DNC 600

Technical information

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Important:
This notice explains normal and standard programming operations for the numerical control.
In view of the fact that numerical controls can be equipped with configurable functions by the press manufacturer for his own specific purposes, please refer to the manufacturer-supplied complementary instructions regarding the programming of these functions.

SAFETY AND MAINTENANCE INSTRUCTIONS

- The operator must be trained for working with the machine on which the numerical control is installed.
- Improper use of the numerical control can cause heavy damage on equipment and/or injuries to people.
- Modification of machine parameters can cause important material damage or lead to irregular product quality.
- The rear panel may only be removed by a qualified technician (danger of electrocution).
- Do not expose the numerical control to excessive humidity so as to avoid any risk of electrocution and any deterioration of the equipment.
- Make sure the numerical control is disconnected from the mains power before carrying out any cleaning. Do not use liquids based on alcohol or ammoniac.
- In case of malfunction of the numerical control, call a technician.
- Do not expose the numerical control to direct sun rays or any other heat source.
- Do not place the numerical control in the neighbourhood of magnetic equipment such as transformers, motors or devices which generate interference (welding machines, etc.)
- Replace fan filters at regular intervals so as to avoid overheating.

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CONTENTS

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GENERAL DESCRIPTION

The CYBELEC numerical controls are specifically intended for sheet metal working machines.
Depending on the software they will be installed on press-brakes (synchronized or not), foldintg presses or tube bending machines.

The machines equipped with these numerical controls are dangerous and are subject to the Machine Directives of the European Community.
It is the responsibility of the machine manufacturers to ensure that the safety precautions relative to these machines are respected.
The numerical control is not a safety device.

CYBELEC numerical controls are assimilated with programmable automatons and are subject to the “Low voltage” (73/23/CEE) and "Electromagnetic Compatibility" (89/336/CEE) Directives, but are not subject to the Machine Directives (89/392/CEE).

The CYBELEC numerical controls conform with the above standards (see *Installation* chapter).

TECHNICAL CHARACTERISTICS

The technical characteristics of the numerical control can be found in the document called CYBELEC DATA SHEET which is annexed to this document..

HANDLING, UNPACKING, STORAGE

CYBELEC numerical controls are delivered in a packaging destined for transport by train, road or air.

If the numerical control has to be transported at a later date, it must be packed in the original container.

Storage characteristics

Storage of the numerical control should be if possible in the original container.

Temperature: - 25°C à + 55 °C
Humidity: 10 % à 90 %

Unpacking, handling

Due to the weight and size of the apparatus, two persons are necessary to take it out of the container, to move it and to fix it.

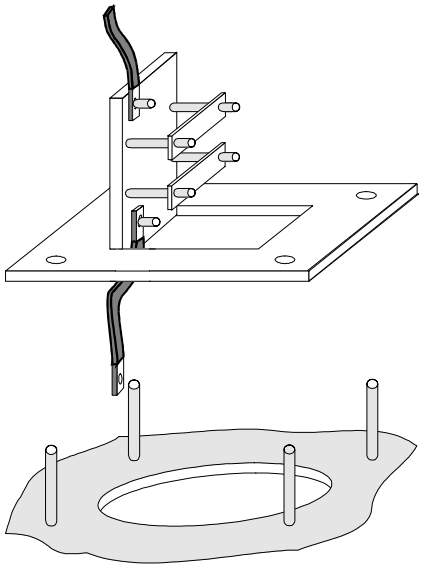
Avoid placing the apparatus where there is a risk of objects or metallic (or other) particles being projected. They could enter the apparatus by the connection opening and cause a break-down.

The apparatus should be held by the casing in one of the following ways:

MOUNTING

The numerical control must be fixed using the 4 M6 screws to a metallic bracket. The intermediate plate (from mid-1997 on) must be held between the bracket and the numerical control. Once mounting is finished and the cables are attached to the intermediate plate with the ties, it is recommended to screw this plate on to the bracket. Preferably 2 small screws with conical heads (so that they do not project beyond the intermediate plate) placed from underneath.

Attention:
The bearing surface against the bracket must not be painted.



See also the *Connection precautions* chapter which follows.

INSTALLATION

Respect of standards

CYBELEC numerical controls comply with the "Electromagnetic compatibility" EMC 89/336/CE directives for as much as the connection instructions are respected (see following paragraph), that the electrical cabinet is made respecting the standards EN50081-2 and EN 50082-2 and that the subsidiary components used also comply with the "Electromagnetic compatibility" EMC 89/336/CE directives.

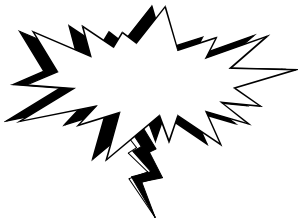
Guarantee

CYBELEC's responsibility under the guarantee is limited to the components supplied. All claims under guarantee are annulled if the adjoined connection recommendations are not or only partially respected. This is a complement to the conditions of guarantee in the sales contract.

You will find below some examples of precautions to be taken.
This list is not exhaustive and does not replace the EMC tests.

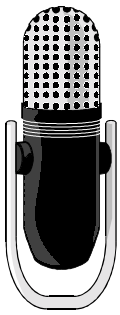
This document does not deal with electrical safety (EN60204-1 and EN 60950), which must be realized and complied with by the manufacturer.

GENERAL INFORMATION



Interfering elements must be protected / filtered.
Interfering elements means, "switching" power supplies, AC or DC powered servo-amplifiers, relay/valve coils, input transformers, high voltage cables, etc.

The deparasiting elements are placed as near as possible to the interfering element. You should use preferably relay supports and deparasiting plugs. (for valves) available commercially, specially designed for this deparasiting function.



Sensitive elements must be protected and placed as far as possible from the interfering elements.
Sensitive elements are for example the analogic inputs with high impedance, the low voltage (0 to 24VDC) input/output cables, the analogic signals etc.

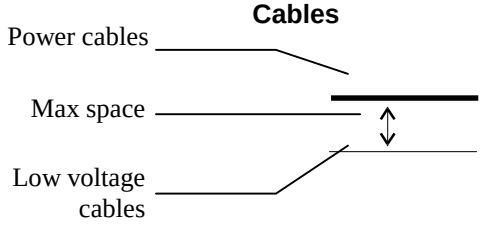
DISPOSITION AND CHARACTERISTICS OF THE ELEMENTS IN THE ELECTRICAL CABINET

Cabinet base

The basic principles of electromagnetic protection for maximum diffusion of the interference in the electrical masse. To achieve this:

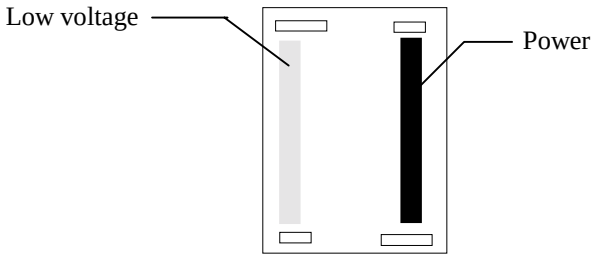
- The base plate of the cabinet must not be isolating (painted), but preferably in anodised metal or aluminium.
- The metallic elements (transformers, filters, etc.) are fixed directly on to the base plate.

Cables



basic principle:
each voltage must be placed in a separate "conduit."

It is thus indispensable to separate the paths of the low voltage and high voltage cables.
They must be as far away from each other as possible.
To do this the each voltage range will have its own conduit.



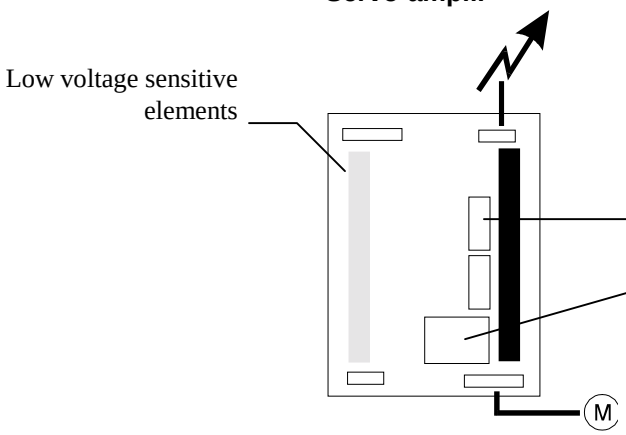
If it is not possible to avoid them coming close, it should only be for a short distance and they should preferable make a 90° crossing.

Terminals

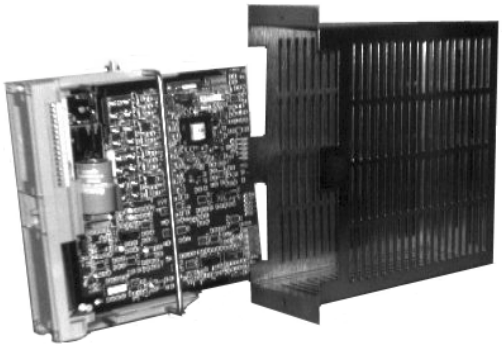
In the same way , the power terminals must be as far away as possible from the “sensitive” terminals.

If necessary the “sensitive” terminals should be covered by a metallic lid which acts as a Faraday cage.

Servo-ampli.



A power servo-ampli is an important source of electromagnetic interference.
Particular attention should be taken for its connection and necessary protections.
They will be placed as far as possible from the sensitive elements and “sensitive” terminals.



The servo-amplifier will be covered by a metallic casing which acts as a Faraday cage.

By experience, it is recommended to place a filter on the servo-amplifier power supply. The filter and the power supply are placed as near as possible to the servo-amplifiers.
The connections of the motors to the servo-amplifiers must be shielded.
The shield must cover the power cables, the position captor and the motors inside the electrical cabinet up to the servo-amplifiers. The power cables and the position captor must not be interrupted.
The earthing of the shield of these cables must be done as near as possible to the servo-amplifier (see further on *Connection precautions, Basic rules*).

If these measures prove insufficient, it will then be necessary to place a filter at the servo-amplifier output.
Often in this case, the shield is no longer necessary for the motor cables.
In the case of DC motors, the output filter improves the motor capacity and reduces overall heating.

Transformers

These elements should be placed as far as possible from the sensitive zones.

Switching power supply

The switching power supply will comply with the EMC standards.

Power supply of the numerical control

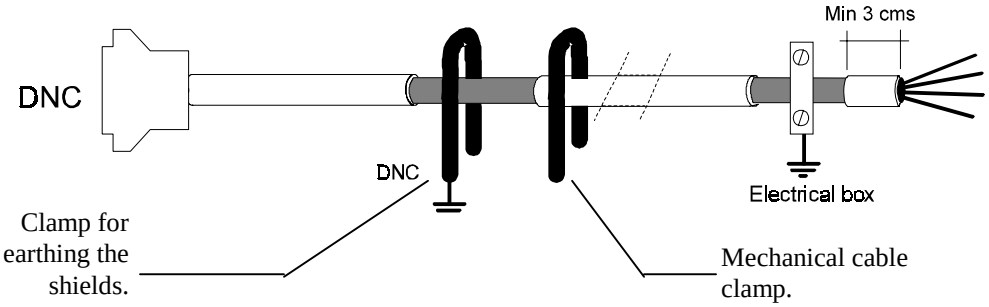
In some countries, the main power supply can be subject to major variations.
Such disturbances can cause inconveniences to the numerical control.
In such cases it is recommended to install an uninterruptible power supply (UPS) on the supply line of the DNC.

CONNECTION PRECAUTIONS

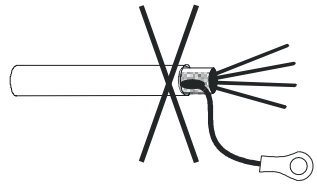
The following connection prescriptions must be complied with to satisfy the "Electromagnetic compatibility" (89/336/CEE) CE standards.

BASIC RULES

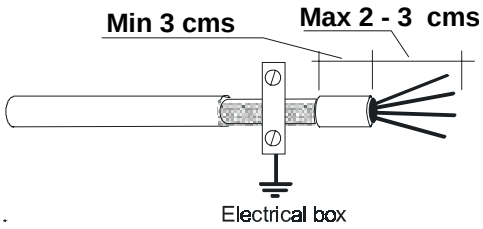
- **All** the cables connected to the DNC must be shielded.
- The cable shielding **must** be connected to the mass at **each** extremity and with the maximum of surface possible.
  In the case where the cable is equipped with a plug having a metallic casing, take care to connect the shield to the metallic casing (see *Mounting the SUB-D plugs*).



Cable earthing

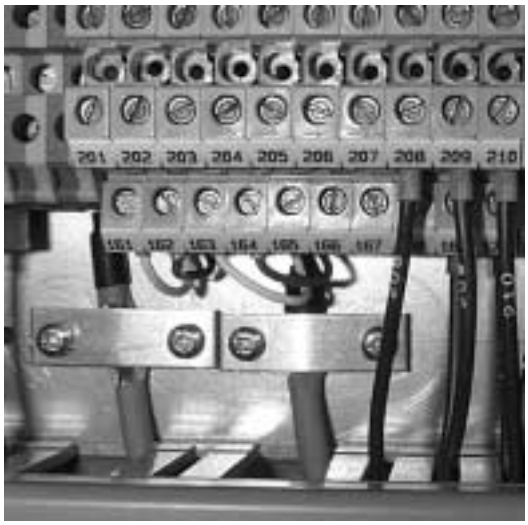


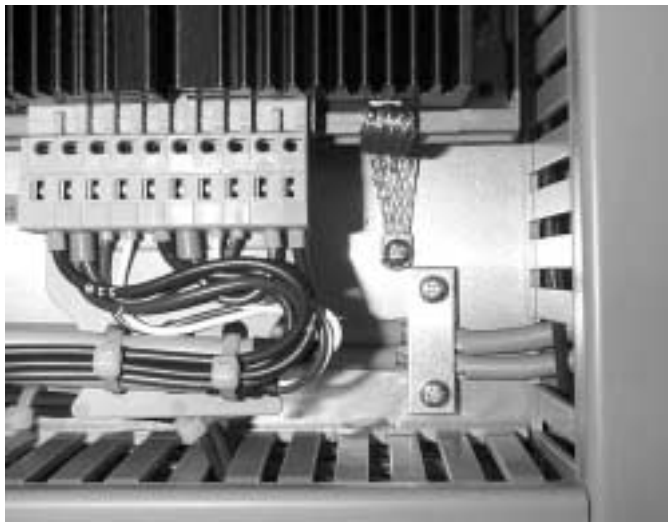
A ground wire (0.75 mm2) soldered to the shield and connected to a ground terminal or to the ground plate of the electrical box is electrically correct but for EMC immunity this method is **not adequate** and must not be used.



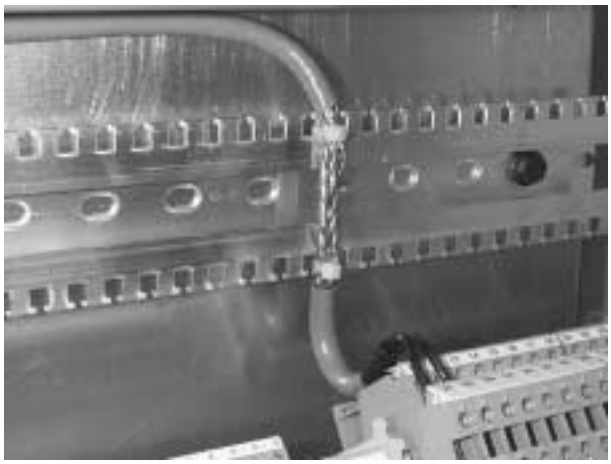
The cable shield should be connected to ground with the most important surface.
The length of the unshielded wires must be as short as possible.

This is valid for all the analog wires in the electrical cabinet (i.e. MVP 400, servo-amplifiers, hydraulic amplifier, etc.). These analog wires must be shielded and grounded on both sides as pictures shown hereafter.

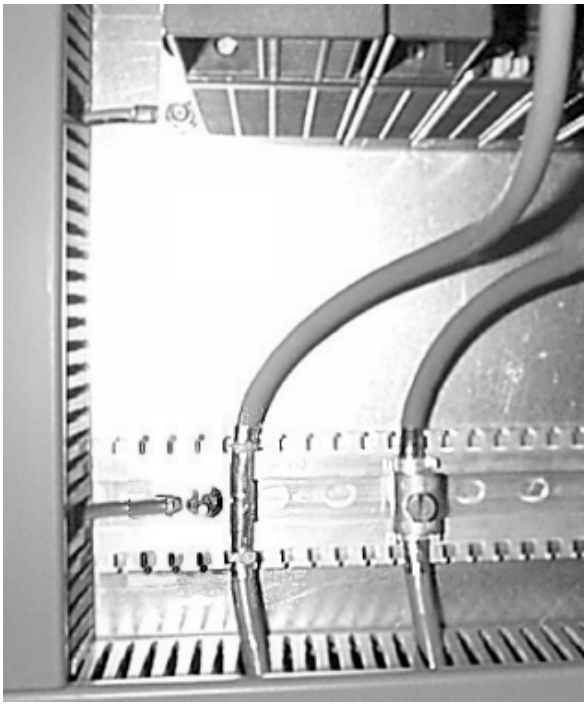




Special profiles for shields grounding are available. This type of solution helps in the wiring efficiency (speed and quality). The pictures below show an example of such alternatives.



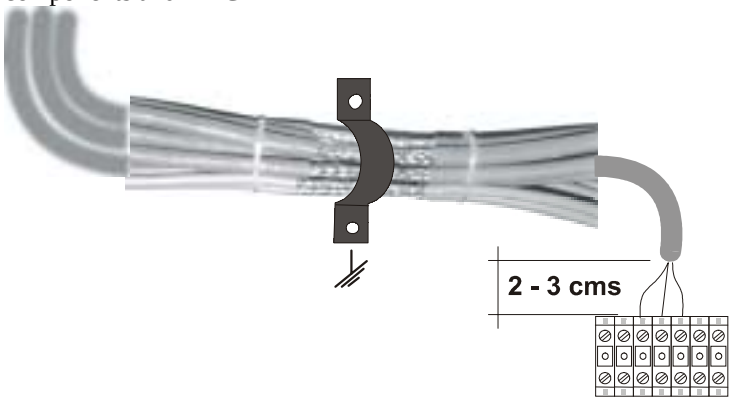
This shows an earthing possibility for incoming shielded cables.



This is an example of earthing internal shielded cables.
2 solutions are shown here, one with a metallic fastening.

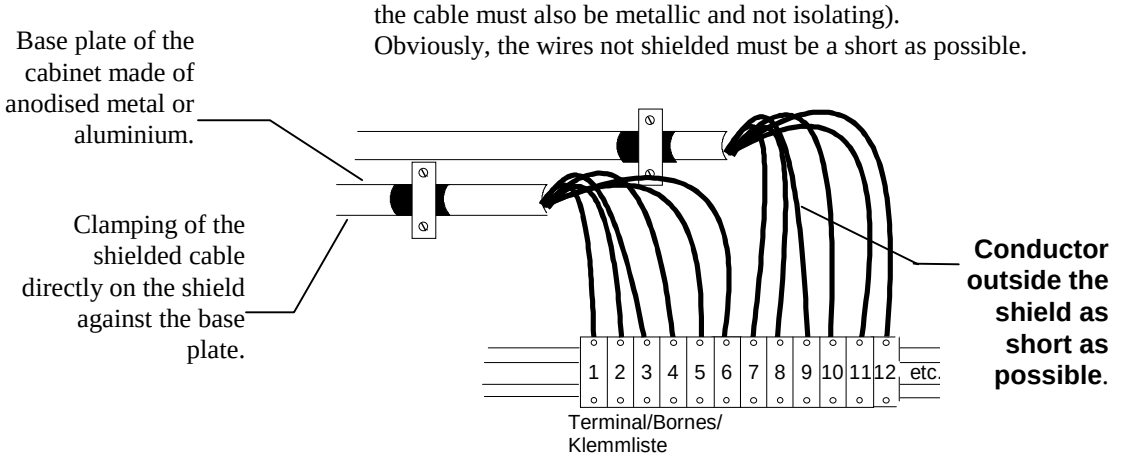
An other solution would be similar as practiced in the DNC. The cables bundle may be grounded at one point on the ground plate of the electrical box.

To external
components and DNC



The fastening must be tight enough to give a good earthing.
The ground plate must be free of painting.

- Shielding, on the side of the electrical cabinet.
  The aim is to **connect the shielding to the mass with the largest possible surface and as near as possible to the cable destination.**
  Each shield must be connected to the cabinet mass by means of a small metallic plate which serves also as a cable clamp (see above). In this case it is important that the base plate of the electrical cabinet is made either of anodised metal or aluminium.
  It is possible to use a **metallic** stuffing box (or other clamping system) clamped directly on to the shield (attention, the piece which clamps the cable must also be metallic and not isolating).
  Obviously, the wires not shielded must be a short as possible.

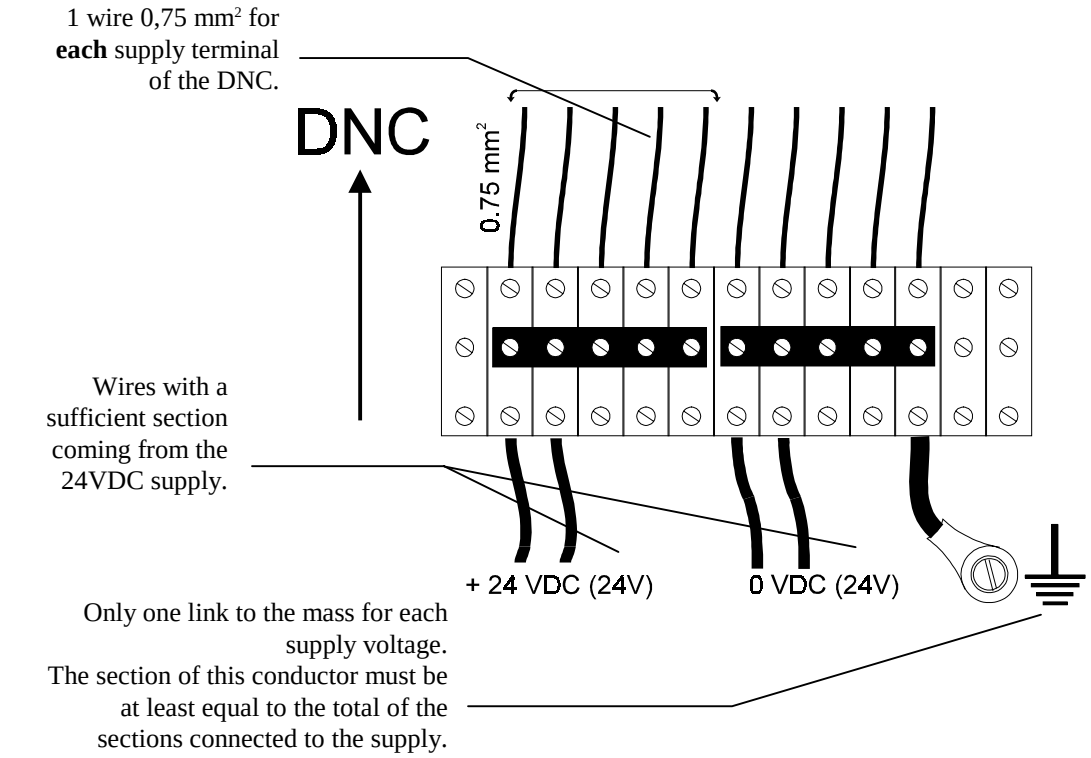


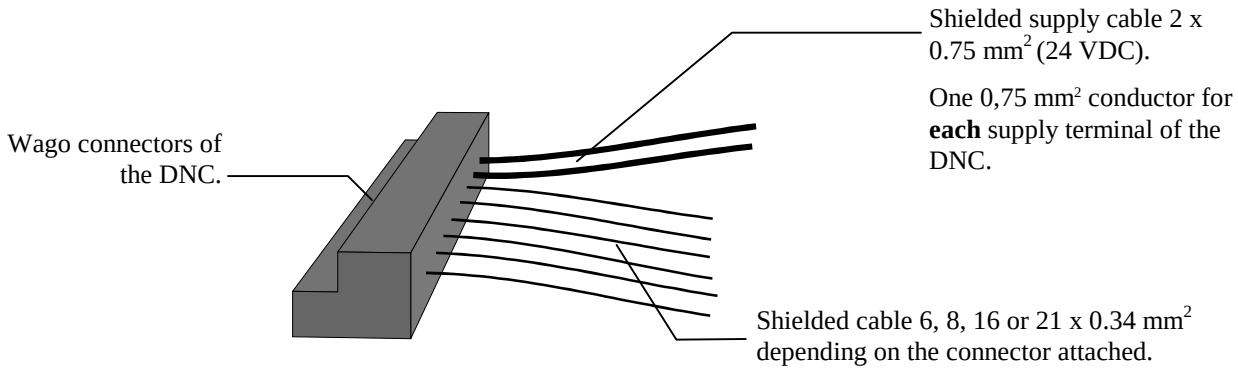
- The shielded cables destined for the power (servo-amplis) or measurement signals **must not be interrupted** (avoid passing over the intermediate terminals in the electrical cabinet).
  They must be away from the interfering elements and high voltage cables.

- The shielded cables destined for the command (+ 24VDC) must have a **minimum** section of:
  0,34 mm^2 for the DNC - cabinet link cables.
  0,5 mm^2 for the cables in the electrical cabinet:

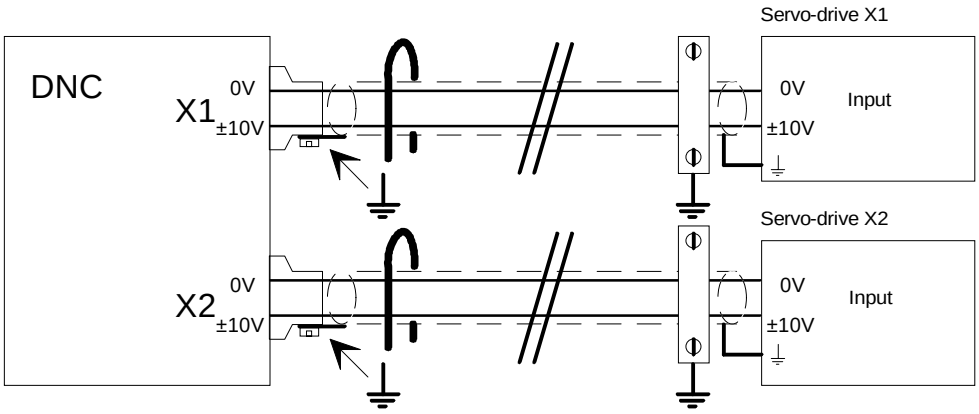
- Each supply terminal 24VDC(24V) and 0VDC(24V) of the DNC must be connected by a conductor with a section of **0.75 mm^2** a shielded cable **separated** at the source of the supply in question (this can be several terminals in the electrical cabinet which are supplied by one or several conductors with a sufficient section).

  The 0V is **not** identical to the earth.
  A 0V exists for each voltage.
  The 0V must be connected to the earth at one point only, using a conductor with a sufficient section (see fig below).
  Each 0V must be connected separately by a wire with a sufficient section to the relative supply.



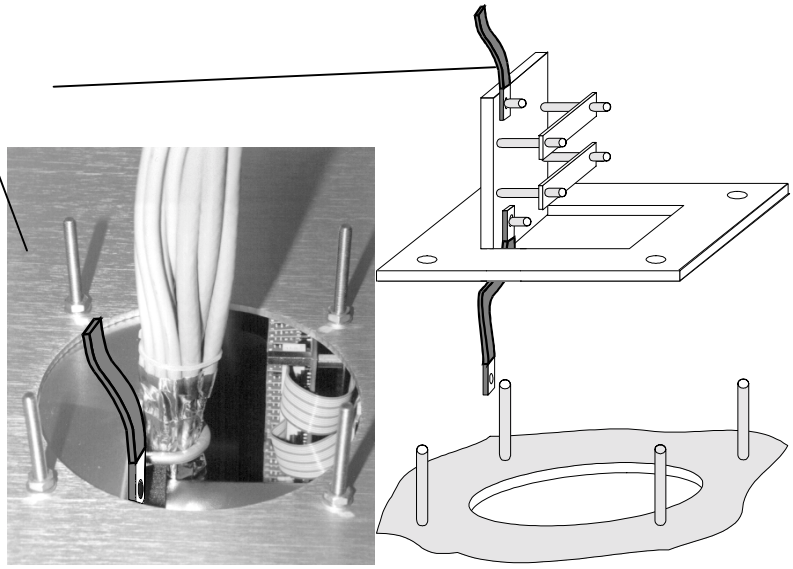


- The 0V of the analogic supply voltages must be connected **separately** to each peripheral concerned in the same way as the "hot" wire of the analogic voltage is connected.
  This 0V must not be connected to the earth .
  Reminder:
  A supply cable must not be interrupted.
  It must be connected directly to the peripheral concerned.
  The supply cables must be placed in separate conduits and as far away as possible from the other voltages.
  The earthing of the shield is realized as near as possible to its destination.



- If the encoder cables are particularly long (more than 10 meters), it is necessary to double the supply wires (0V and 5V) so as to increase the section of the supply conductors, making sure that the encoders receive the necessary voltage.
  Special supply cables with two conductors with increased section are also available.
- The earth terminal (GND) of the DNC must be connected by a copper **braid** minimum 20 mm^2 **separated** and connected **directly** to the casing of the electrical cabinet (see fig. below).

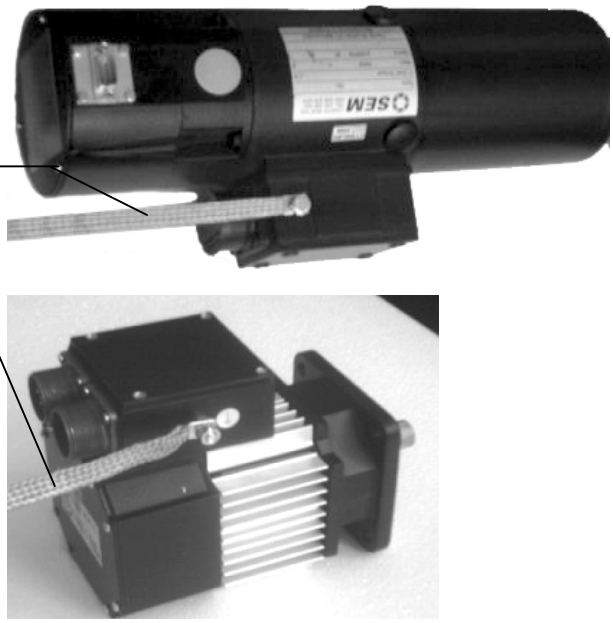
Connect the earth braid (min 20 mm^2) to the terminal provided for it.



From mid 1997 on, the DNC 80, 800 and 900 are equipped with a fixation plate / intermediate connection on which the earth braid is screwed.
Delivered with the numerical control, a braid connects the plate to the DNC. This must imperatively be connected to the terminal provided for it.
The upper clamp is used as a cable clamp and should be securely tightened .
The lower clamp equipped with springs assures a perfect earthing of the shields.

- In the same way, the armature of the motors is connected by a copper **braid** minimum 20 mm^2 to the machine casing, as often the mechanical earth is not sufficient (see fig. below).
  This concerns especially the motors which move with the stop gauge.

Connect the earth braid (min 20 mm^2) to the terminal provided for it.

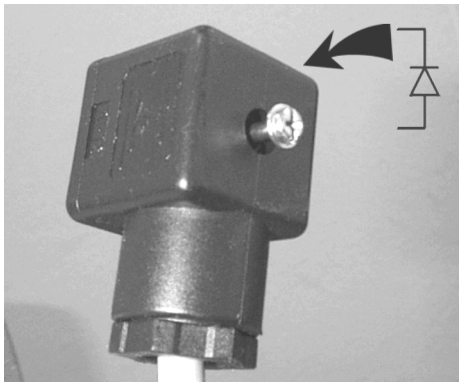


Position of suppressors

The position of suppressors must be as near as possible of the noise generator.

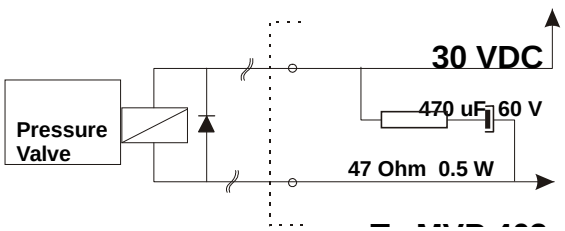
It is illusory to think to have a good protection if the suppressor is mounted in the electrical box and the noise generator 5 meters away like an electro-valve.

In case of elements such electrovalves, the suppressors **must** be mounted in the plug itself or with an intermediate suppressors as shown in the next 2 pictures. For the relays, the suppressor must be mounted on the socket itself or preferably use a relay with included suppressors.



RC on MVP 40x

It is very important to install the RC element on the MVP 40x. This RC element does not replace the noise suppressor, which still must be mounted in the pressure valve.



CABLE CONFECTION PROCEDURE

- Figure 1 represents how to prepare a cable.
  The cable is stripped for a length of 3 to 4 cm then connected to the plug.
  An incision (exposing the shield) must be made between 30 and 70 cm in relation to the end of the cable in order to easily connect it to the DNC.
  At this place, the cable is stripped for a distance of ~ 8 cm in such a way that only the insulation is removed exposing the cable shield.

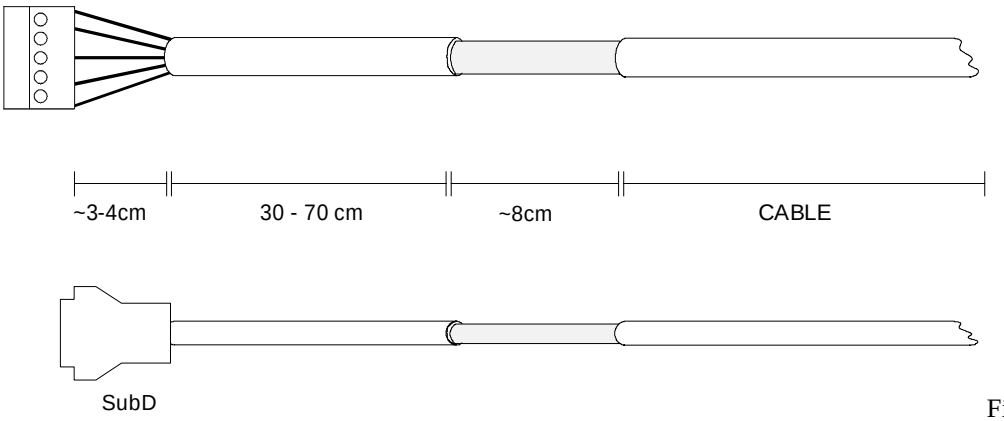


Fig. 1

- Figure 2 shows in detail the incision made on all the cables held together by a strap. This method allows to connect as effectively as possible the shields to the DNC's earth.

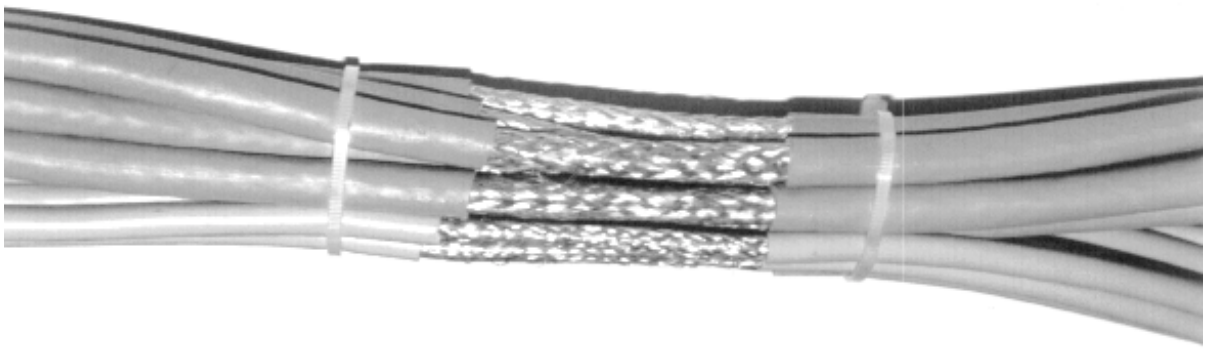


Fig. 2

- Figure 3 represents the end of the bunch of cables which will be connected to the DNC. The numbering which allows to easily pick out each cable can clearly be seen.

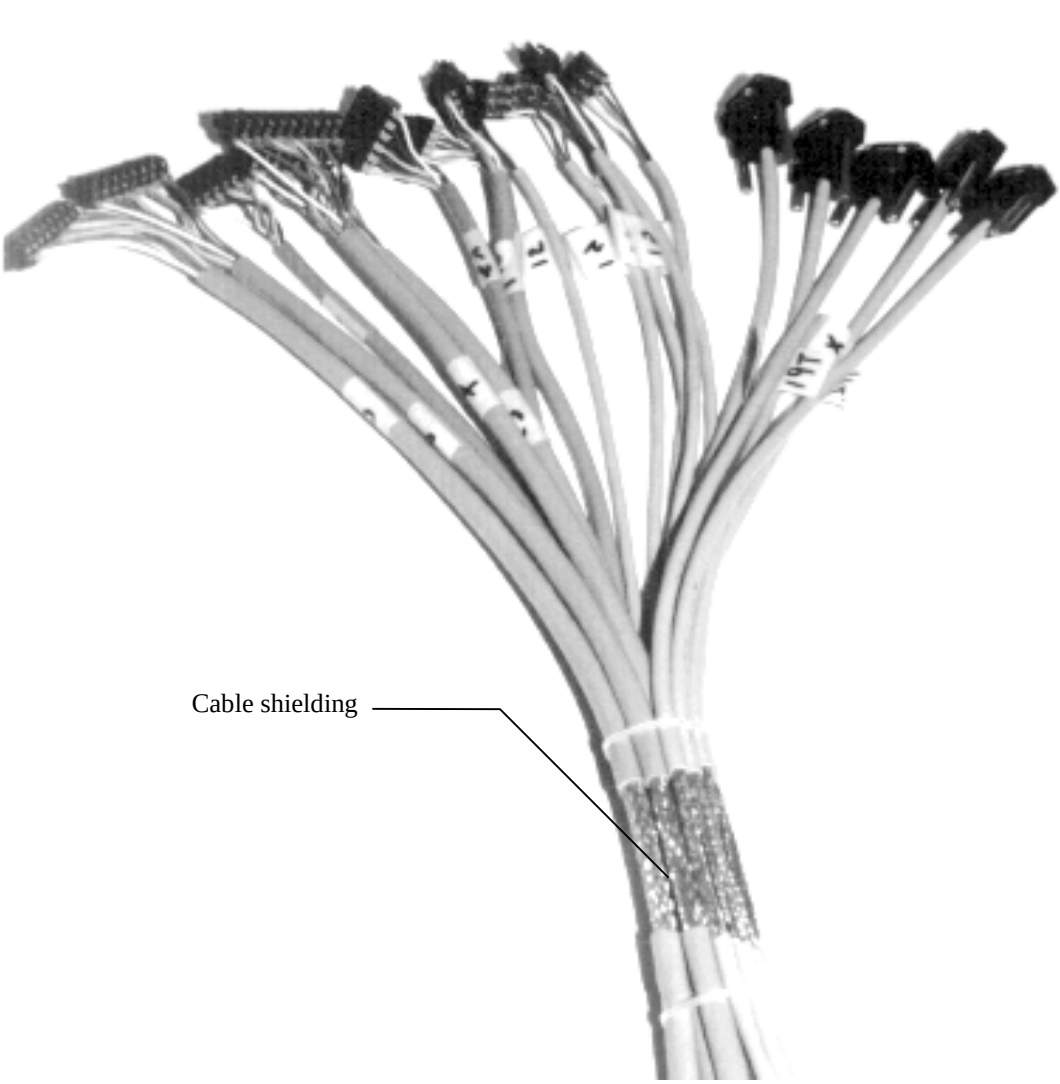


Fig. 3

- Figure 4 shows an optional operation which we recommend.
  It consists of protecting the cables where they have been stripped with an aluminium or copper tape which conjointly acts as an earth conductor and a mechanical protection.

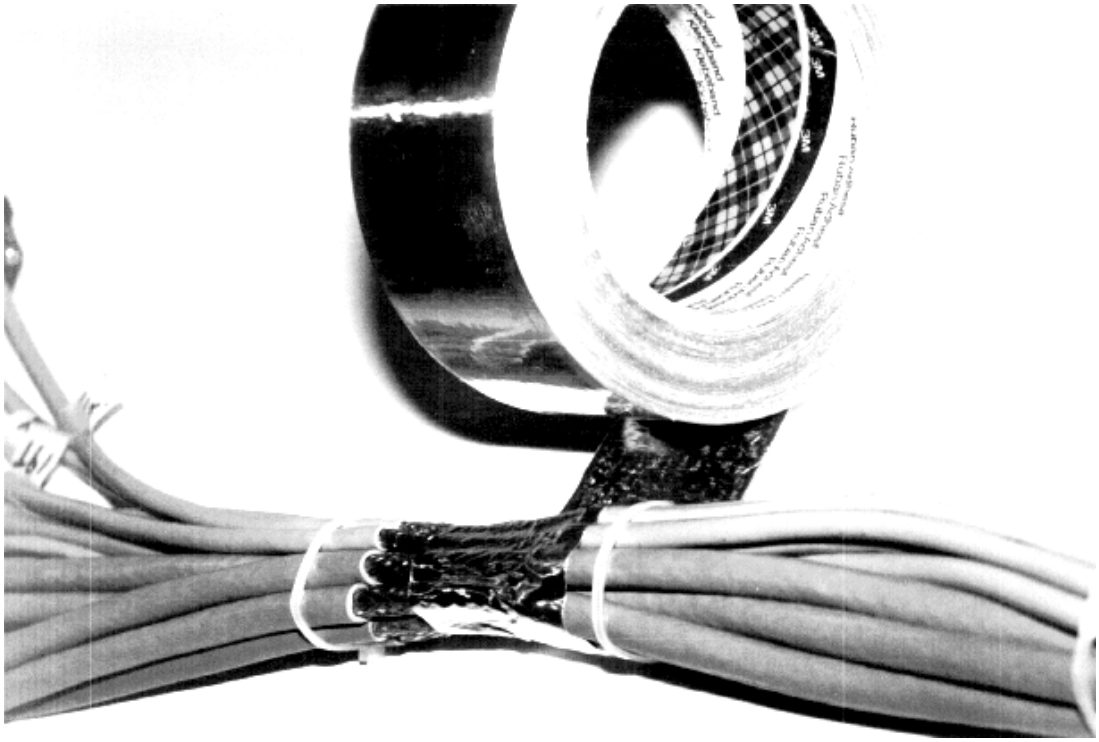


Fig. 4

- Figure 5 shows how all the cables should be clamped on to the DNC support. Obviously this support must not be dismounted and the photograph has been taken uniquely for illustration.
  On the DNC 80 / 800 / 900, there are two clamps.
  The upper clamp is destined for holding the cables, it will be placed on the insulation.
  The lower clamp is destined as in the explanation for earthing the cable shields.

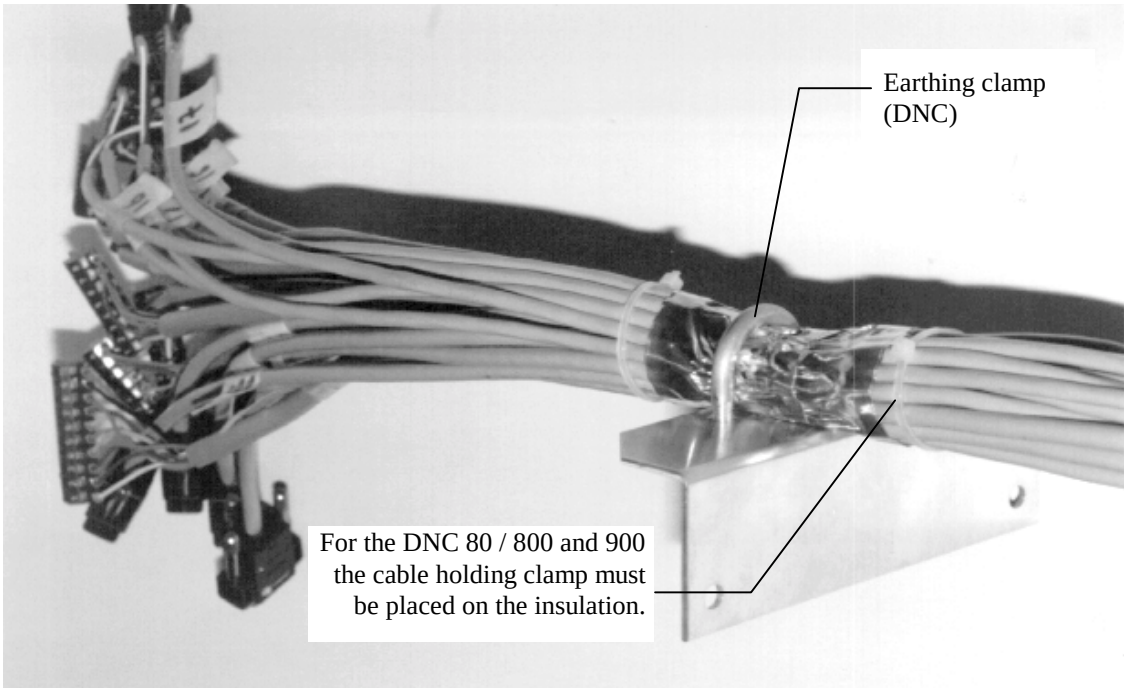


Fig. 5

- Figure 6 represents the bunch of cables placed in the fixing clamp and the earthing of the shields. This operation is absolutely necessary to insure correct functioning of the DNC.

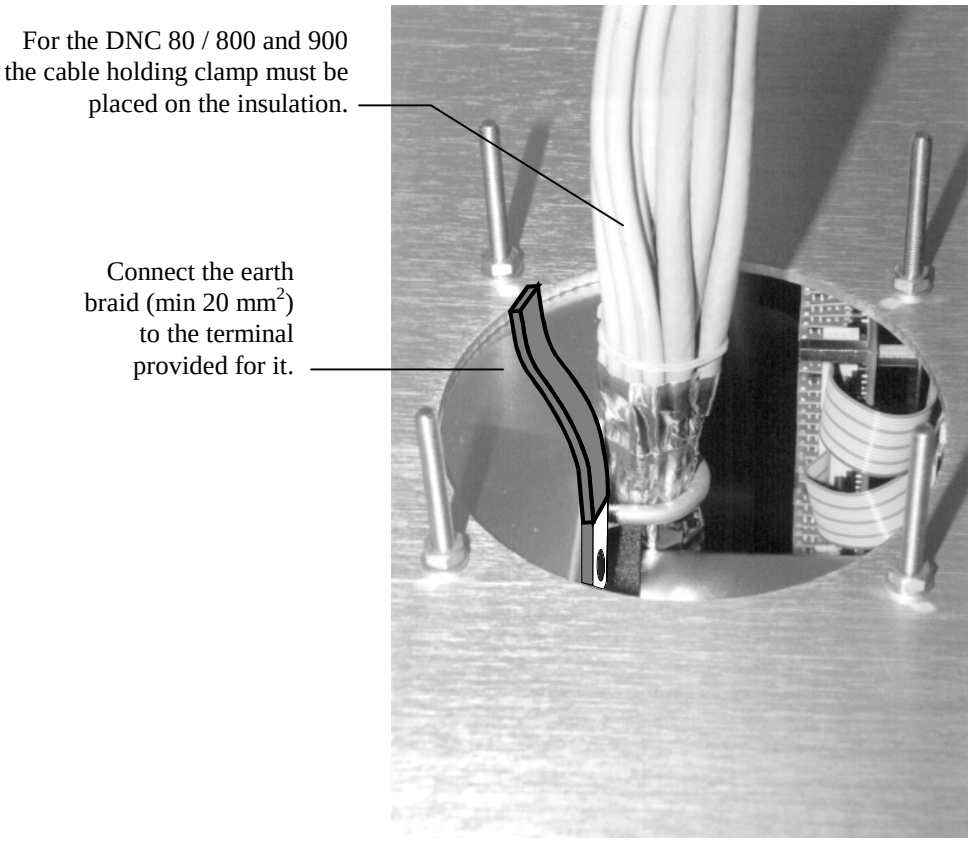


Fig. 6

- Figure 7 represents the DNC interior with the cables connected.
  It can be seen that the curve of the cables is harmonious and that the shielding of the RIA or WAGO plugs continues up to 3 to 4 cm from the plug.

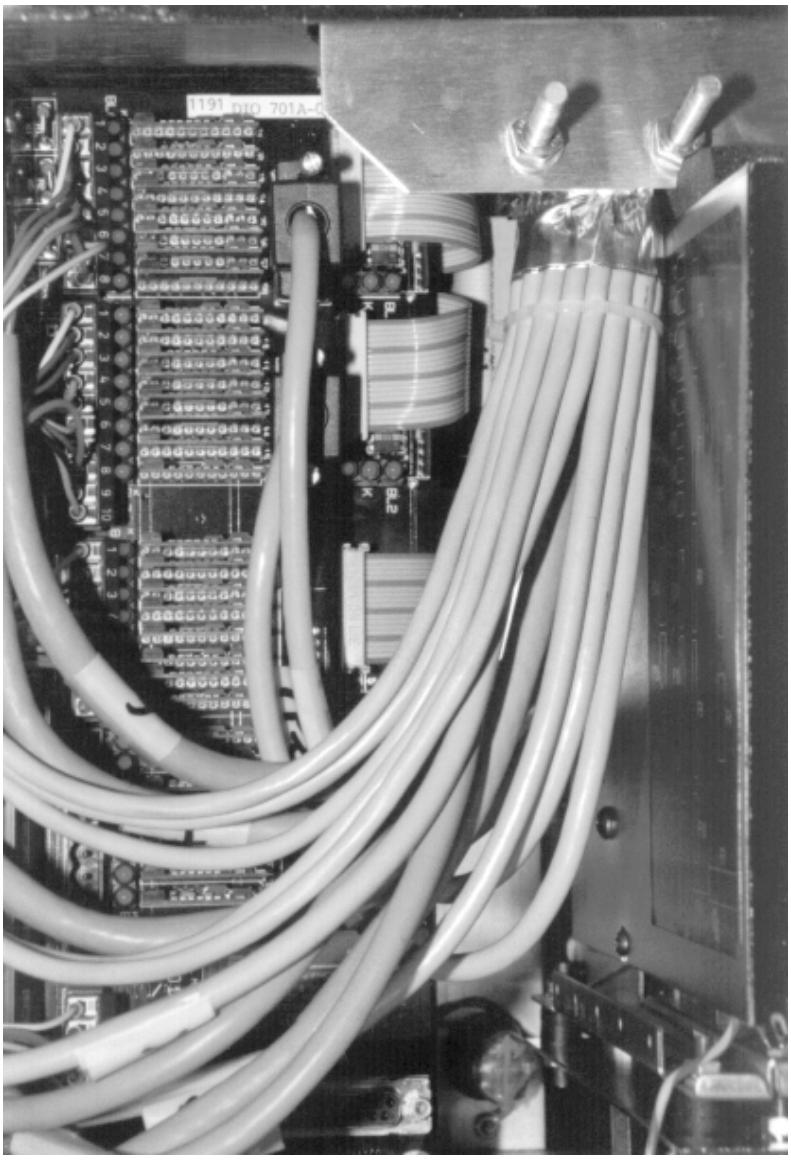


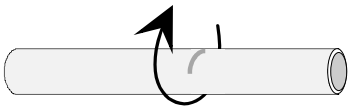
Fig. 7

MOUNTING THE SUB-D PLUGS

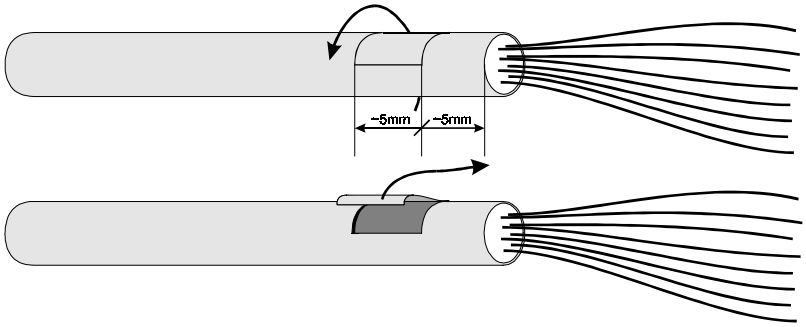
For maximum immunity from interference exterior to your equipment, the link plugs must be cabled with great care respecting as much as possible the following procedure.

Important

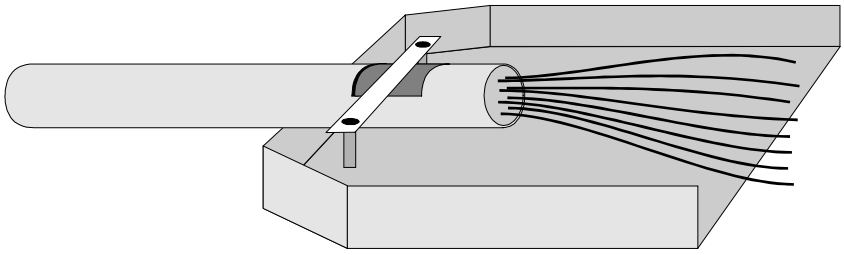
It is only in this way that the contact with the shielding and the cable support will resist any ulterior manipulations.



- Cut the protective sheath over a sufficient distance ~50 mm, then remove it. Cut the shielding.



- Expose the shielding by cutting a “window” of 5 mm on **half** of the cable circumference.
  In this way the shielding will stay in place and will not “fray”. The risk of tearing is also diminished.



- Fix the cable on to the casing by the shielding.
  It is necessary to use a metallic casing.

MAINTENANCE

The maintenance of the numerical control is limited to regularly changing the filters and cleaning the exterior.

Changing the filters

It is important to change regularly (once a month) the filters in the numerical control ventilators. If this maintenance is neglected, the numerical control can over heat and provoke misfunctionning which may be irreversible.

- Cut the main power supply.
- Unscrew the 4 screws on the protection grill.
- Change the filter.
- Replace the protection grill.

Cleaning the DNC

- Cut the power supply
- Clean the keyboard, the casing and the rear panel with a damp cloth and liquid soap (this is what is best !).
  Dry with a clean dry cloth.
  Never use alcohol based products, or solvents, (trichlorethylene, thinner, acetone, benzene, etc.).

REPAIRS

- Any intervention in the numerical control must only be realized by a qualified technician..
- Before any intervention, the owner or the technician MUST save the numerical control data.
- When connecting or removing a connector in the DNC, changing a board or any other manipulation it must only be done with the DNC **disconnected from the power supply**.
  Attention, even when disconnected, the possibility of electrical discharges remains, especially within the cathode screen housing.
- When handling boards, they must be conserved in the antistatic packaging until the last moment. The technician will take all the necessary precautions to avoid any electrostatic discharges (earthing by an antistatic bracelet for example).
- If certain measures have to be realized with the current on, the technician must insure that the safety earth conductors are correctly connected.
- If the numerical control is equipped with cooling ventilators, their functioning must be controlled at the end of the intervention, when the rear panel has been put back in place.

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