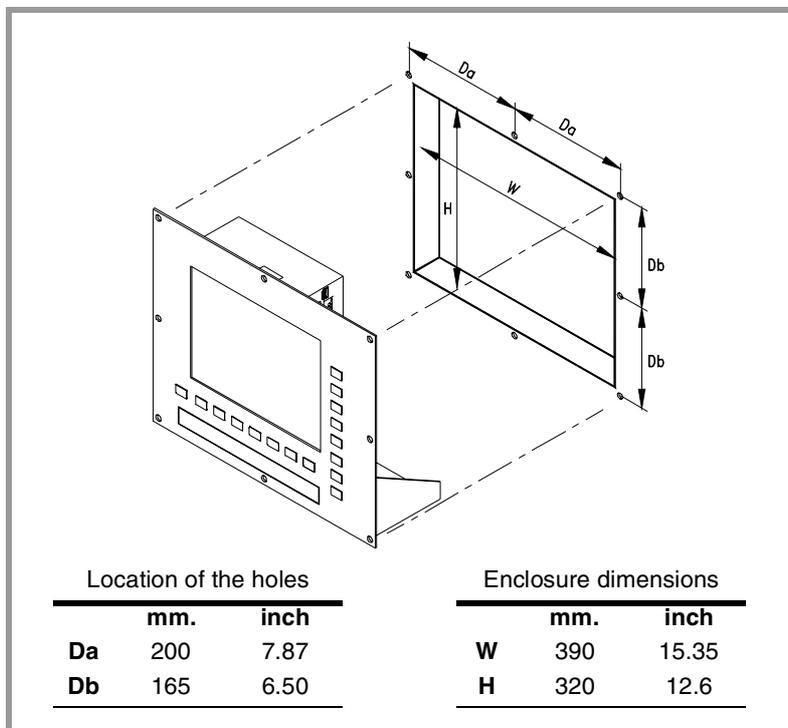
Location of the holes

	mm.	inch
Da	200	7.87
Db	165	6.50
Dc	10	0.39
Ø	6	0.23

7.2 LCD-12. Characteristics of the enclosure

Securing the unit

To properly secure it, use the mounting holes on the front panel of the unit.



Characteristics of the enclosure

The working temperature of the enclosure must not exceed 45°C (113°F). To ensure that it does not exceed this temperature, respect the recommended minimum gap between the sides of the enclosure and the central unit. See "[4.3 PC104. Characteristics of the enclosure](#)".

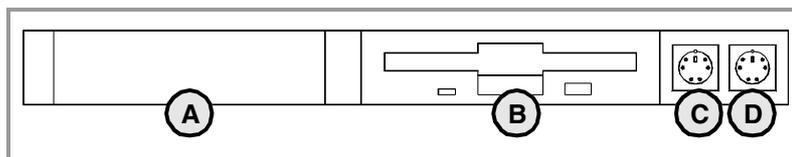
PC-104 central unit with LCD-12 monitor

7.3 LCD-12. Elements (connectors)

We now describe the specific connectors for this type of monitor: For further information on the connectors of the central unit, refer to section ["4.4 PC104. Elements \(connectors\)"](#).

Front connectors

The little compartment under the screen has the following elements:

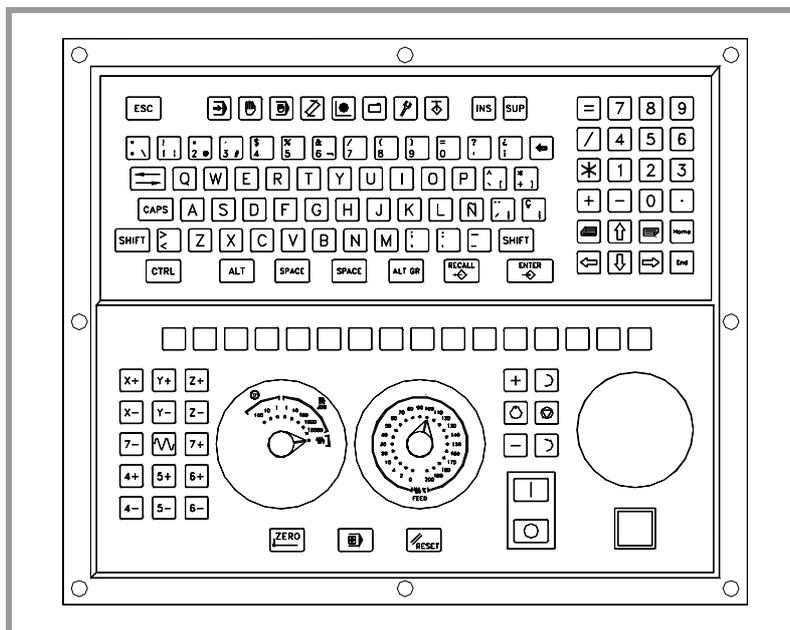


- A.** Enclosure reserved for optional devices:
PCMCIA card, CD ROM, Floppy disk, etc.
- B.** 3½" floppy disk drive.
- C.** Connector for a PC-compatible keyboard.
- D.** Connector for a serial mouse with a PS-2 connector.

PC-104 central unit with LCD-12 monitor

8 Set of keyboard and operator panel (OP-Panel-H/E)

Set of alpha-numeric QWERTY keyboard with integrated operator panel. The operator panel has either an emergency button (E-stop) or a handwheel.



Description

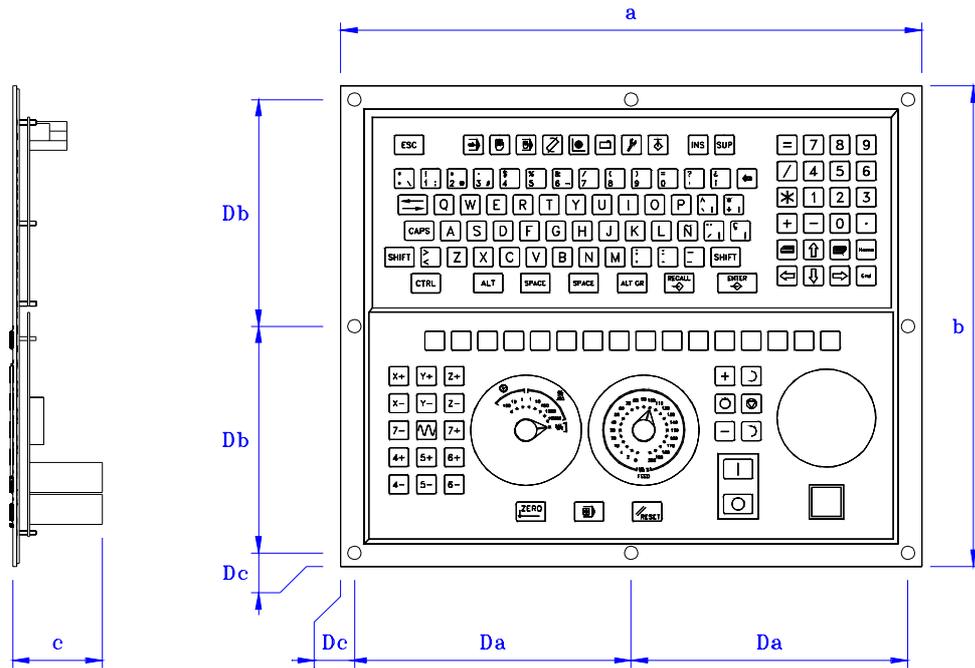
- 24 Vdc universal power supply.
- Connection to the central unit through CAN bus.
- Electronic handwheels. Possibility to connect up to three handwheels with A and B signals (5 Vdc TTL).

For further information, refer to section **"8.4 Elements"**.

Set of keyboard and operator panel (OP-Panel-H/E)

8.1 Dimensions

Set of keyboard and operator panel (OP-Panel-H/E)



Dimensions

	mm.	inch
a	420	16.53
b	350	13.77
c	70	2.75

Location of the holes

	mm.	inch
Da	200	7.87
Db	165	6.50
Dc	10	0.39
Ø	6	0.23

8.2 Technical characteristics

▼ Degree of protection

It meets the protection standard IP54.

The machine manufacturer must comply with the EN 60204-1 (IEC-204-1) regulation regarding electrical shocks in case of defective input/output pins with external power supply when not plugging this connector before turning the power supply on.



*This unit **MUST NOT** be opened by unauthorized personnel. Only personnel authorized by Fagor Automation may manipulate the inside of this module.*

Set of keyboard and operator panel (OP-Panel-H/E)

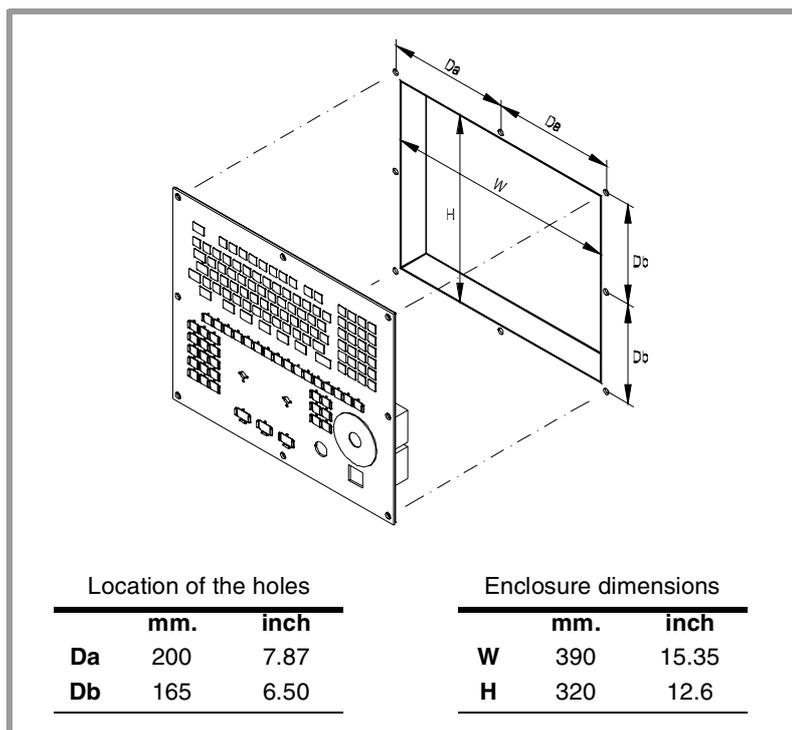
FAGOR

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8.3 Securing characteristics

Set of keyboard and operator panel (OP-Panel-H/E)

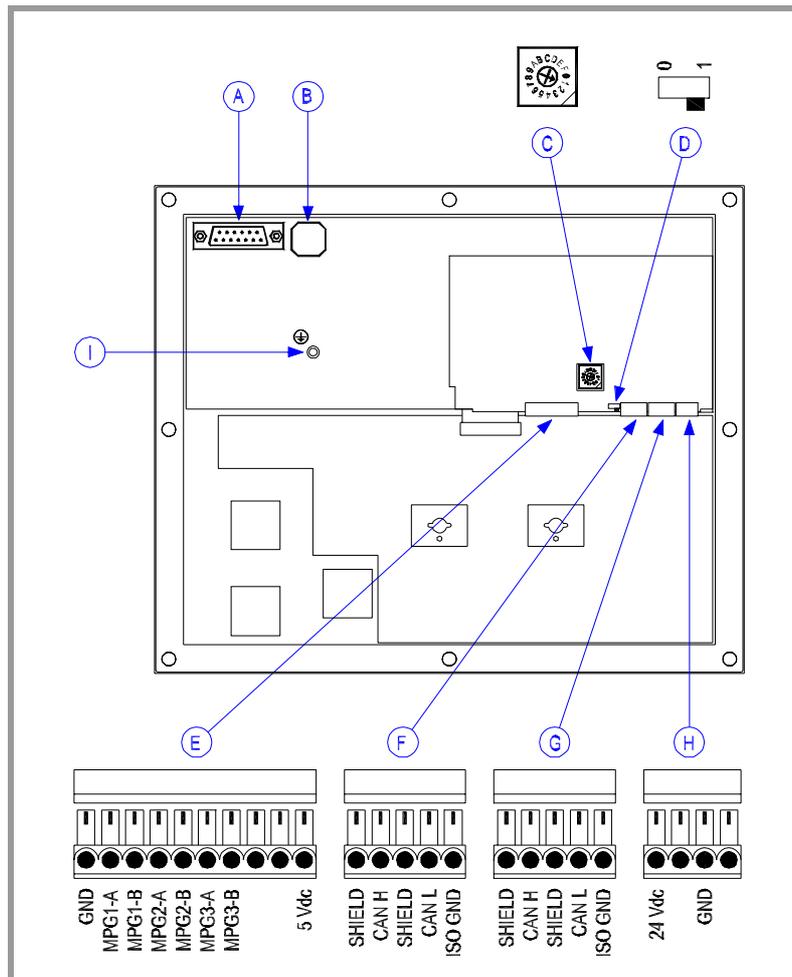


8070 CNC

REF. 0501

8.4 Elements

The connectors are in the rear.



A. Connection of the keys of the central unit. Maximum cable length is 1 meter.

B. Buzzer.

C. Keyboard address selector on the CAN bus.

D. Line termination switch for the CAN bus.

E. Handwheel connection.

Up to 3 handwheels are possible (MPG1, MPG2 and MPG3) with 5 Vdc A and B TTL signals.

F. Connector for the CAN bus.

G. Connector for the CAN bus.

H. Connector to power the keyboard with 24 Vdc.

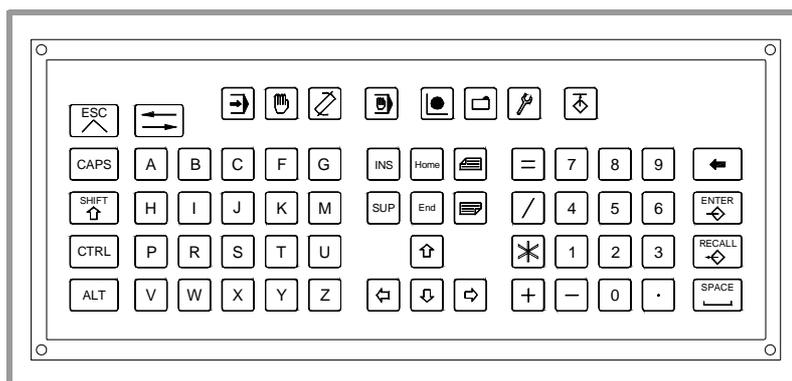
I. Ground connection.

For further information on how to connect to the CAN bus, see section "[16 CAN connection](#)" of this manual.

Set of keyboard and operator panel (OP-Panel-H/E)

9 Keyboard (Key Board Panel H)

Keyboard (Key Board Panel H)

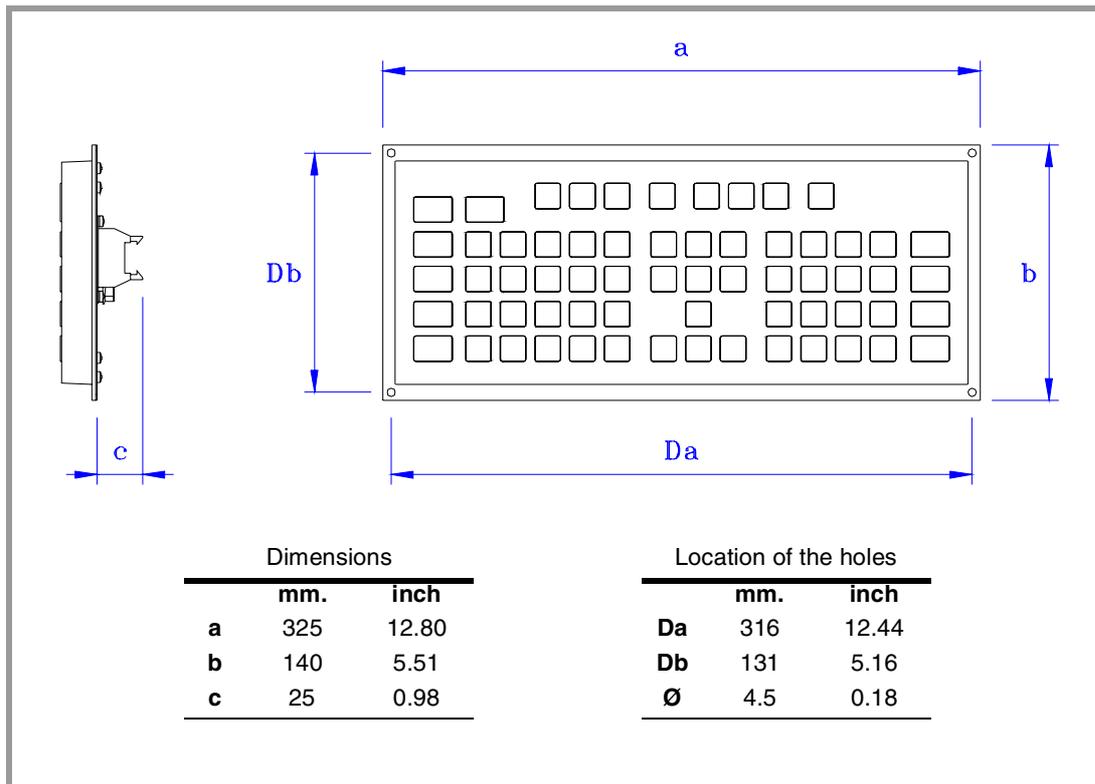


Description

- Connection to the central unit through PS-2 connector.

For further information about the connectors, refer to section ["9.4 Elements"](#).

9.1 Dimensions



Keyboard (Key Board Panel H)

9.2 Technical characteristics

▼ Degree of protection

It meets the protection standard IP54.

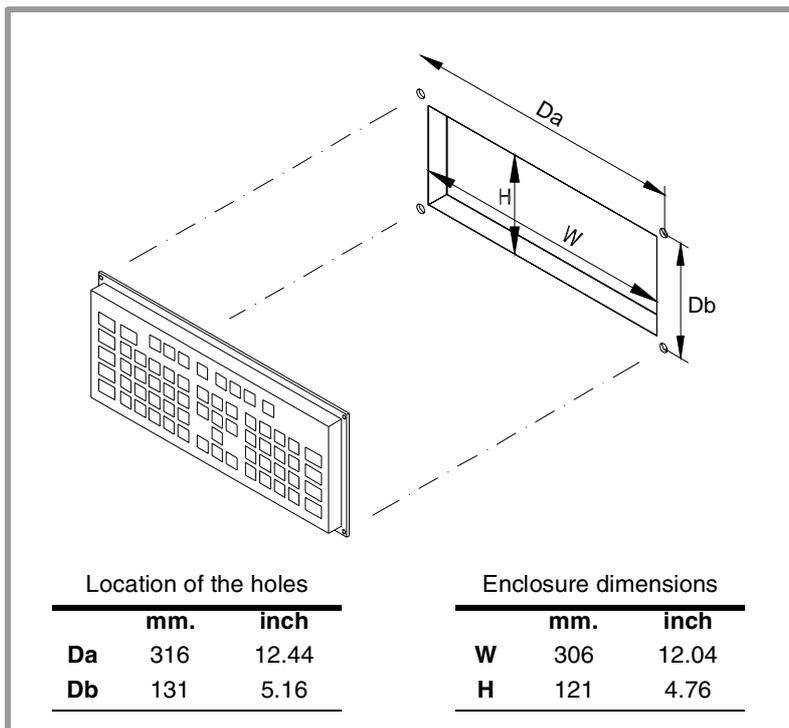
The machine manufacturer must comply with the EN 60204-1 (IEC-204-1) regulation regarding electrical shocks in case of defective input/output pins with external power supply when not plugging this connector before turning the power supply on.



*This unit **MUST NOT** be opened by unauthorized personnel. Only personnel authorized by Fagor Automation may manipulate the inside of this module.*

Keyboard (Key Board Panel H)

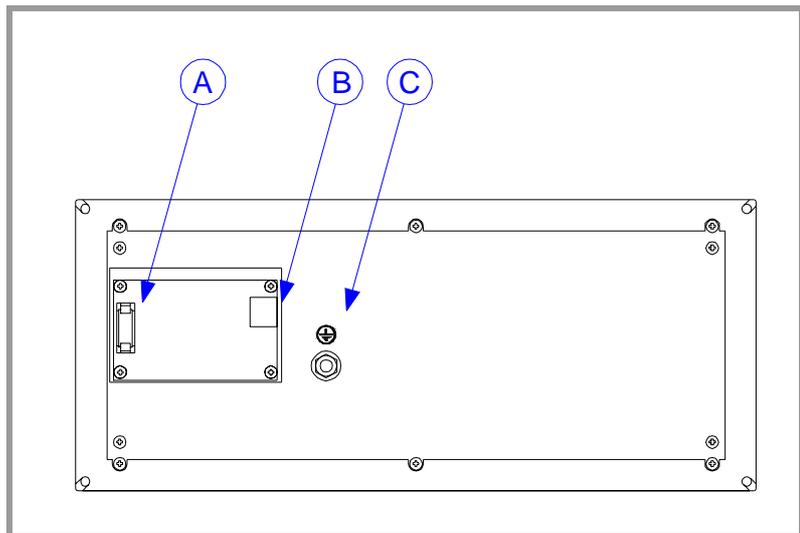
9.3 Securing characteristics



Keyboard (Key Board Panel H)

9.4 Elements

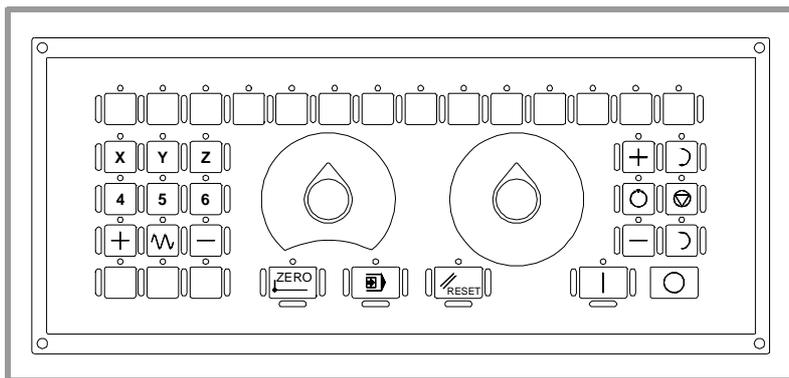
The connectors are in the rear.



- A.** Connection of the keys of the central unit. Maximum cable length is 1 meter.
- B.** PS-2 connector to connect the keyboard to the central unit.
- C.** Ground terminal. All ground terminals of the machine must be connected to this terminal.

Keyboard (Key Board Panel H)

10 Operator panel (Jog panel)



Description

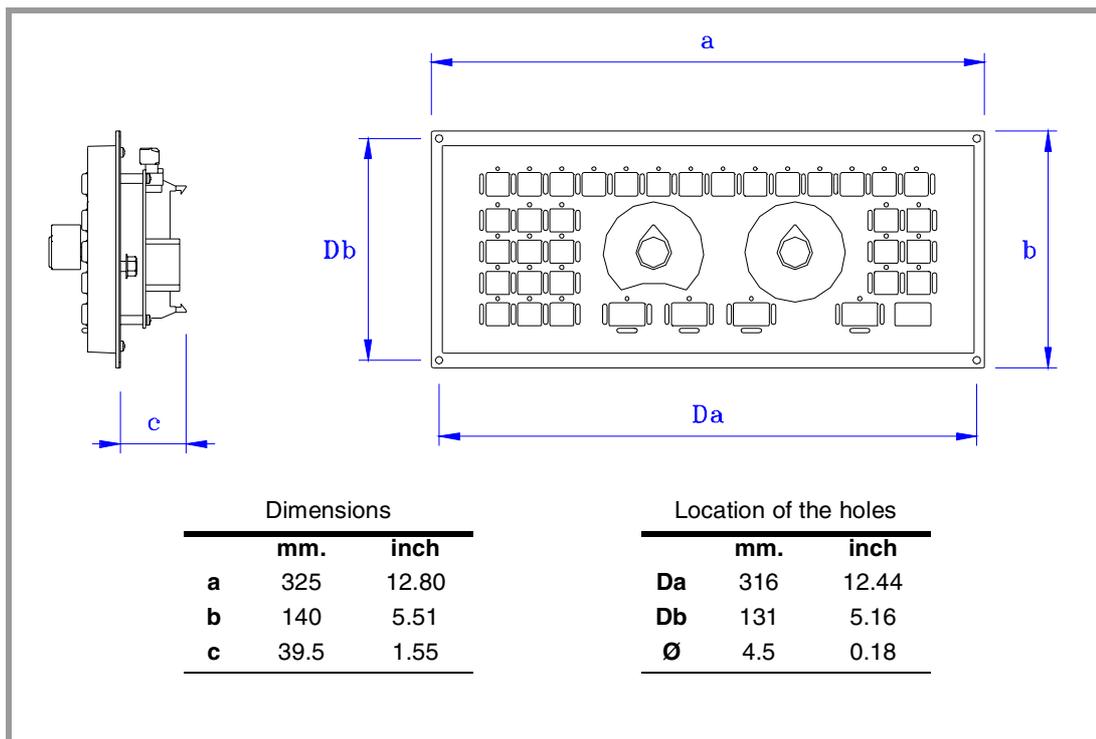
- 24 Vdc universal power supply.
- Connection to the central unit through CAN bus.
- Electronic handwheels. Possibility to connect up to three handwheels with A and B signals (5 Vdc TTL).

For further information about the connectors, refer to section ["10.4 Elements"](#).

Operator panel (Jog panel)

10.1 Dimensions

Operator panel (Jog panel)



10.2 Technical characteristics

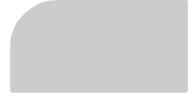
▼ Degree of protection

It meets the protection standard IP54.

The machine manufacturer must comply with the EN 60204-1 (IEC-204-1) regulation regarding electrical shocks in case of defective input/output pins with external power supply when not plugging this connector before turning the power supply on.



*This unit **MUST NOT** be opened by unauthorized personnel. Only personnel authorized by Fagor Automation may manipulate the inside of this module.*



Operator panel (Jog panel)

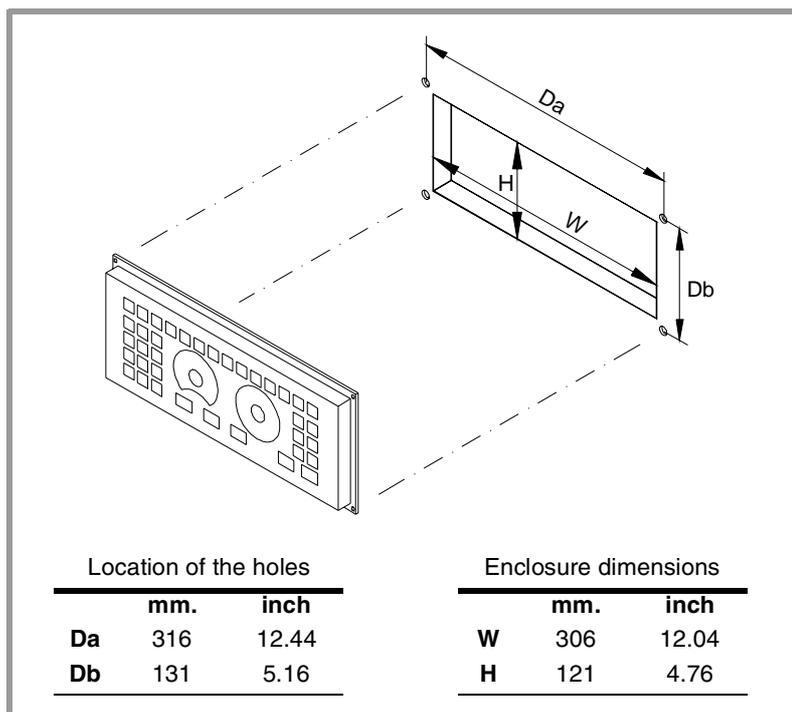
FAGOR 

8070 CNC

REF. 0501

10.3 Securing characteristics

Operator panel (Jog panel)

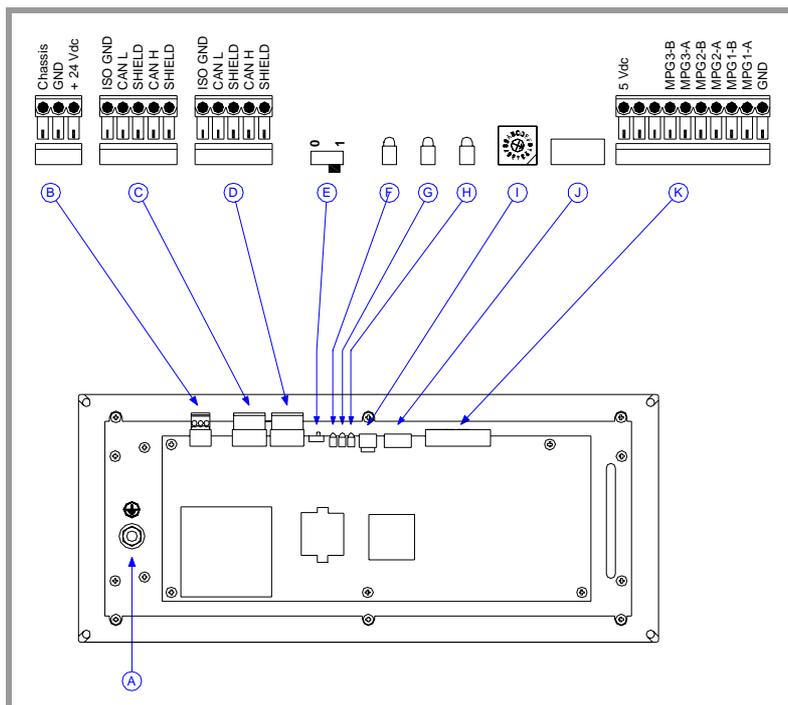


8070 CNC

REF. 0501

10.4 Elements

The connectors are in the rear.



Operator panel (Jog panel)

A. Ground terminal. All ground terminals of the machine must be connected to this terminal.

B. Connector to power the keyboard with 24 Vdc.

C. Connector for the CAN bus.

D. Connector for the CAN bus.

E. Line termination switch for the CAN bus.

F. Red LED. It turns on when the operator panel is under voltage.

G. Red LED. It turns on when there is an error at the CAN bus.

H. Green LED. It turns on when the CAN bus is working fine.

I. Operator panel address selector on the CAN bus.

J. CAN bus configuration.

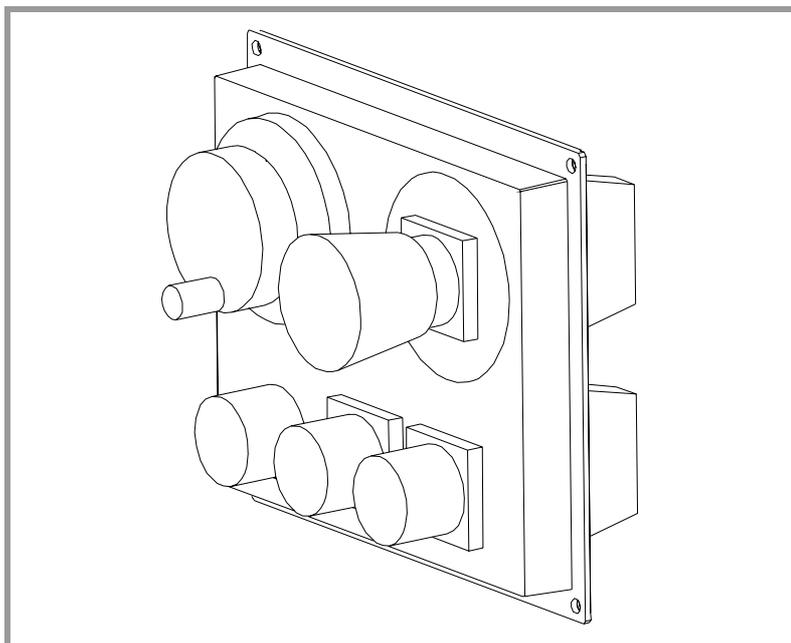
K. Connector for the handwheels.

Up to 3 handwheels are possible (MPG1, MPG2 and MPG3) with 5 Vdc A and B TTL signals.

For further information on how to connect and configure the CAN bus, see section **"16 CAN connection"** of this manual.

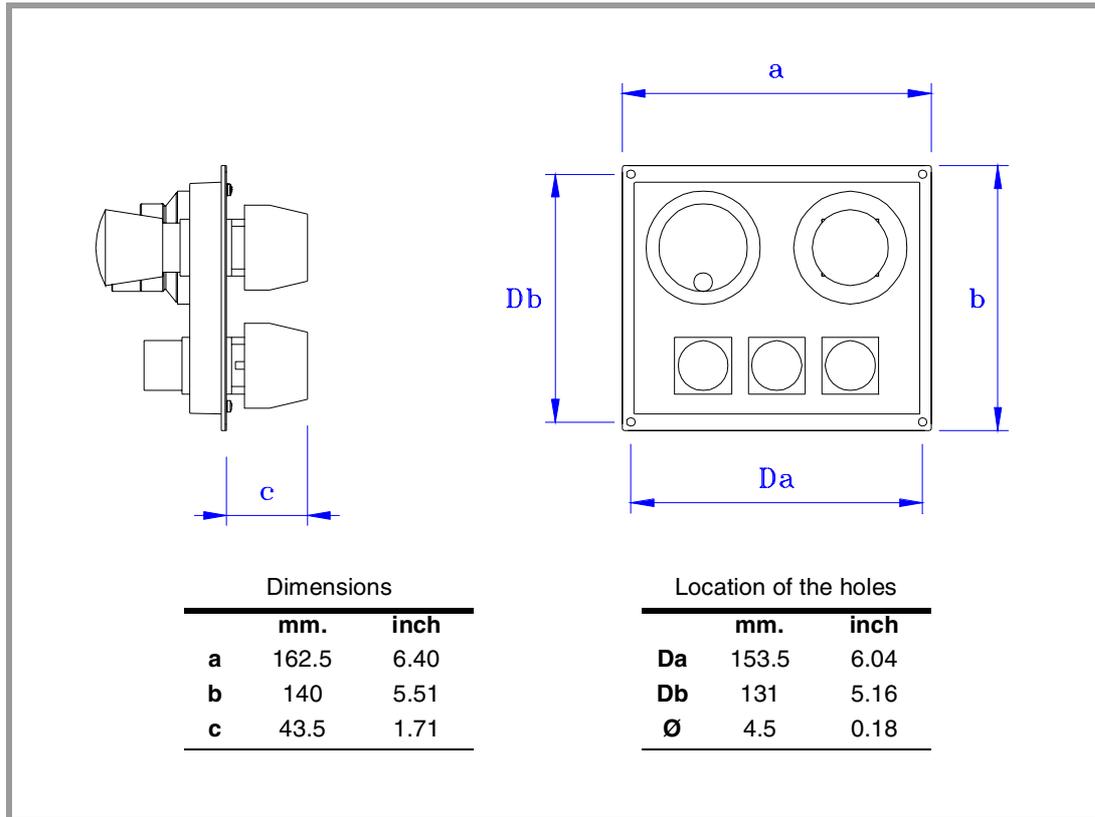
11 “Handwheel + E-stop button” module

Set of handwheel and emergency button to connect to the PC104 central unit.



“Handwheel + E-stop button” module

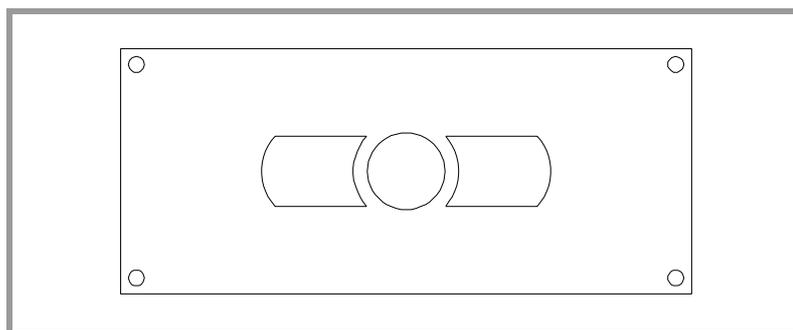
11.1 “Handwheel + E-stop button” module dimensions



“Handwheel + E-stop button” module

12 Mouse module

Flat mouse to be connected to the PC104 central unit.

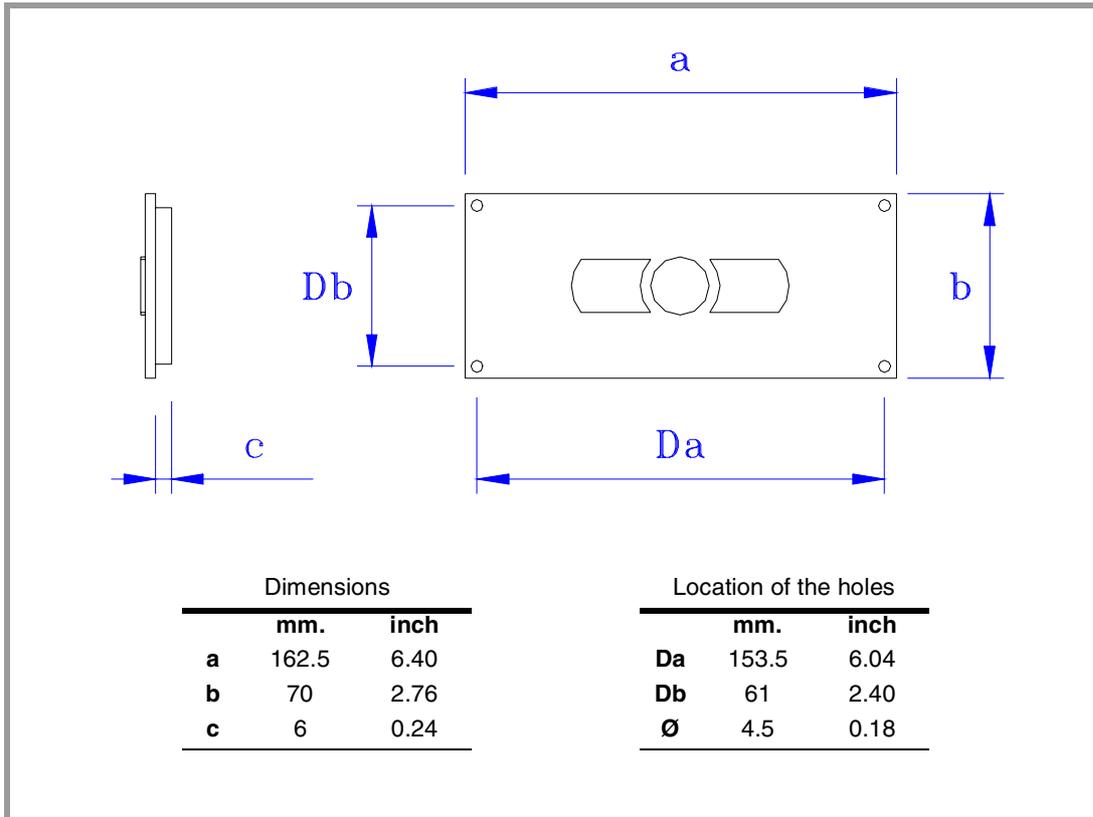


External connection

The mouse is connected to the central unit through the PS-2 connector.

Mouse module

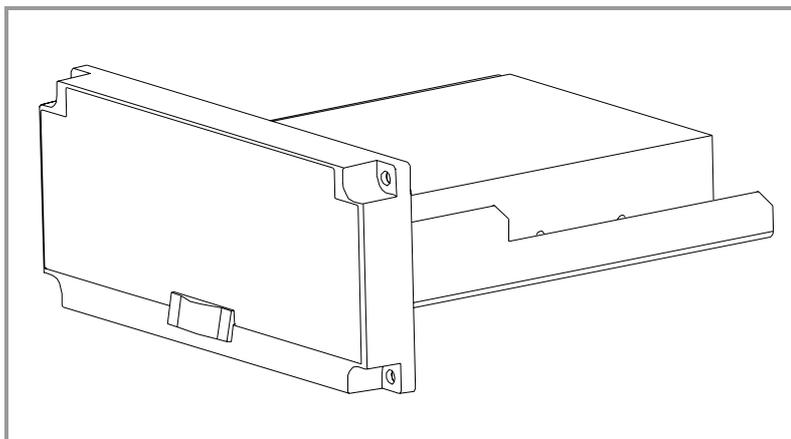
12.1 Mouse dimensions



Mouse module

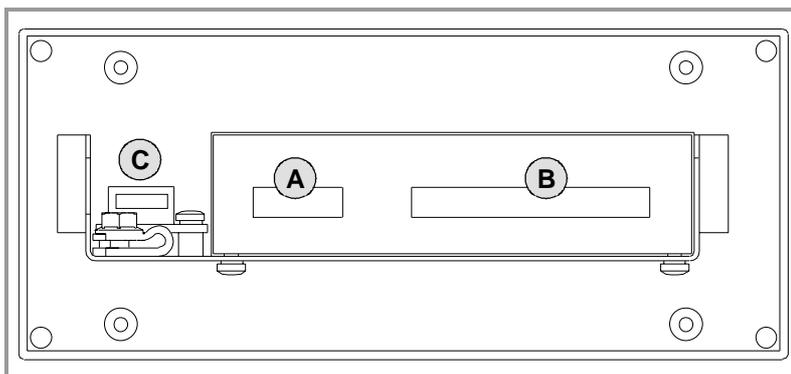
13 Floppy disk drive.

Floppy disk drive to be connected to the PC104 central unit. It has two USB connection points.



External connection

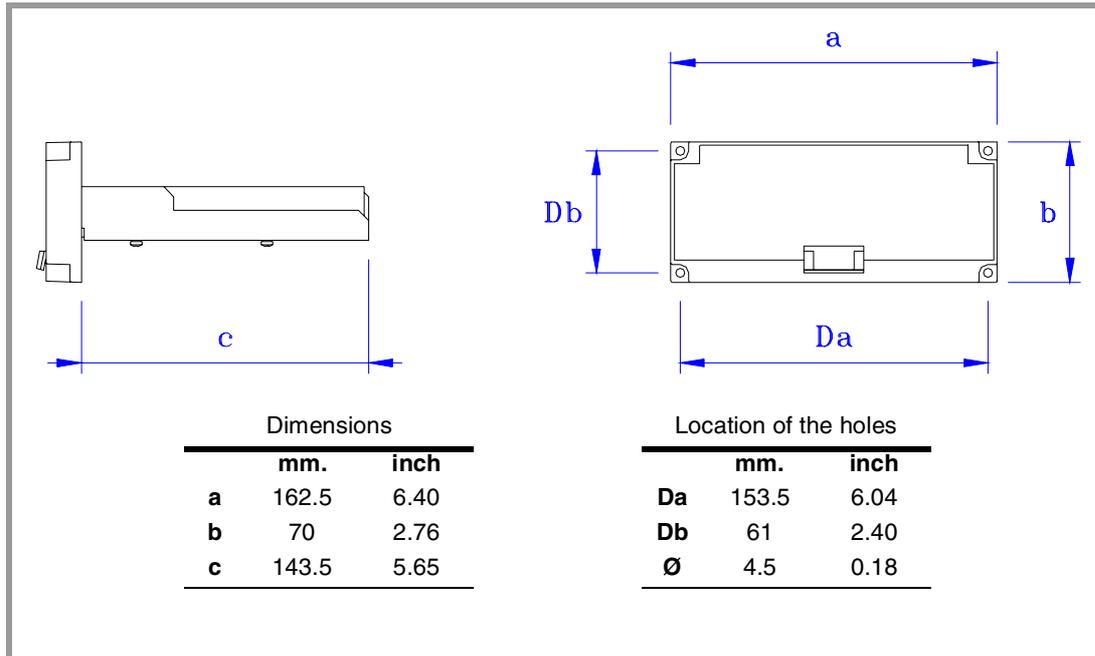
The following elements are in the rear:



- A. Power supply.
- B. Connector for the data cable.
- C. USB connector.

Floppy disk drive.

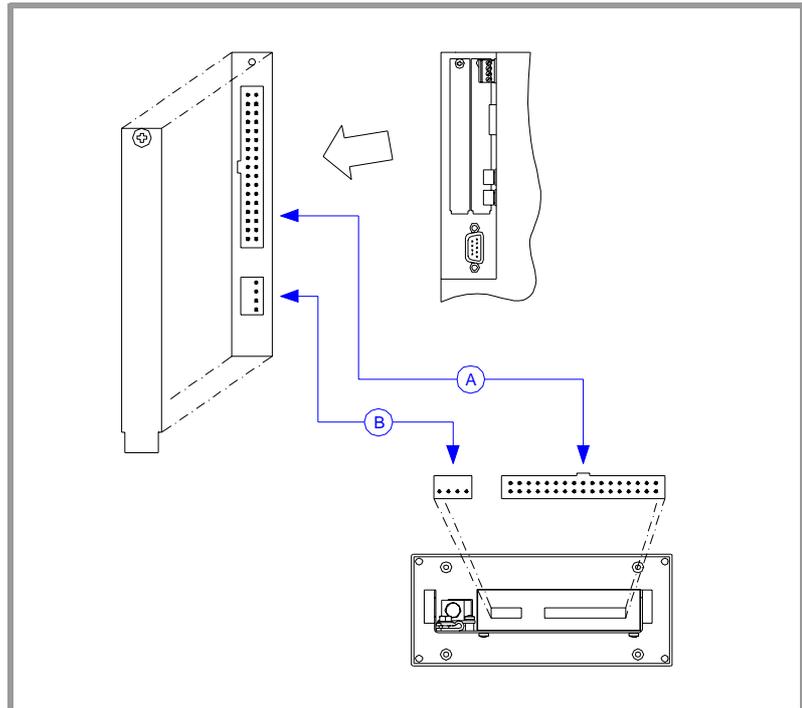
13.1 Floppy disk drive dimensions



Floppy disk drive.

13.2 Floppy disk drive installation

Floppy disk drive.

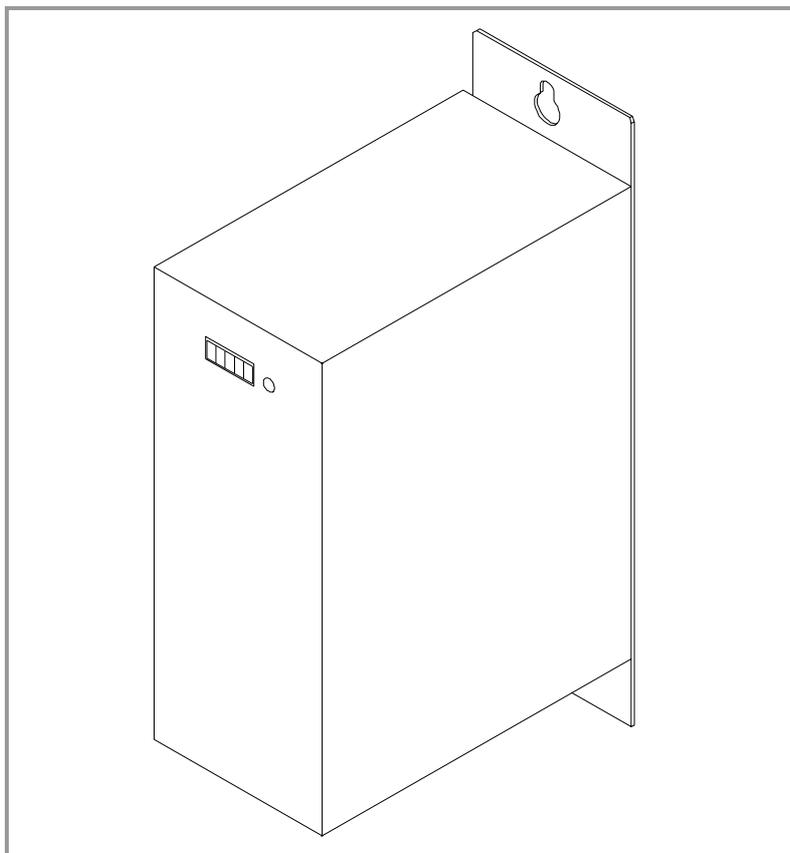


Connecting the floppy disk drive to the central unit requires a power cable, a 34-pin data cable and a standard USB cable with Type-A connectors at both ends.

1. Turn the central unit off and unplug the power cable.
2. At the central unit, remove the plate protecting the floppy disk drive connector. The floppy disk drive is connected through two connectors.
 - A. 34-pin connector for the data cable.
 - B. Connector for the power cable of the floppy disk drive.
3. Connect the data cable between the floppy disk drive and the central unit.
4. Connect the power cable between the floppy disk drive and the central unit.
5. Connect the USB cable between the floppy disk drive and the central unit.
6. Secure the floppy disk drive in its compartment. To properly secure it, use the mounting holes on the front panel of the unit.
7. Plug the general power cable of the central unit.

14 Emergency battery

It is in charge of supplying power to the central unit in case of a AC power outage.



Characteristics

The battery provides an autonomy of 20 minutes after being charged for 35 hours.

Emergency battery

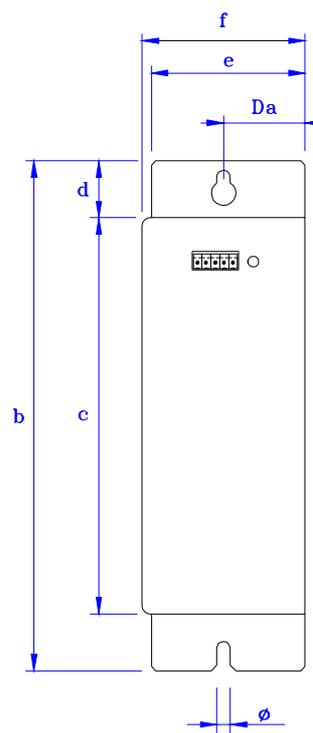
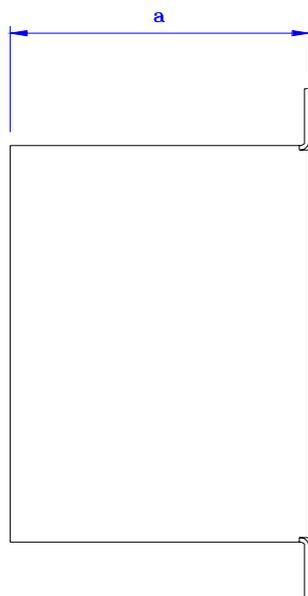
FAGOR 

8070 CNC

REF. 0501

14.1 Battery dimensions

Emergency battery



Dimensions

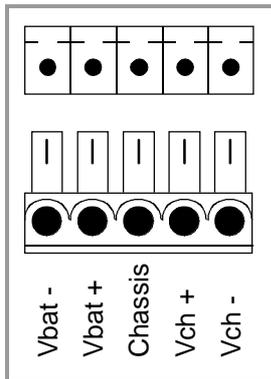
	mm.	inch
a	110	4.33
b	189.3	7.45
c	147.1	5.79
d	21	0.82
e	56.5	2.22
f	60	2.36

Location of the holes

	mm.	inch
Da	30	1.18
Ø	5	0.19

14.2 Elements (connectors)

It has a single connector to charge the battery and supply the system when necessary.



5-pin male Phoenix minicombicon connector (3.5 mm pitch).

Signal	Description
Vbat - / Vbat +	Central unit powered by the battery.
Chassis	System ground connection
Vch - / Vch +	Charge the battery.

The LED next to the connector blinks while the battery is being charged and it stays on when the battery is charged.

Emergency battery

15 Remote modules

They are distributed in groups. Each group may have up to 5 modules depending on consumption.

Place the modules on 2 profiles, according to the UNE 50022 standard, with 2 securing ends, one at each end of the group. They help securing the modules besides maintaining the right gap between the profiles.

Elements

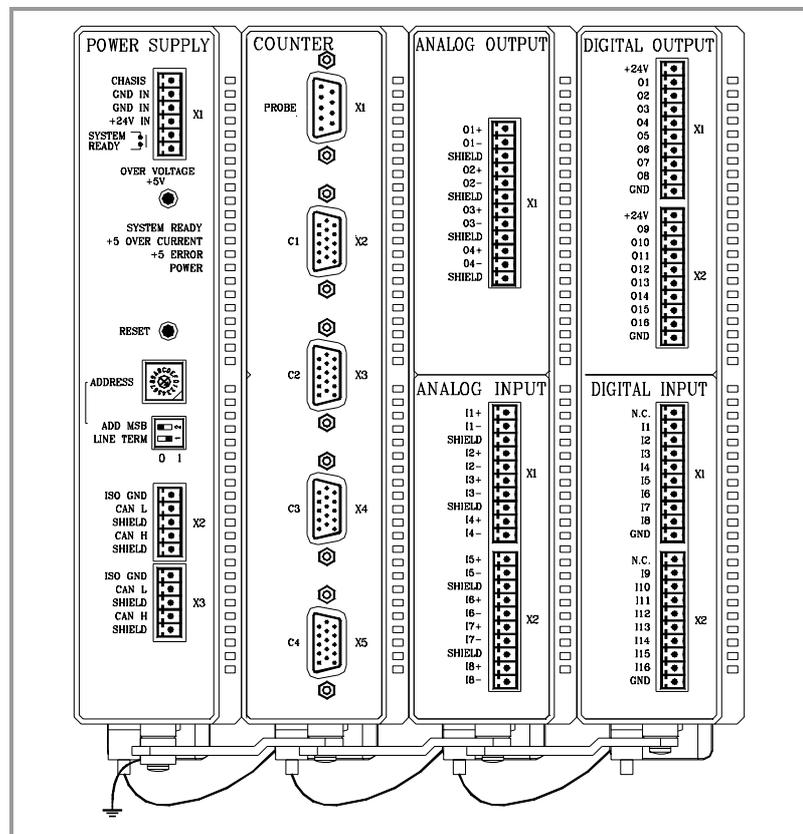
There are full-size and half-size modules.

- Full-size modules fill out the whole box (Power Supply, Counter).
- Half-size modules occupy half the box (Analog Output, Analog Input, Digital Output, Digital Input).

All types of possible combinations are supplied with half-size modules, even units with a single half-size module (the other half will be a cover).

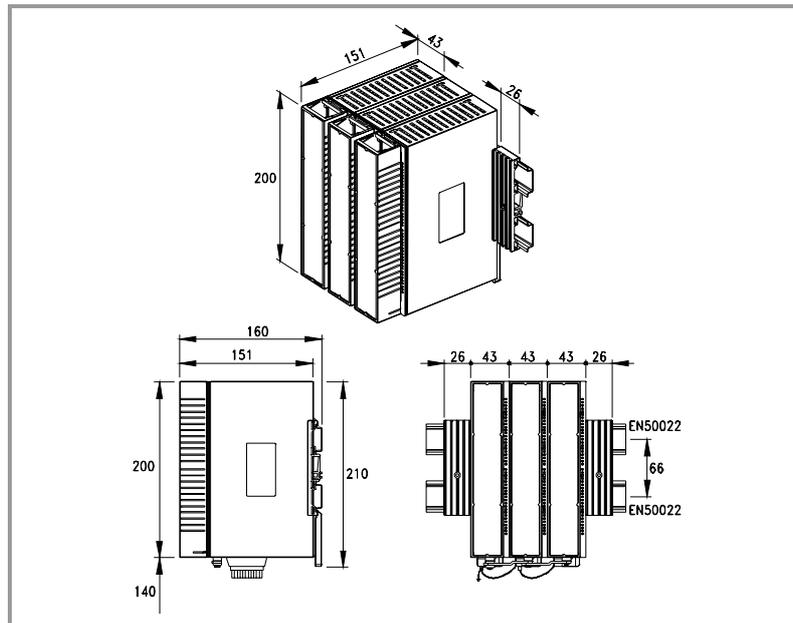
The mounting order to be followed from left to right is:

- Power Supply.
- Counters.
- Analog outputs. Half size.
- Analog inputs. Half size.
- Digital outputs. Half size.
- Digital inputs. Half size.



Dimensions

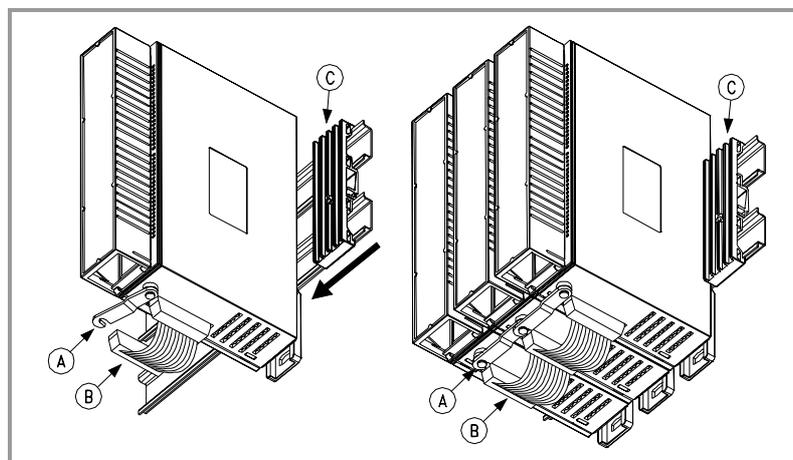
Always leave a 140 mm gap under the modules for ventilation and later handling.



Remote modules

Connection of the modules

The modules of the group are connected as follows:



- A.** For ground connection.
- B.** Ribbon cable to interconnect the modules.
- C.** Securing ends.

Each group is connected to the system (CPU, Keyboard, etc.) through the CAN bus as described later on.

15.1 Consumption of the remote modules

The power supply is in charge of supplying to the rest of the modules through +5V and ±18V and managing the internal bus of the group. The total consumption of the group depends on the configuration of the modules.

		5V	±18V
(DI)	Digital inputs	0.40 watts	---
(DO)	Digital outputs	0.65 watts	---
(AI)	Analog inputs	0.3 watts	1.8 watts
(AO)	Analog outputs	0.35 watts	3.4 watts
(CT)	Counters	1.75 watts	---
(CPU)	CPU-CAN	0.6 watts	---

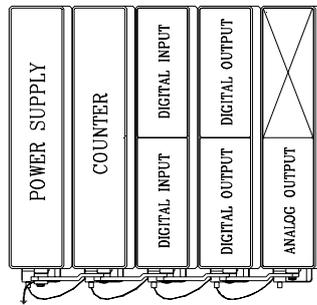
The consumption of the CPU-CAN is added to each module of the configuration. When mounting two half-size modules together (in the same box), the consumption of the CPU-CAN must only be added once.

The total consumption of the group must not exceed the following maximums:

- For +5V, a maximum consumption of 10 watts.
- For ±18V, a maximum consumption of 7.2 watts.

If any of them is exceeded, double the group. Use two power supplies and distribute the modules.

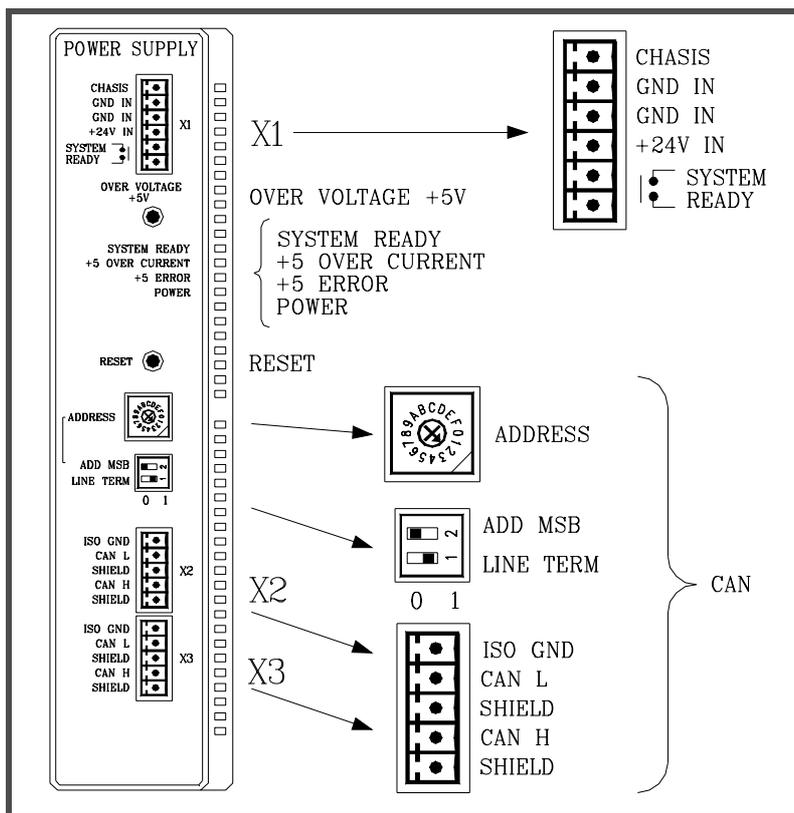
Example:



Modules	5V	±18V
(CT) + (CPU)	1,75 + 0,6.	---
(DI) + (DI) + (CPU)	0,4 + 0,4 + 0,6	---
(DO) + (DO) + (CPU)	0,65 + 0,65 + 0,6.	---
(AO) + (CPU)	0,35 + 0,6	3,4
Total consumption	6,60 watts	3.4 watts

15.2 Power Supply

It must be present in all configurations (1 per group). It must be powered at 24 Vdc and connected to the system CAN bus.

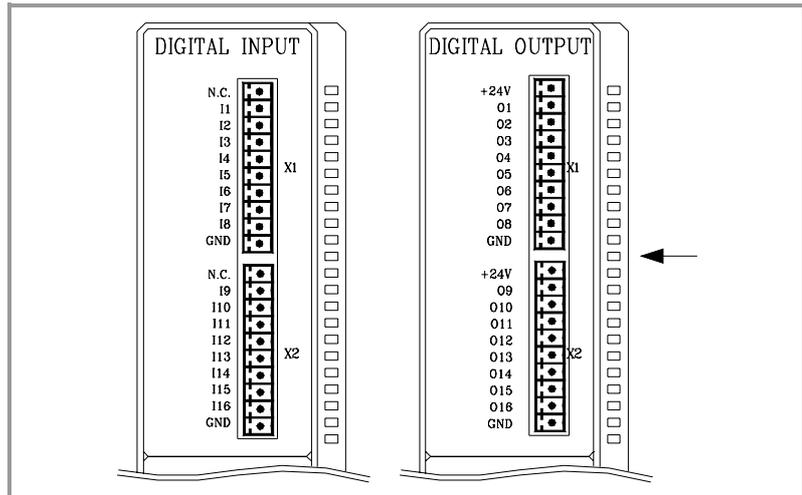


- | | |
|------------------|--|
| X1 Chassis | For system ground connection. |
| X1 +24V / GND | For the 24 Vdc power supply. |
| X1 System Ready | For the emergency chain from the electrical cabinet. It is an internal contact that closes when the group is ready. |
| Over voltage +5V | It has a push-button and a red LED that turns on when activating the internal safety device of the +5V power supply. Use the push-button to reactivate the power supply. If the LED comes back on, call the Technical Service. |
| System Ready | Green LED that blinks when the group is ready. |
| +5V over-current | Red LED that comes on when the +5V power supply is demanded the maximum current. |
| +5 error | Red LED that turns on when the power supply is not capable of supplying the 5 Vdc due to over-current. Remove some load or duplicate the group. |
| Power | Green LED that comes on when the +5 V is working properly. |

Remote modules

15.3 Digital inputs and outputs

Remote modules



Digital inputs

All digital inputs (I), 16 per module, have a status indicating LED and are galvanically protected with opto-couplers.

The electrical characteristics of the inputs are:

Nominal voltage	+24 Vdc (between +18 and +30 Vdc).
High threshold "1"	over +18 Vdc
Low threshold "0"	under +9 Vdc
Typical consumption of each input	5 mA.
Maximum consumption of each input	7 mA.

Digital outputs

All digital outputs (O), 16 per module, have a status indicating LED and are galvanically protected with opto-couplers.

The electrical characteristics of the outputs are:

Nominal voltage	+24 Vdc (between +18 and +30 Vdc).
Output voltage	2V less than supply Vdc.
Maximum output current	500 mA per output.

The digital output modules have an 8A fuse inside for protection against over-voltage (over 33 Vdc) and against reverse connection.

The green LED located in the middle of the digital output module turns on when the module is powered with 24 Vdc and the inside fuse is OK.

Probe

The digital inputs let you handle the signal of the two probes (5 Vdc or 24 Vdc) both for analog and SERCOS® axes.

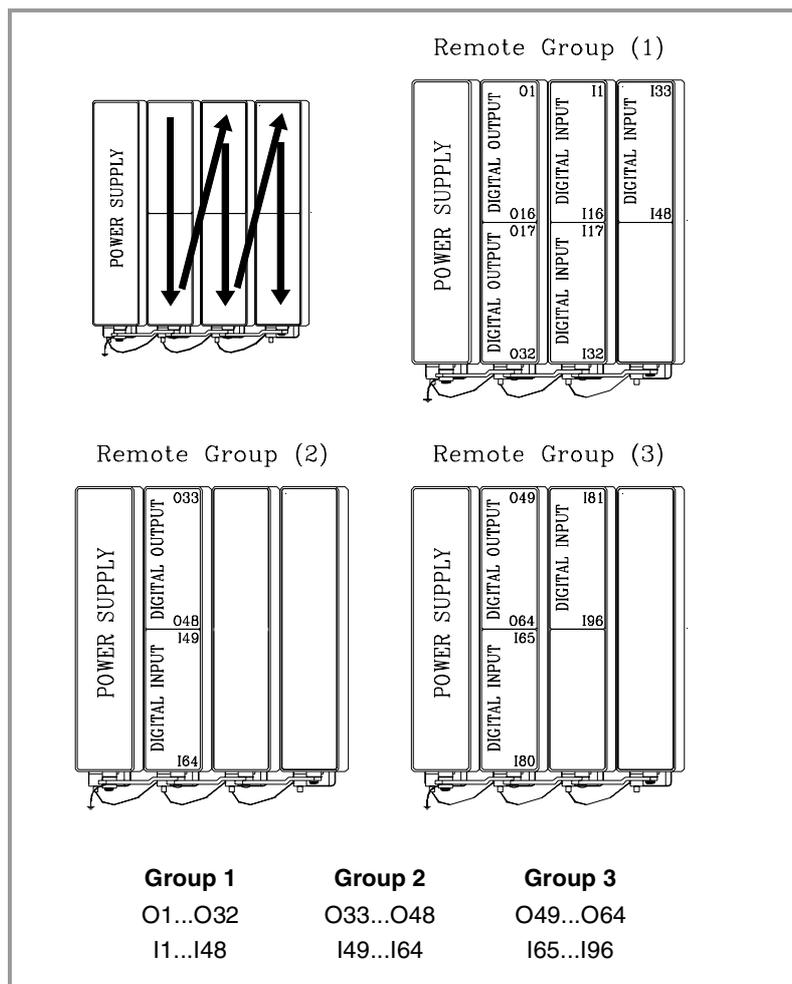
Use machine parameters to define which digital input is associated with each probe and their type of pulse.

Numbering of the digital inputs and outputs

Use machine parameters to set the number of digital I/O modules connected to the same CAN Bus. If these parameters are not set, the CNC numbers the modules automatically according to the order of the remote groups (rotary switch of the Power Supply element).

Numbering according to the order of the remote groups

They are numbered following the order of the remote groups (rotary switch of the Power Supply element). Within each group, they are ordered from top to bottom and from left to right.



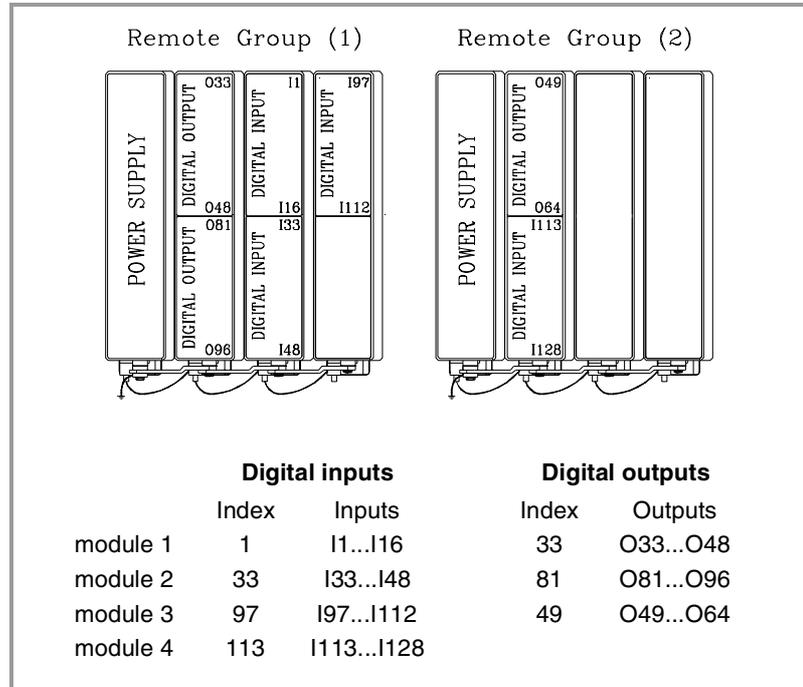
Remote modules

Numbering by machine parameters

When the numbering is set by machine parameters, each module is assigned a base index and the inputs or outputs of that module are numbered after it. The values of the base index must be multiple of 16, plus 1 (i.e. 1, 17, 33, etc.). The base indexes may follow any order and they do not have to be sequential.

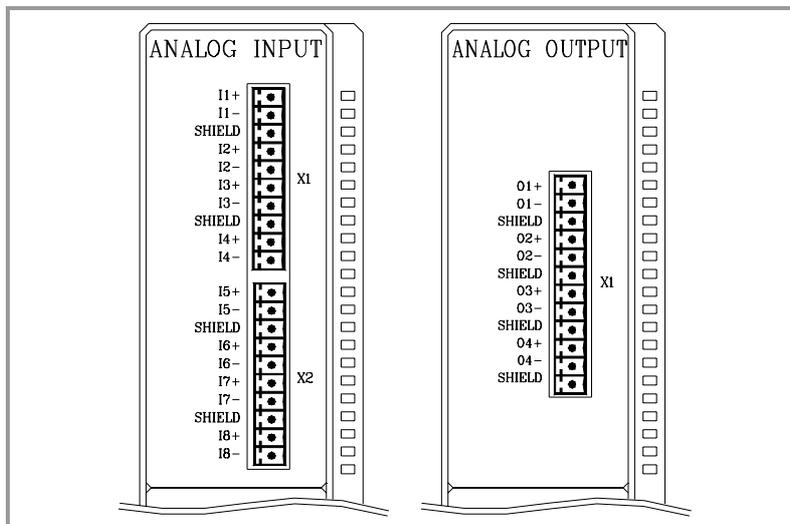
When inserting a new module, the first modules will be assigned the numbering of the table and the last one will be assigned the next valid base index after the highest one assigned until then.

Remote modules



15.4 Analog inputs and outputs

Every input and output has three connection pins (I1+, I1-, Shield) or (O1+, O1-, Shield). Use shielded cables connecting their meshes to the corresponding Shield pin.



Remote modules

Analog inputs

All the analog inputs (8 per module) have the following characteristics:

Voltage range	$\pm 10V$.
Resolution	12 bits
Input impedance	20K Ω
Maximum cable length (unshielded)	75 mm.

Analog outputs

Characteristics of the analog outputs (4 per module):

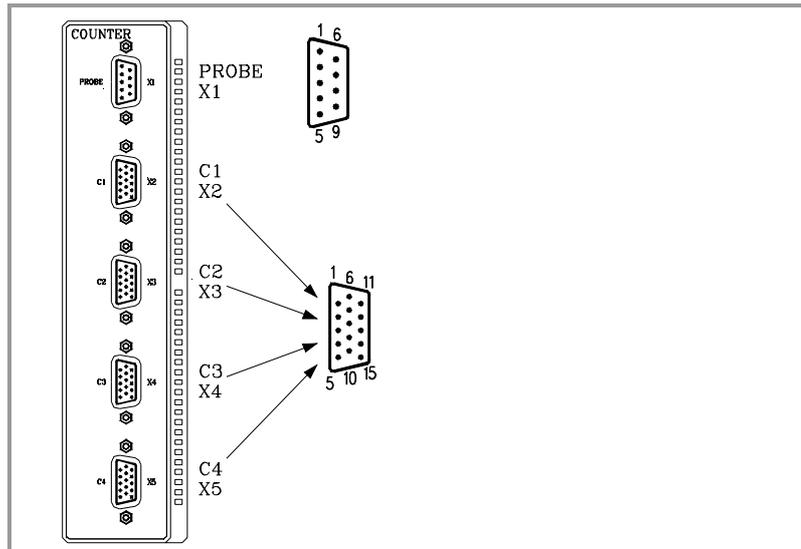
Voltage range	$\pm 10V$.
Resolution	16 bits
Minimum impedance of the connected device	10 K Ω .
Maximum cable length (unshielded)	75 mm.

Numbering of the analog inputs and outputs

They are numbered following the order of the remote groups (rotary switch of the Power Supply element). Within each group, they are ordered from top to bottom and from left to right.

15.5 Counters

Remote modules



Connector X1

Not being used from software version V01.10 on.

Previous versions allowed connecting 2 probes of 5Vdc or 24Vdc. From version V01.10 on, the probes are managed through digital inputs.

Connectors X2, X3, X4 and X5

To connect feedback devices with TTL, differential TTL or 1Vpp sinusoidal signals.

Signal	Description
1 A	Feedback signals
2 / A	
3 B	
4 / B	
5 I0	Reference signals
6 / I0	
7 AL	Feedback alarm
8 / AL	
9 +5 Vdc	Feedback system supply output
10	Reserved
11 GND	Feedback system supply output
12	Reserved
13	Reserved
14	Reserved
15 Chassis	Shield

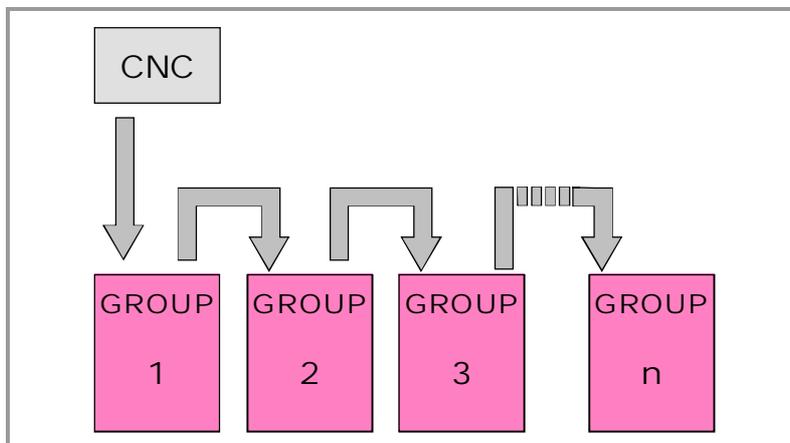
Numbering of the feedback inputs

They are numbered following the order of the remote groups (rotary switch of the Power Supply element). Within each group, they are ordered from top to bottom and from left to right.

REF. 0501

16 CAN connection

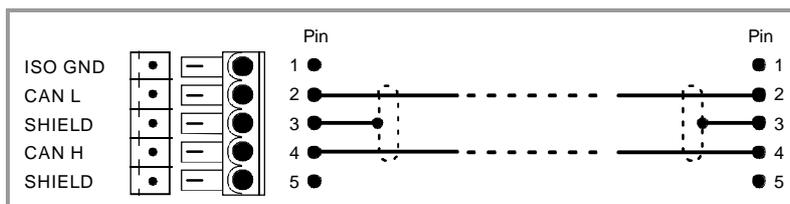
It is used to connect the group to the system (CPU, keyboard and other groups). The CAN connection is good for 32 elements, CPU included. There may be more than one keyboard and several groups of remote modules.



CAN connection

CAN connector pinout

5-pin male Phoenix minicombicon connector (3.5 mm pitch).



Signal	Description
ISO GND	Ground / 0V
CAN L	Bus signal (LOW)
SHIELD	CAN shield
CAN H	Bus signal (HIGH)
SHIELD	CAN shield

The connector has two shield pins. Both pins are equivalent and the CAN shield may be connected to either one.

CAN cable characteristics.

Use a specific CAN cable. The ends of all the wires and the shield must be protected by the corresponding terminal (pin). Also use the terminals (pins) to secure the cable to the connector.

Type:	Shielded. Twisted pair (1 x 2 x 0.22mm ²).
Flexibility:	Extremely flexible. Minimum bending radius, static = 50 mm and dynamic = 95mm.
Cover:	PUR
Impedance:	Cat.5 (100Ω - 120Ω)

FAGOR 

8070 CNC

REF. 0501

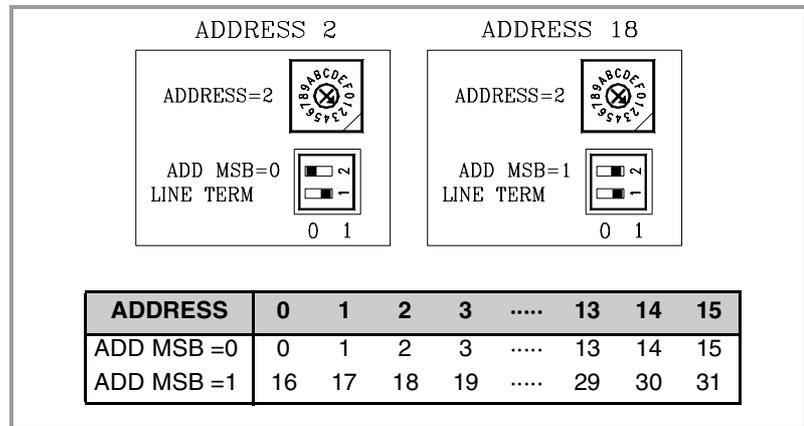
16.1 Module identification and connection

Module identification

Each one of the elements integrated into the CAN bus is identified by the 16-position rotary switch (0-15) "Address" (also referred to as "Node_Select"). With the "ADD MSB" switch of the remote modules, the positions or elements integrated in the CAN bus may be expanded up to 32. Positions 0-15 are selected with ADD MSB=0 and positions 16-31 with ADD MSB=1.

The "Address" switch selects the address (node) occupied by each of the elements integrated into the bus. The CNC must always occupy position "0" and the rest of the modules will occupy consecutive positions starting with 1.

In order for any address change at the "Address" switch to be assumed, the corresponding module must be reset.



The "Line_Term" switch

The "Line_Term" switch identifies which are the elements that occupy the ends of the CAN bus; i.e. the first and last physical element in the connection.

The central unit must always be at one end of the line. The other end will be the last one of the remote module groups.

The switch position of the terminating elements must be "1" and that of the rest of the elements "0".

CAN connection

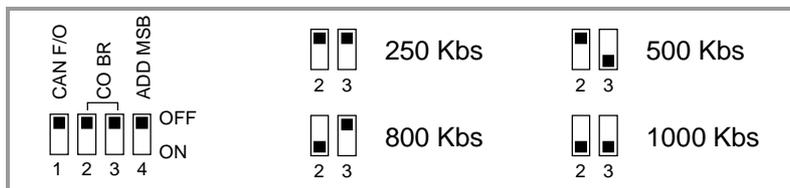
“CAN Fagor / CanOpen” configuration

At certain elements, one must select the type of CAN bus to be used, i.e. CAN Fagor or CanOpen. This is done using the “CAN F/O” switch.

CAN F/O = ON CanOpen has been selected.

CAN F/O = OFF Can Fagor has been selected.

The “CO BR” switches set the transmission speed when the CanOPEN bus has been selected.

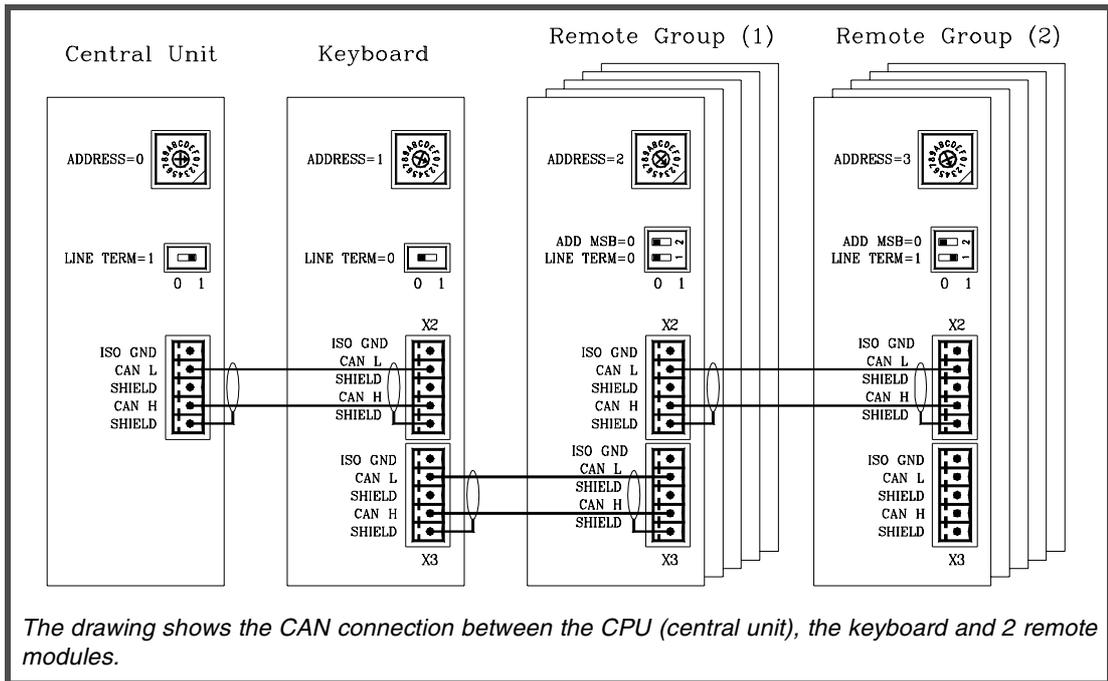


CAN connection

Module interconnection

It is a serial connection and any of the two connectors may be used.

CAN connection



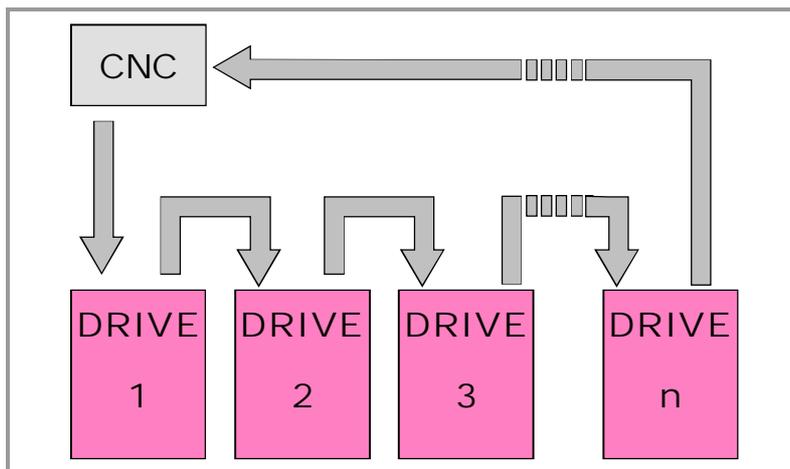
Respect the cable's minimum bending radius when connecting it. See "[CAN cable characteristics](#)."

17 Sercos® Connection

Sercos® is a communications standard especially designed for the machine-tool industry offering a simple interface between the CNC and the drives.

All the data and commands are transmitted in digital format through fiber optic lines. These lines make up a ring that interconnects all the elements that make up the system (CNC and drives).

Using the Sercos® interface considerably minimizes the necessary hardware, makes cabling simpler and grants greater reliability to the system making it immune to electrical interference (noise).



Sercos® cable characteristics.

Ø3,6mm or Ø6mm highly flexible fiber optic cable.

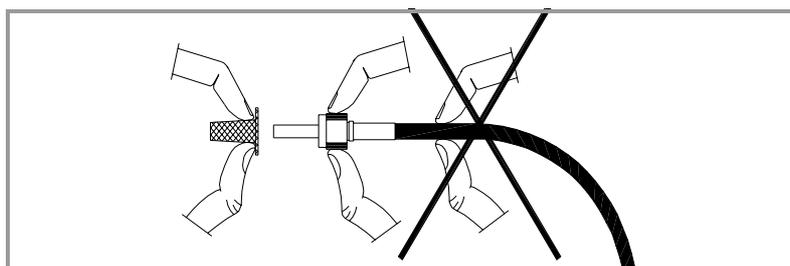
- For the Ø3.6 mm cable, a minimum static radius of 30 mm and a dynamic radius of 60 mm.
- For the Ø6 mm cable, a minimum static radius of 50 mm and a dynamic radius of 70 mm.

Type of cover PUR.

Cable handling

The cable provided by Fagor has its pins protected with a hood. Before connecting the cable, remove the protecting hood.

Both for removing the pins protecting hood for the pins and for plugging and unplugging the cable, hold the cable by its pin, never pull at the cable while holding it by its plastic part because it could make it useless.



17.1 Module identification and connection

Module identification

The CNC and the drives are identified with the 16-bit rotary switch "Address" (also called "Node_Select").

This switch selects the address (node) occupied by each of the elements integrated into the Sercos® connection. The CNC must always occupy position 0 and the drives will occupy consecutive positions starting with 1.

In order for any change at the "Address" switch to be assumed, the corresponding drive must be reset and the CNC powered off and back on.

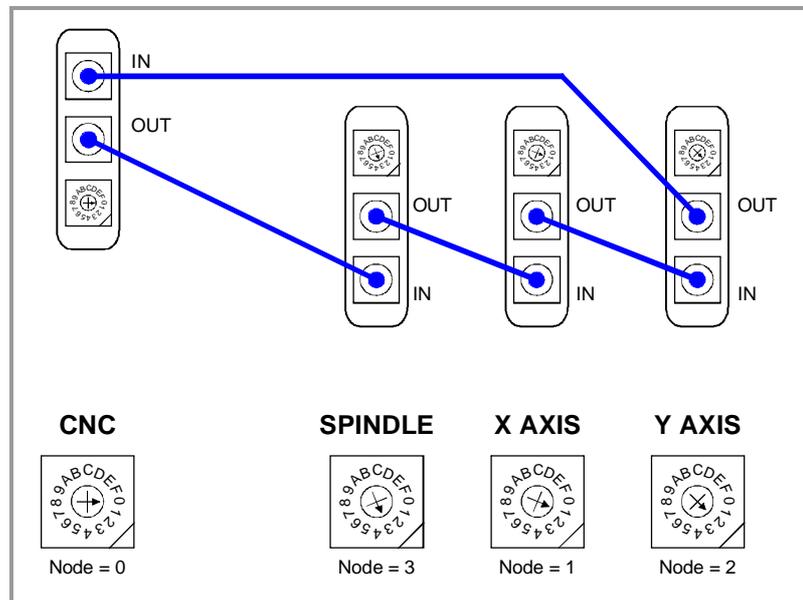


Then set certain CNC machine parameters to configure the connection.

Whether the drive identified with number 1 (for example) corresponds to the X axis, to the Y axis or to another one is irrelevant. However, it is a good idea, for clarity sake, that the machine axes X, Y, Z, U, V, W, A, B and C be assigned consecutive numbers in that order.

Module interconnection

The SERCOS® connection is carried out in a ring using fiber optic cable and joining an OUT terminal with an IN terminal.



The drawing shows the SERCOS® connection of the CNC with Fagor spindle drives and the X, Y axes.

17.2 Data exchange via Sercos®

The data exchange between the CNC and the drives takes place in each position loop. The more data is exchanged, the more overloaded the Sercos® transmission will be. These registers should be limited leaving only the ones absolutely necessary after the setup.

There is data that must necessarily be transmitted in every position loop (velocity commands, feedback, etc.) and other data that may be transmitted in several loops (monitoring, etc.). Since the CNC must know the priority of those transmissions, there must be two separate transmission channels.

Cyclic channel (fast)

The data is transmitted in every position loop. It contains velocity commands, feedback, etc. Each variable that is read or written at the drive is included in this data pack. In order not to overload the interface, you must limit the number of drive variables involved to the minimum necessary.

Indicate the type of data to be transmitted. The data to be sent to the drives must be placed in certain particular registers of the PLC and the data to be read from the drives is received in other registers of the PLC.

Service channel (slow)

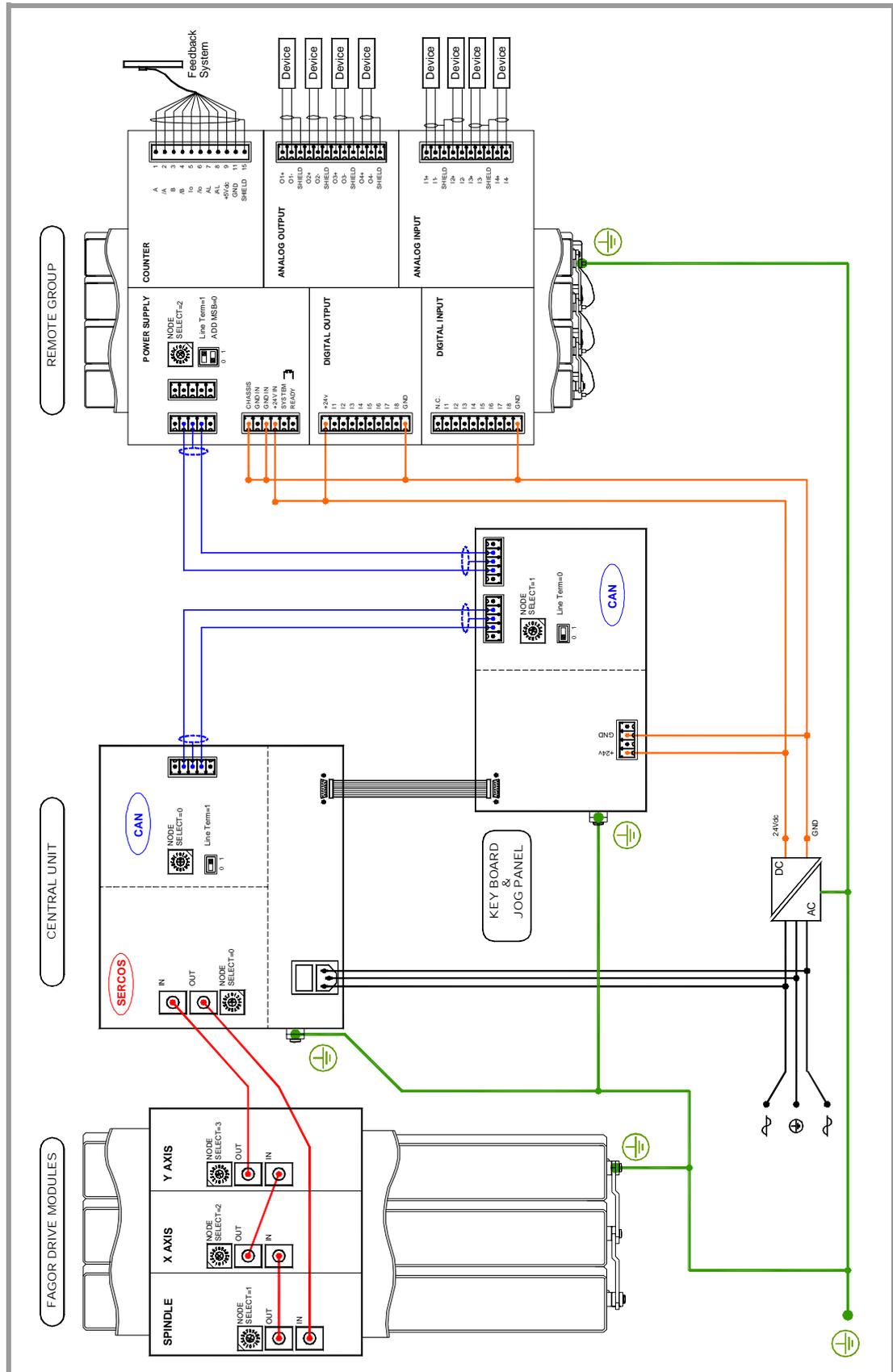
The data is transmitted in several position loops. It contains monitoring data, etc.

This channel can only be accessed through high-level blocks in the part-program or from the PLC channel.

18 Overall connection

(UC-PCI) + (LCD-12) + (OP-Panel-H/E)

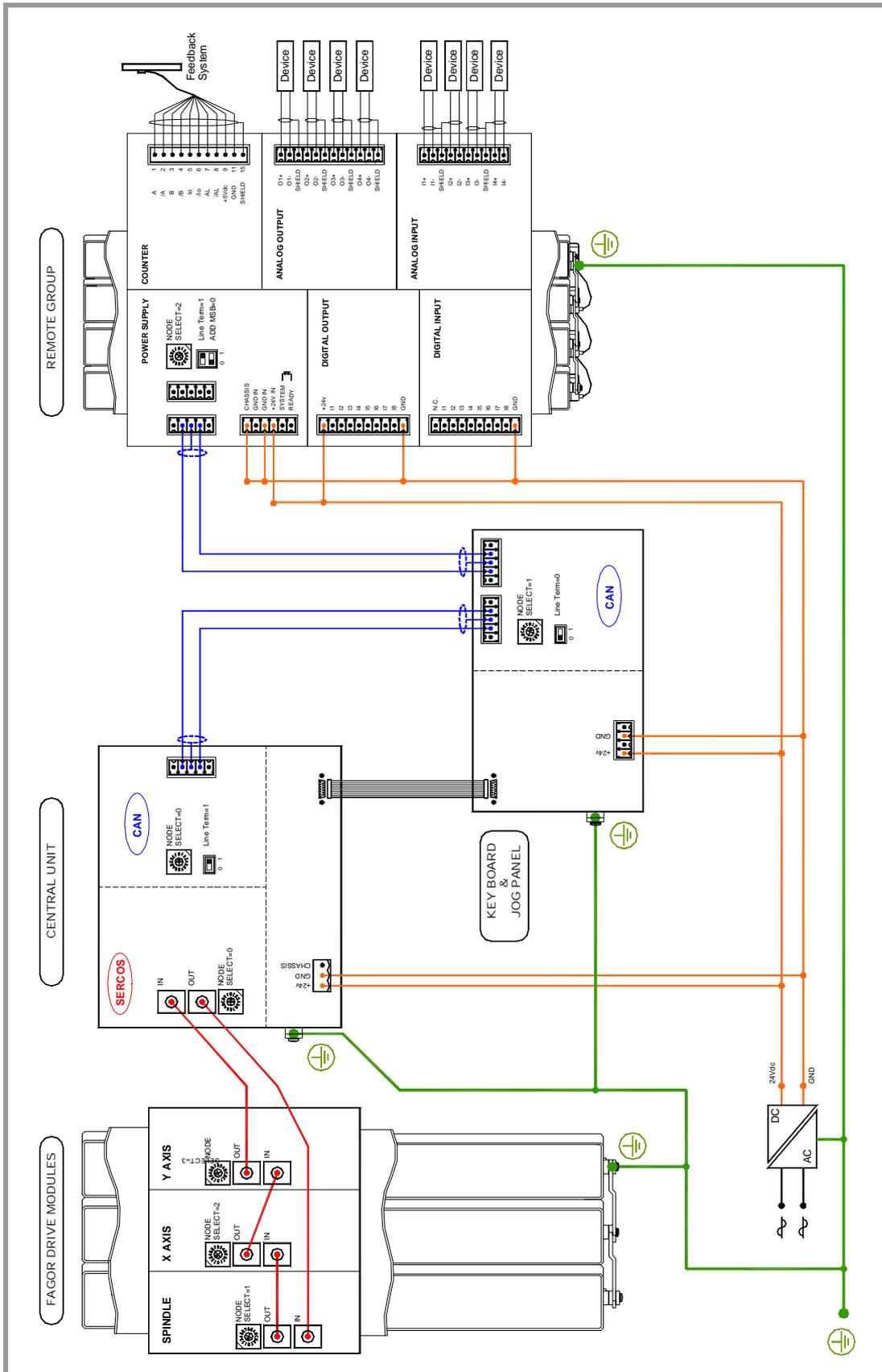
Overall connection



8070 CNC

REF. 0501

(UC-PC104) + (LCD-12) + (OP-Panel-H/E)



Overall connection

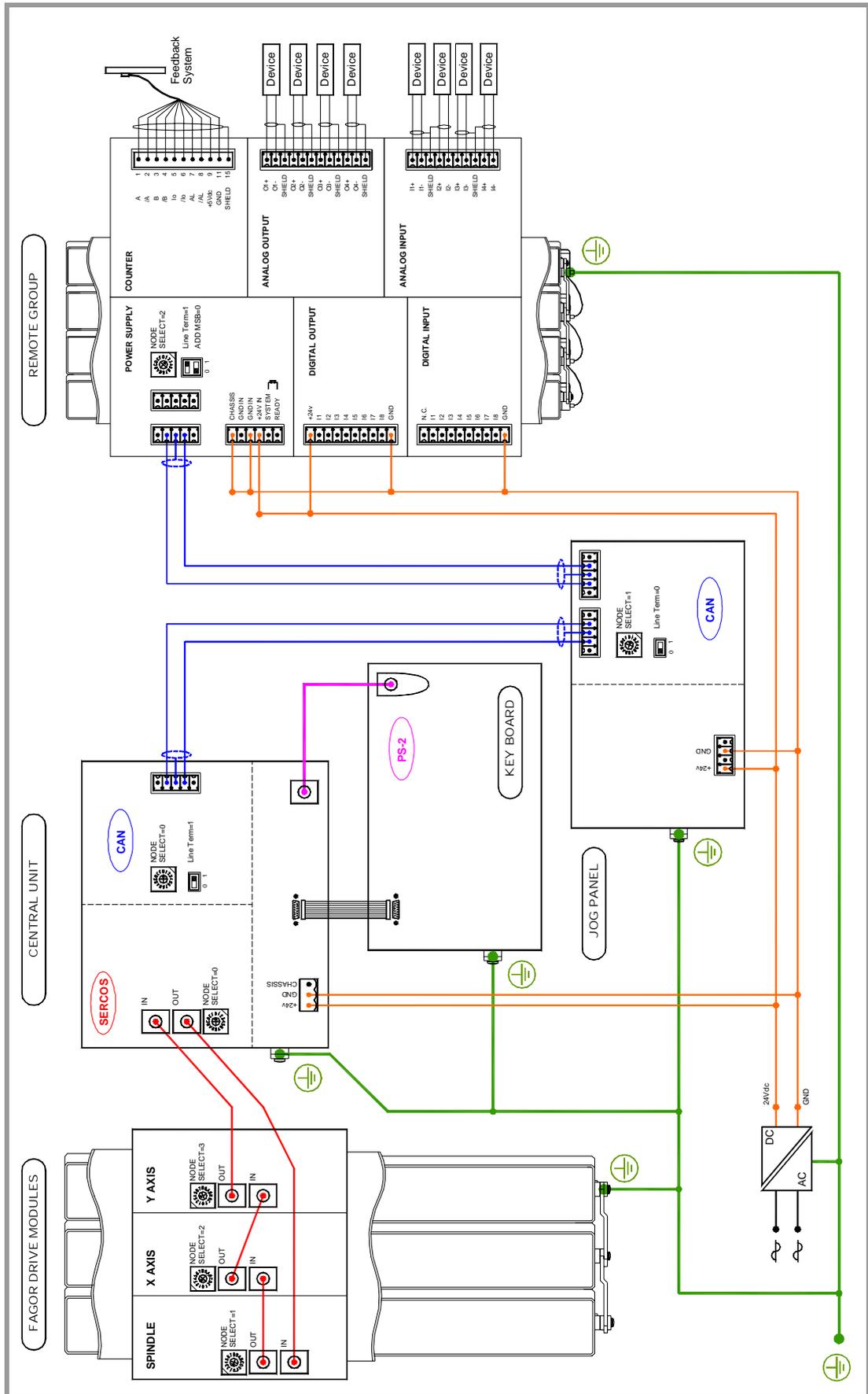


8070 CNC

REF. 0501

(UC-PC104) + (LCD-10) + (Key Board Panel H) + (Jog Panel)

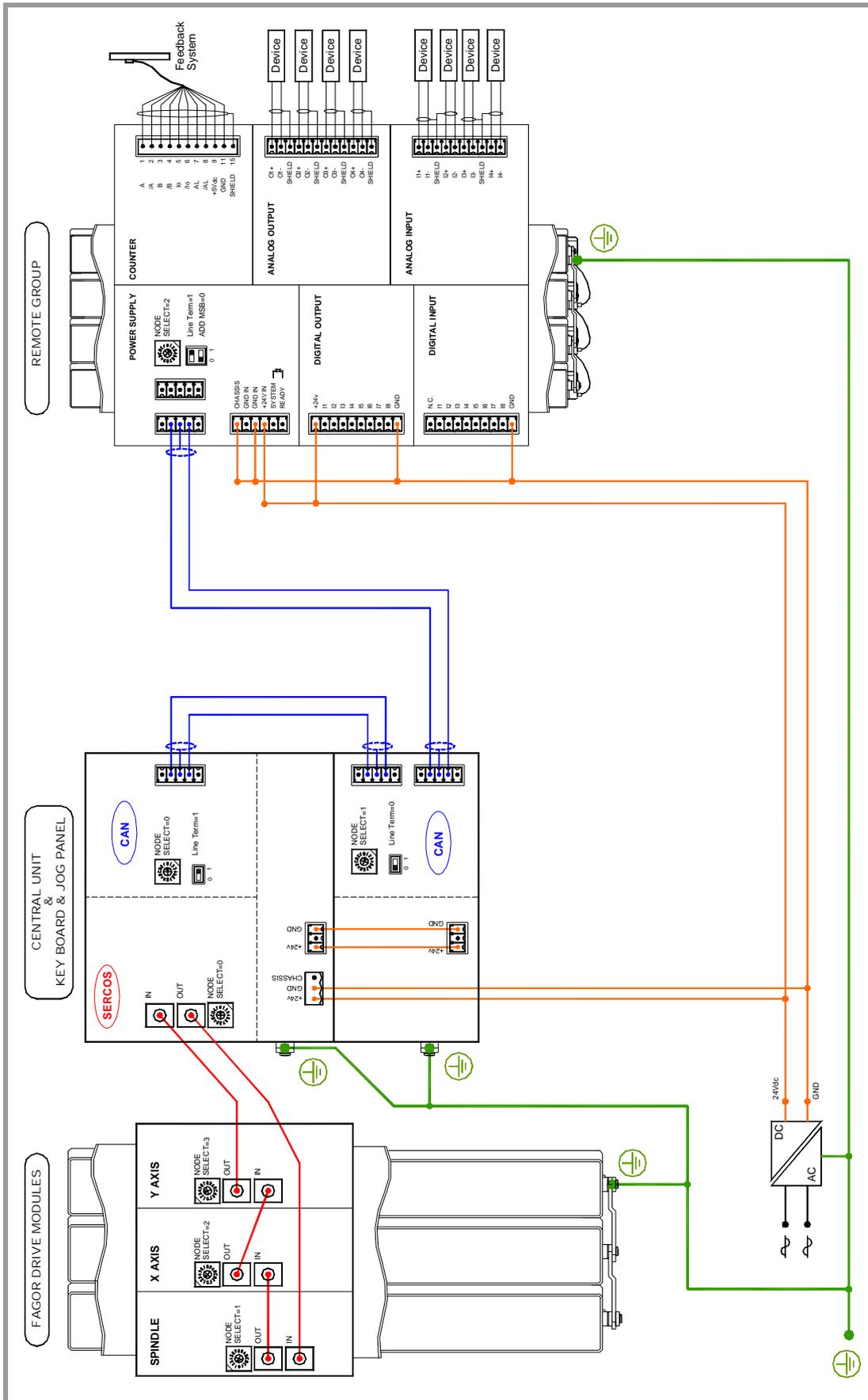
Overall connection



8070 CNC

REF. 0501

(UC-PC104) + (LCD-10K)



Overall connection



8070 CNC

REF. 0501

