



EMC - Checklist

A checklist to avoid EMC trouble

General

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1 Components/Software used

Type/Name	Version Software/Firmware	Date of manufacture
General	General	General

Table 1.1: 1 Components/Software used

2 Checkpoints

2.1 Common

- Are all system segments consistently earthed – check carefully because, for example, metal cable ducting is often interrupted! Wherever interruptions are discovered, both ends must be connected with at least one braided copper strap! A **single** gap destroys the shield effect of the entire duct!
- Pay special attention to the laying of cables between the system and the control cabinet – this differs from the cabling used at the manufacturer's location during commissioning. Ask the customer to open covered cable ducts in this area for this reason!
- Is there an equipotential bonding busbar? How and where is it connected? (At Festo: The central point conductor is connected to a foundation earth electrode in the transformer station and is then star-connected to the equipotential bonding busbars in production.)
- Is meshed earthing used, i.e. are numerous system components connected to functional earth via earthing straps? (Numerous earthing straps connected in parallel result in a low-impedance connection to earth potential, even for high frequencies!)
- Cross-section of earthing cables at least 4 sq. mm?
- Does the system consist of anodised extruded profiles? Are the individual elements screwed together with T-head nuts which reliably puncture the anodised coating?
- Machine base segments connected consistently with low-impedance – above all check for paint on painted frame sections which prevents large-area surface contact.
- Plastic or metal cable ducts? Plastic ducts should only be used in earthed system segments, because they are otherwise susceptible to field-related interference.
- Cables are consistently laid along an earthed machine base. A metal cable duct is used where this isn't possible.
- Cables or cable harnesses do not protrude "into the air" as a loop.
- Where foils are processed, conveyor belts are used or in the case of insulated workpiece carriers during a welding process: have brushes or ionising bars been installed in order to disperse charges?
- Welding units with HF ignition – is the welding electrode holder earthed?
- The shielding effect is poor where large lattice support structures are used. For example, massive field interference can occur in proximity to welding units.
- All cables are laid along earthed metal structures, i.e. no surfaces are spanned due to laying.

2.2 Control cabinet

- Bare mounting plate (e.g. galvanized steel sheet metal), massively earthed.
- The following applies in general: all of the control cabinet's metal parts must make large-area surface contact with each other – no paint to paint!
- Control cabinet door connected to the cabinet itself via short, braided copper straps? In the case of large control cabinets, 3 braided copper straps should be connected which are evenly distributed over the length of the door.
- Is earthing to components mounted in the control cabinet door connected?
- Bare converter housings make large-area surface contact with bare, earthed mounting plate.
- Devices which generate interference (e.g. converters) and sensitive control components spatially separated from each other?
- There are no cables which form loops in the air, i.e. all cables are laid close to earthed sheet metal parts/housings.
- Motor cables laid separately from signal lines?
- Signal cables are only fed into the control cabinet from one side.
- Reserve lines are connected to functional earth at both ends.
- Shielded cables: the shield is connected with good surface contact immediately after entry into the control cabinet.
- Shielded cables: the shield is connected with large-area surface contact upstream and downstream from a clamp.
- Shield connection not on painted surfaces?
- Connection established between 0 V and functional earth? (due to PELV: in accordance with DIN EN 60204-1, one side of the circuit or a point within the energy source for this circuit must be connected to the protective circuit).
- Mains filters installed correctly? The bare mains filter housing makes good surface contact with the bare mounting plate and is not mounted on the painted control cabinet! If this is not the case, unscrew and remove the mains filter, and strip the paint down to bare metal.
- Mains filter: cables laid correctly? – i.e. the filtered cable is not led back to the unfiltered end and laid parallel to the incoming mains cable!
- Filter for converter installed very close to the converter?

2.3 Cable ducts

- Are power cables (e.g. motor cables) and sensitive signal cables laid separately?
- Uninterrupted metal partitions in metal cable ducts?
- Are cables separated according to cable category, or is everything mixed up?

2.4 System environment

- Are there potential sources of interference in the system's environment (e.g. welding units, converters, electric drives)?
- Are metal cable ducts consistently earthed with low-impedance?
- Are cable reserves wound up as coils? If so uncoil, fold in the middle and wind back up doubled over (bifilar winding).
- Is sporadic interference detected (e.g. due to a gantry crane, a lift, air conditioning or a welding unit)?