# SAFETY INSTRUCTIONS

# 1. Safety instructions

## 1.1 Commissioning

By commissioning and operation of the control please observe the safety instructions. The was given by the mechanical engineer and the correspondingly VDE/En commissioning and accident prevention regulations.

| | |
|---|---|
| - Service and installation of the controls only by electrotechnicians | VDE 1000-10 |
| - observation of the accident prevention regulations | UVV VBG4 / VDE 100 / VDE 105 |
| - Installation regulations | EN 60204-Teil1 / prEN 50178 |

Observe the safety notes and danger warnings, which are appropriated on the components:


Danger due to high voltage


Electrostatic sensitive devices


PE conductor


screen

Ignoring warning signs can result dangers in serious bodily injury or property damage.

For this reason, only electrotechnicians as recognized under VDE 1000-10 may perform the procedures as authorized in this manual.

## 1.2 Proper use

NC and CNC controls are components to be installed in machines and systems for commercial or industrial use.

Before puttind the machine into operation, ensure that the following guidelines are observed:

- the directions of the machines guideline 89/392/EWG
  and
- the directions of the EMV guideline 89/336/EWG.

The controls correspond the protection guidelines

- the norm
  memory programmable controls prEN 61131-2
  part 2 operating means order and tests edition 18.08.1994
  and
- the harmonized norms prEN 50178 (VDE 0160) and
  EN 60146 (VDE 0558).

Proper transport, storage, setting-up, assembly and careful operation of this product are the prerequisites for its safe reilable operation.

Controls contain electrostatically endangered components wich can easily be destroyed by improper handling.

Ensure that no components are bent and no isolation distances are changes at the controls. Do not touch any electronic components and contacts.

**Working with the NC and CNC controls will not usually present any risk of personal injury or demage to machinery if the user observes the handling procedures and safety instructions regarding configuration, assambly and proper use.**

## 2. Mounting instructions

### 2.1 Preliminary notes about mounting

Through the advanced drive technology, the frequency range and the repeat frequency of the interfering impulses have been tremendously changed.

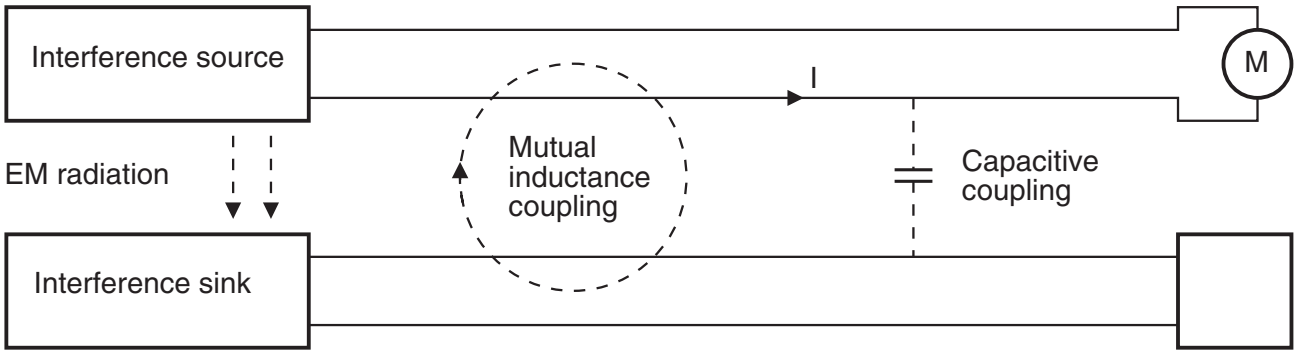
Now, there appear bursts having a frequency of 4 - 5 MHz and a repetition rate of 2.5 - 4 kHz in the new pulse converters that are provided with modern high-performance transistors upon switching the transistors on and off.

By reason of shifting the interference stress into the high-frequency range, the star-shaped earth and screening system approved in former days is no longer sufficient for guaranteeing the noiselessness of the control system.
In order to guarantee the noiselessness in future, the following items of the mounting instructions have to be taken into consideration.

The coupling and transmission paths of interferences can be of different kinds and have different effects, too.

The main kinds of coupling in a switch cupboard are

the capacitive coupling
the mutual inductance coupling
the interference by radiation.



## 2.2 Proceedings for reducing the interferences

Spatial arrangement in different places of the source of interference and the interference sink

The motor supply lines of all motors have to be separated spatially from the signal lines using the shortest possible way from the switch cupboard to the motors for embedding them.

The controller modules must **not** be located **right next to** the control chassis.

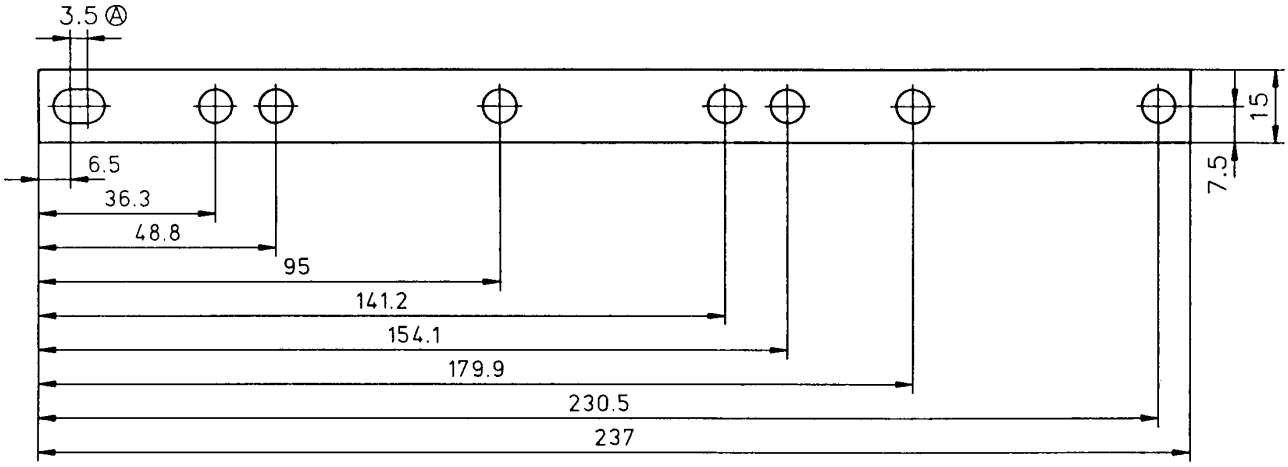
### Protective earthing by means of potential neutralization

For an operation free from interferences of the control components communicating with each other by means of potential-bound signal transmission, these components / subassemblies have to be connected to potential-neutralizing lines.

All potential-neutralizing lines leading to the individual chassis groups have to be realized with a cross section of at least 6 mm².

The potential-neutralizing conductor is required for operating the control unit free from interferences. Since it is used as a protective conductor at the same time, the colour of its insulation has to be yellow/green (Recommendations for protective conductors according to DIN VDE 0100 , DIN VDE 0113 EN 60204 und DIN VDE 0160).

The individual chassis of one chassis group have to be connected to the PN connector rails (art. no. 083920) or directly to each other by means of suitable copper rails at the overhead threated bolts (threat M6).




PN connector rail Art. no. 083920

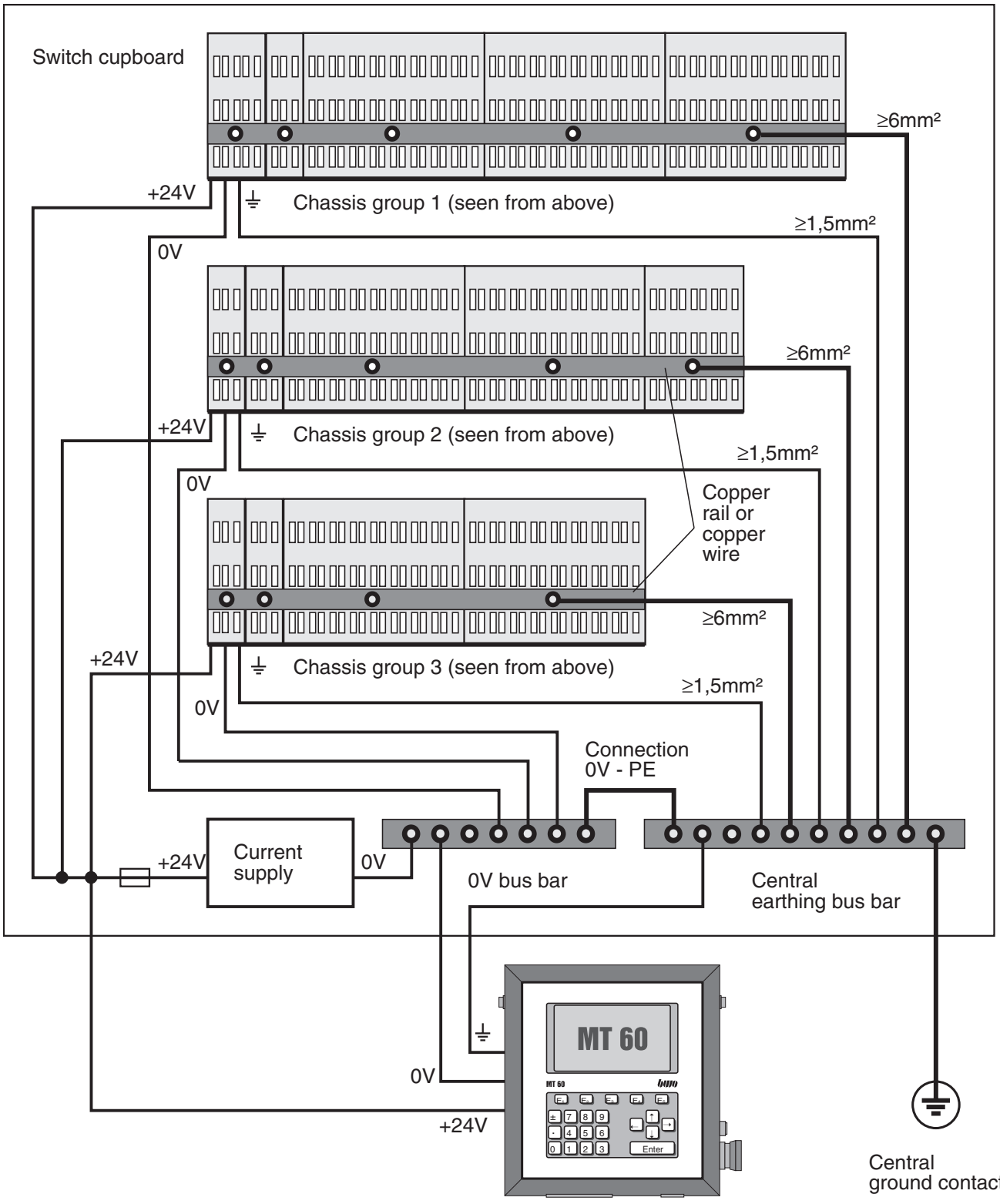
## 2.2 Proceedings for reducing the interferences

Each chassis group has to be connected to the central earthing bus bar by means of a potential-neutralizing line. For an advanced noiselessness, the housings of the following control components have to be connected to the mounting plate of the switch cupboard at all fixing points by way of a good conductibility.

Chassis groups,
Drive control units,
Central earthing bus bar.

By connecting the individual components via the mounting plate, the impedance of the potential-neutralizing systems is considerably reduced. The ground of the machine (machine frame) has to connected solidly to the ground of the switch cupboard (if possible by means of multiple connection).

## 2.2 Proceedings for reducing the interferences



## 2.2 Proceedings for reducing the interferences

### Connection of the cable screenings

The cable screenings of the following serial data cables have to be connected to the corresponding pins of the plug-type connectors at both cable ends (housing potential).

Operating device control interface <--> Socket of CEA/PLC/CNC operating panel
Socket of axial modules shaft encoder <--> Shaft encoder

By connecting the screenings to ground on both ends, the impedance of the system is reduced and the coupled noise voltages are deflected. As to further separable plug-type connectors of the connecting lines, the cable screenings have to be interconnected by connecting them to corresponding pins. For improving the screening effect, the cable screening may be connected to the corresponding pin and to the connector shell at each plug-in connection.

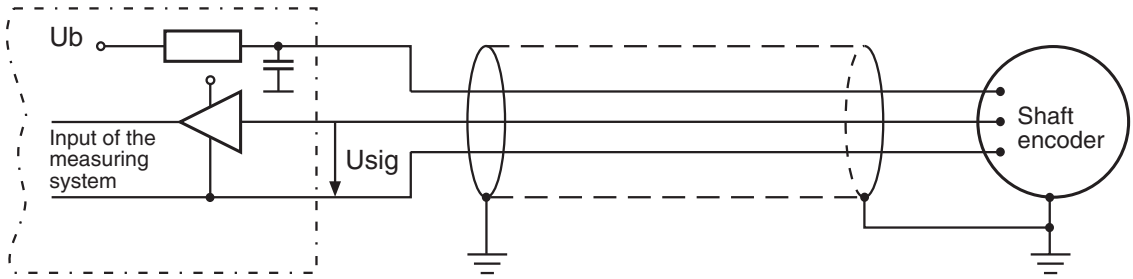
When networking the different chassis groups / stations, the screening of the bus cable is connected to the housing potential only at one end. For all other stations, the screening only has a capacitive coupling with the housing potential of the station (see chapter ‘Networking’).

## 2.3 Checking the signal lines

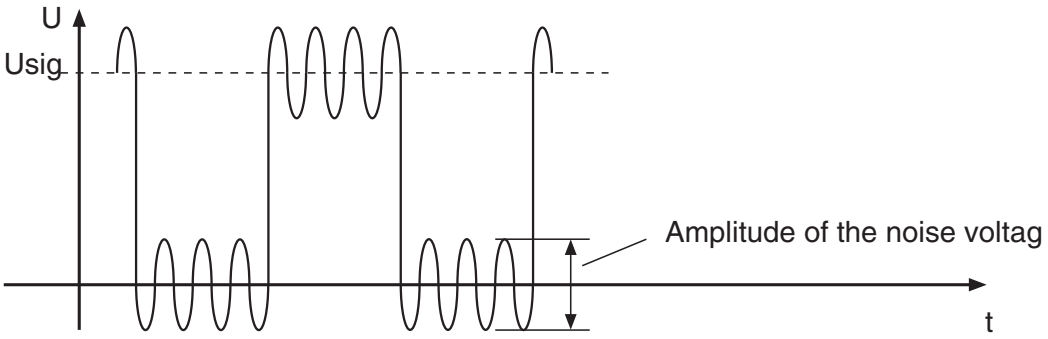
It is possible that interferences are coupled nevertheless with the signal lines in a unit that has been mounted according to the mounting instructions by reason of unfavourable conditions of compatibility. In order to verify the neutralization proceedings, the voltages in the signal lines have to be measured. In order to render possible a reliable evaluation of the measuring system signals, the amplitudes of the noise voltages must not exceed certain maximum values.

### Checking the inputs of the measuring system

Incremental shaft encoders with TTL level have an operating voltage Ub of 5V. In case of these encoders, the signals T1, /T1, T2, /T2 and T0, /T0 have to be measured. The amplitude of the noise voltage must not exceed the value of 3V in case of these signals. If greater values are measured, the arrangement of the lines and the connection of the screening to ground have to be examined.




In case of absolutely parallel measuring systems, the number of the signals to be measured depends on the resolution of the encoder. For these encoders, the operating and signal voltage is within a range of 15 - 24V. The maximum amplitude of the noise voltage must not exceed the value of 3.5V.




ATTENTION !
The individual measurements have to be performed by means of a sensitive oscilloscope having a minimal width of the frequency band of 100 MHz. In order to avoid measuring errors, the relative ground of the measuring point has to be connected to 0V-pin of the measuring plug at the shortest possible distance.