Content

1 Introduction

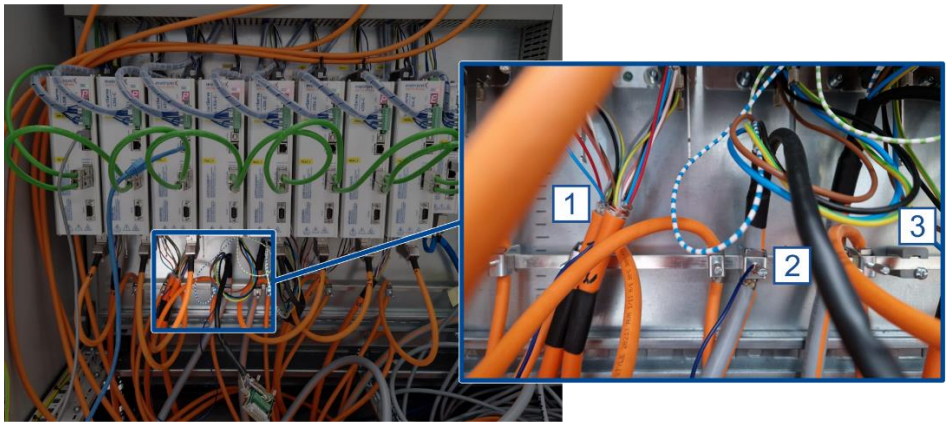
This application note describes the effects if the motor cable shield is not connected to the control cabinet back panel or the intended shield connection point on the servo drive. It is intended for users of the servo drives of the smartServo BL 4000-C and ARS 2000 series.

DANGER ⚠ **Life-threatening voltage on motor cable**

If the motor cable shield is not connected correctly, there may be danger to life! Furthermore, personal injury and damage to the servo drive may occur.

2 Problem description

During the commissioning phase, it may happen that motor cables are not earthed as intended. The following pictures from the field serve as examples.

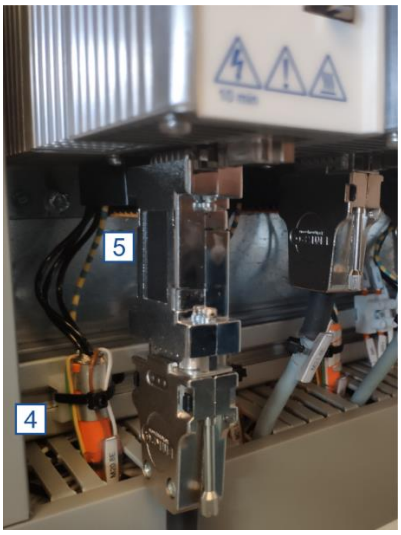


This setup contains the following faults:

- The shield of the motor cable is neither stripped nor fixed with a shield clamp 1
- Motor and encoder cables are fixed with a common shield clamp 2
- The unshielded part of the motor cables is much too long 3

The following faults can be seen in this setup:

- The shield clamp is mounted on an anodised mounting profile and not as intended on the servo drive mounting plate 4
- The shield clamp is not mounted electrically conductive 4
- The motor shield should instead be placed on the mounting plate with a large conductive surface 5



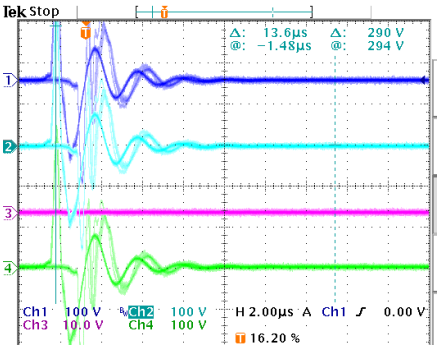
3 Investigation

For the investigation, a set-up with a BL 4304-C was created in the laboratory of Metronix. In this set-up, the faulty earthing described above was simulated. For this purpose, the motor cable shield was disconnected at the Weidmüller plug X6, so that the motor cable shield was not connected to the controller. The measurement was made on the brake control lines that were not connected to the servo drive. However, it is generally valid for all lines that are included in the motor cable. The motor cable used corresponded to the given specification but was extended to 30m to simulate more unfavourable conditions.

The encoder cable was replaced by a dummy encoder. Thus, no current can be discharged via the shield of the encoder cable. The motor itself is not earthed when the power unit is switched on.

With an enabled power stage, the following voltages were measured:

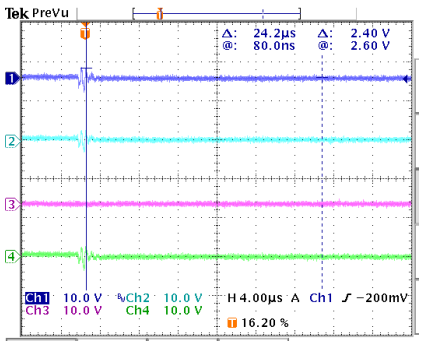
Shielding not connected to the Weidmüller connector, i.e. **no** conductive connection via the motor cable.



CH4 (green) Line 5
CH1 (blue) Line 1
CH2 (Light blue) Line 8

Disturbances with approx. 290V amplitude! Danger to life!

Complete shield connection via encoder cable and motor cable.



CH4 (green) Line 5
CH1 (blue) Line 1
CH2 (Light blue) Line 8

Interference with approx. 2.4V amplitude: OK.

Figure 1: Measurements of the voltage on lines in the motor cable (30m) with incorrect earthing of the cable shield (left) and correct earthing of the cable shield (right).

4 Conclusion

If the wiring is done correctly and completely according to the instructions in the manual, the PWM-related leakage currents can be discharged to earth and no high voltages will occur. Only if the motor cable shield is correctly connected to the control cabinet rear panel and all instructions for safe electrical installation in the mounting instructions or the manual are followed, high voltages in the other lines and on the cable shield will be avoided.

5 Measures

DANGER **Life-threatening voltage**

Always make a good conductive connection between the motor shield and the servo drive housing before switching on the power stage in order to avoid high voltages on lines carried in the motor cable (brake, motor temperature).

Before the very first commissioning, follow all instructions in the section *Electrical Installation*, especially all instructions in the section *Proper Wiring* of the BL 4000-C Product manual.

› BL 4100-C

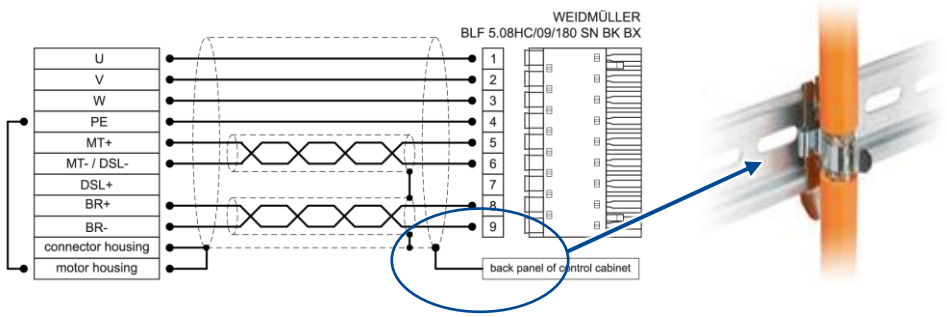


Figure 2: Connection of the motor shield with the BL 4100-C

› BL 4300-C

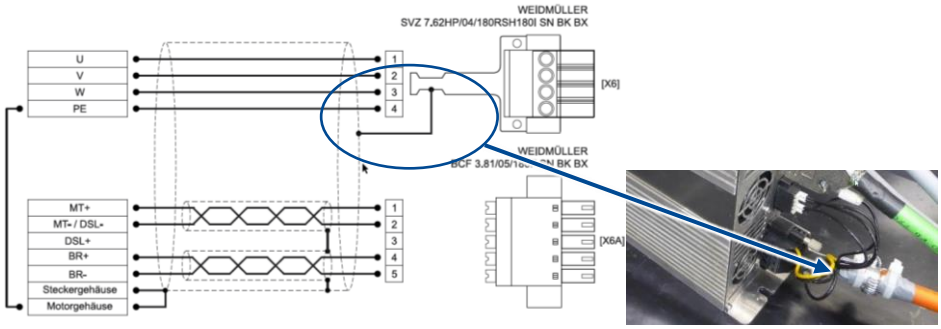


Figure 3: Connection of the motor shield with the BL 4300-C

INFORMATION **Also applies to ARS 2000 FS**

The connection instructions also apply in the same way to the connection of the motor cable shield on ARS 2000 FS series devices.

Original Application note

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