

EMC

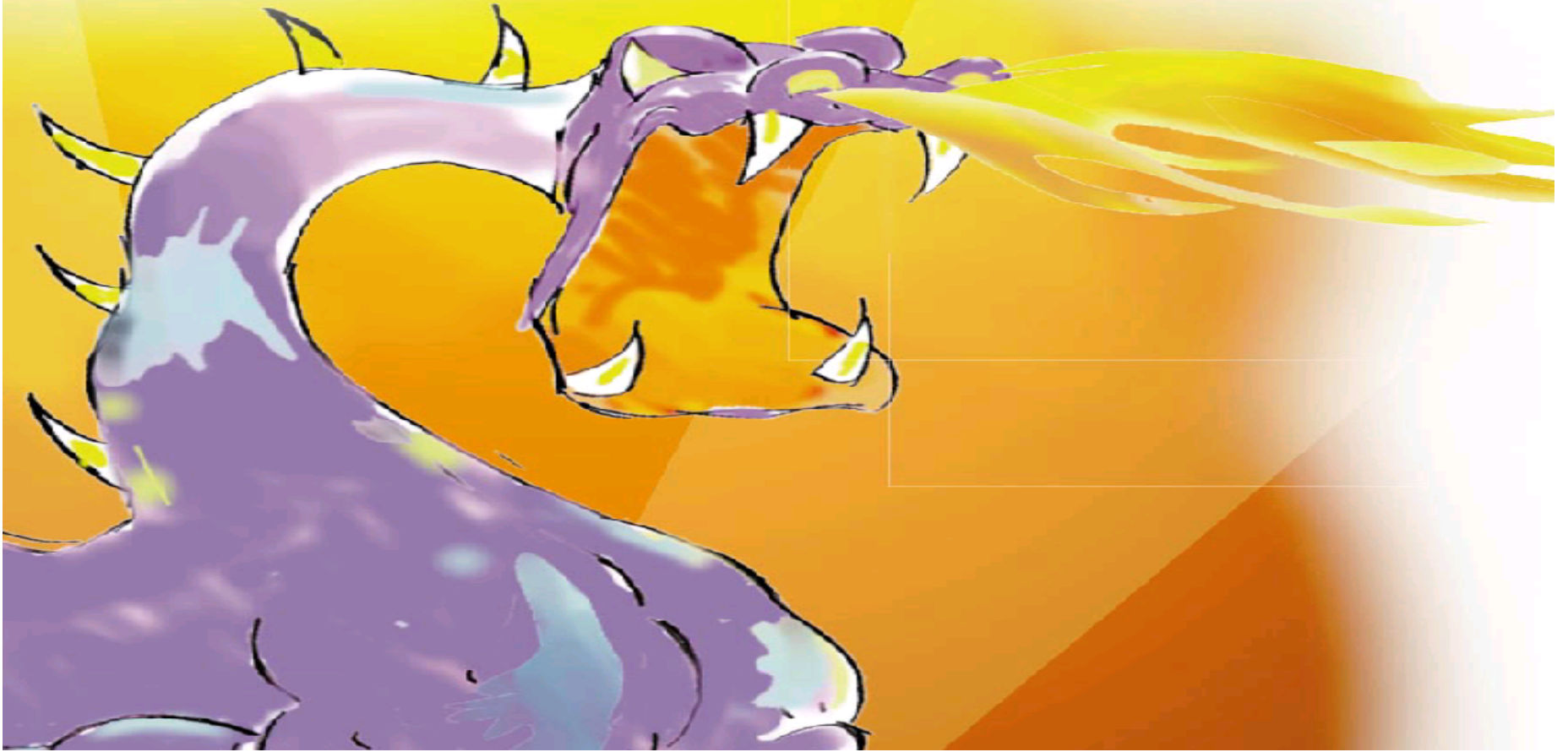
Safety switches

January 2008



EMC Safety switches

Problems with disturbances?



EMC Safety switches

What is EMC ?

- EMC = Electromagnetic compatibility
- EMC means interaction without unwanted influence within and between
 - Electrical equipment
 - Electronic equipment
 - Radio communication



EMC Safety switches

What is disturbing ?

- There are two types of disturbances: cabling dependent
- (LF =low frequency) and radio disturbance (HF=high frequency)
- Examples of disturbance-causing equipment are:
 - Frequency converters
 - Computers
 - Mobile phones
 - Lighting luminaries
 - UPS equipment
 - Capacitors



EMC Safety switches

What are the consequences ?

- Electromagnetic disturbances may cause several different kinds of malfunctions:
 - Problems with electronics
 - Problems with telecommunications
 - Apparatus failure
 - Flickering lighting
 - Magnetic fields



EMC Safety switches

EMC - Directive

- The EMC- directive has been in effect since 1 January 1996, and is transposed into national laws in all EU + EES member states
- The EMC-directive consists of 13 Articles:
 1. Definitions
 2. Applications
 3. Measures to ensure that apparatus without CE marking not are placed on the market
 4. Construction instructions
 5. Marketing
 6. Special measures
 7. Protection requirements
 8. Standardisation
 9. Actions to withdraw apparatus from the market
 10. Certification
 11. Repeal of former directives
 12. Time schedule
 13. Directive addressed to the Member States



EMC Safety switches

Summary of the EMC-directive:

- The apparatus should be constructed in such a way that unwanted signals or emissions are eliminated, and that it has an adequate level of electromagnetic protection or immunity
- The apparatus must be CE marked
- The Declaration of Conformity must be available for inspection purposes



EMC Safety switches

The reality of machines

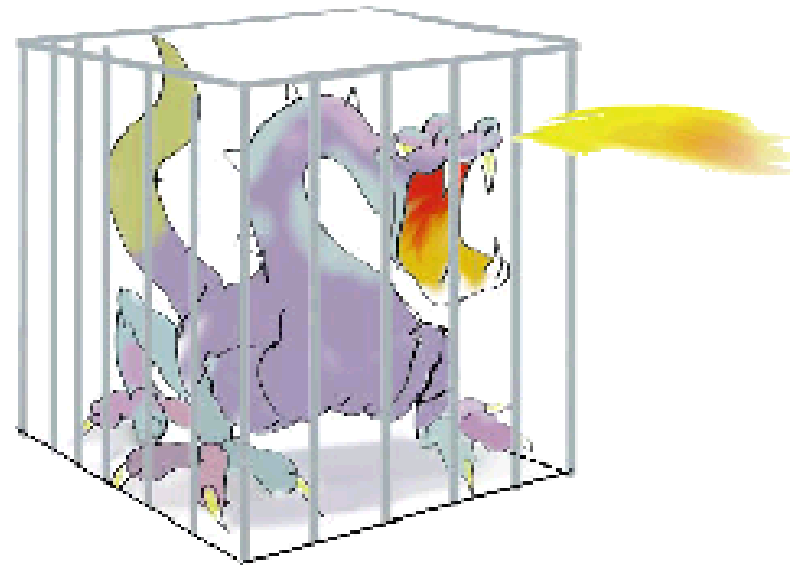
- Machines are getting smarter and smarter while their "brains" are getting smaller and smaller
- The apparatuses and equipment used in our electric mains have become more effective, due to electronics and digital technologies, but they have also become more complex. Electronic apparatuses are more or less sensitive to electromagnetic disturbances, and a majority of electric and electronic apparatus also create electromagnetic disturbances



EMC Safety switches

Some connect to the cage

- In the 70's when it was found that apparatuses caused disturbances within each other and no solution to this problem was available, many simply sought to contain the disturbances in a cage
- Done. Components and machines were enclosed in big cages. But this was only improvised solution, not a final one
- These half-finished methods are still used today. Sometimes it is truly difficult to find a better solution



EMC Safety switches

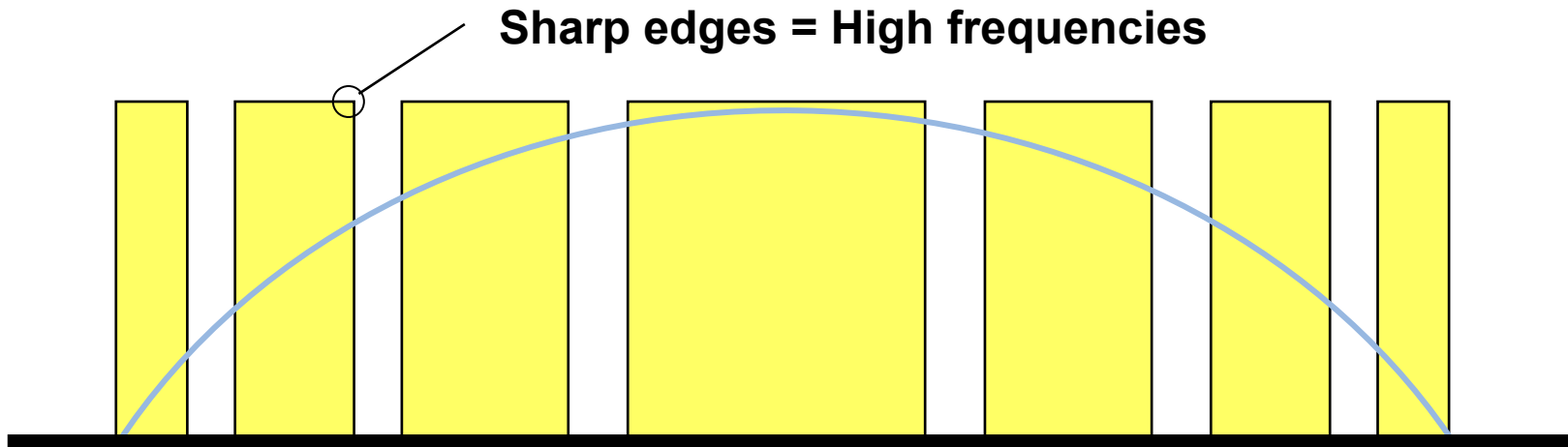
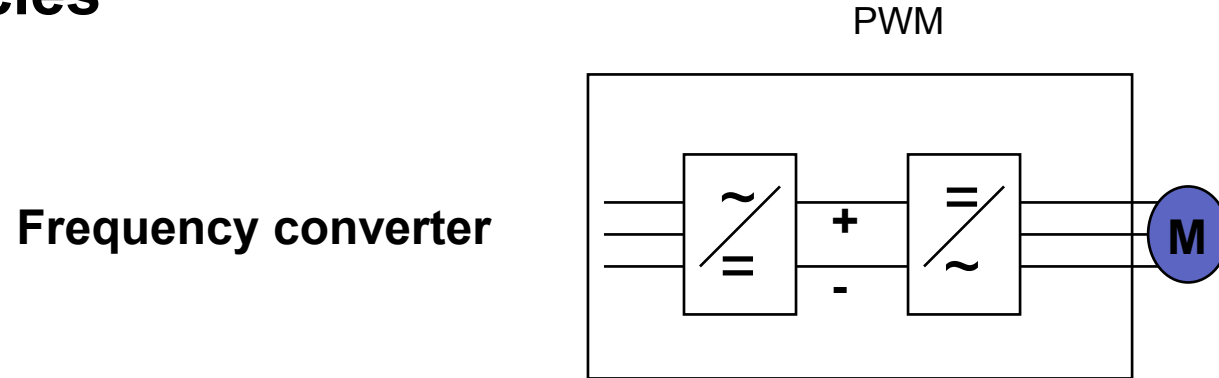
Selection of apparatus and installation

- When selecting an apparatus, product compliance with the EMC directive must be taken into consideration. The directive supports the process to build systems and limits the occurrence of disturbance in the apparatus even from the manufacturer
- To maintain satisfactory function of the installation, it is crucial that the manufacturer's installation instructions are followed. If not, the installer will be responsible for fulfilling the objectives of the EMC directive



EMC Safety switches

EMC - frequencies



EMC Safety switches

Calculation example

The length of the antenna can be calculated with the formula:

$$\frac{\lambda}{4}$$

Example 1:

900 MHz (mobile phone)
emits a wavelength of 30 cm

$$\frac{30}{4} = 7,5 \text{ cm antenna length}$$

Example 2:

100 MHz (frequency converter)
emits a wavelength of 3 m

$$\frac{3}{4} = 0,75 \text{ m "antenna" (cable length)}$$

Emission



EMC Safety switches

The new EMC ride

How can we get electrical and electronic apparatuses to interact without disturbance?

This is regulated by the EMC directive.

We simply have to stop disturbance at the gate. We have to learn how to tame them.

ABB has now made it simple for you to fulfil the necessary requirements, with our EMC package.



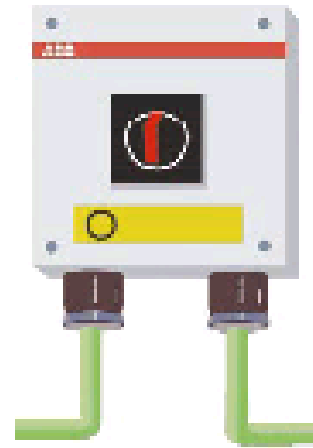
The EMC package from ABB



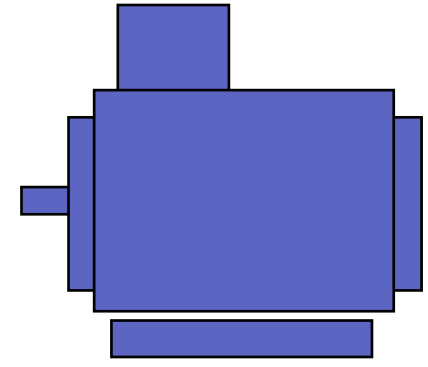
Frequency converter



Cable



Safety switch



Motor



Frequency Converter

EMC-approved screen in the enclosure.

Used with EMC-filter on the supply side to avoid emission of disturbance via cables to common environment.

Screened motor cable earthed 360° in the connection terminal to prevent radio disturbance.

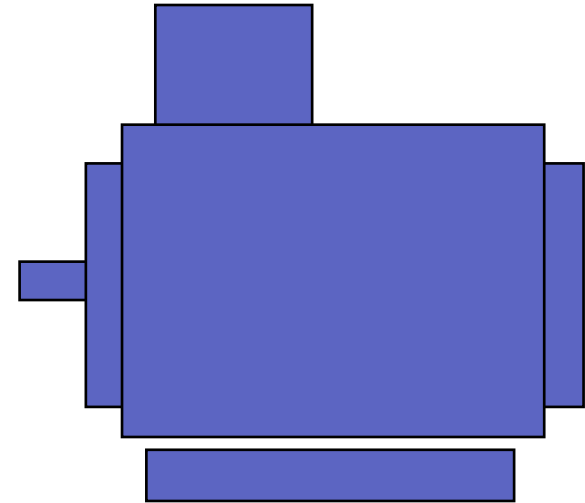
Note! In and outgoing cables should not be placed parallel to one another when installing.



Motor

Our motors are automatically EMC screened by the aluminium or cast iron frame.

In order to maintain a Faraday's cage between the cable and the motor, the motor cable must be earthed 360° in the motor connection box, in accordance with the enclosed instructions.



EMC Safety switches

EMC Safety switches are available in plastic, steel or aluminium casings.

The EMC-safety switch is tested for a frequency bandwidth of 30-1000 MHz, in accordance with EN50081-2.

The disturbance-free safety switch must be connected by screened cables and compression glands which fulfill EMC requirements.

If EMC compression glands are not used the braid of the screened cable must be connected to the earth terminal for both incoming and outgoing cable.

Note! Standard compression glands can be used with OTE_ -range of EMC safety switches.

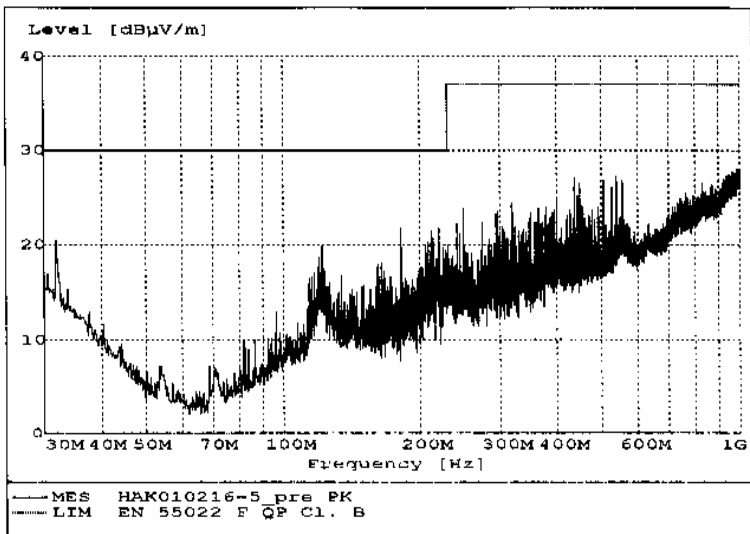


EMC Safety switches

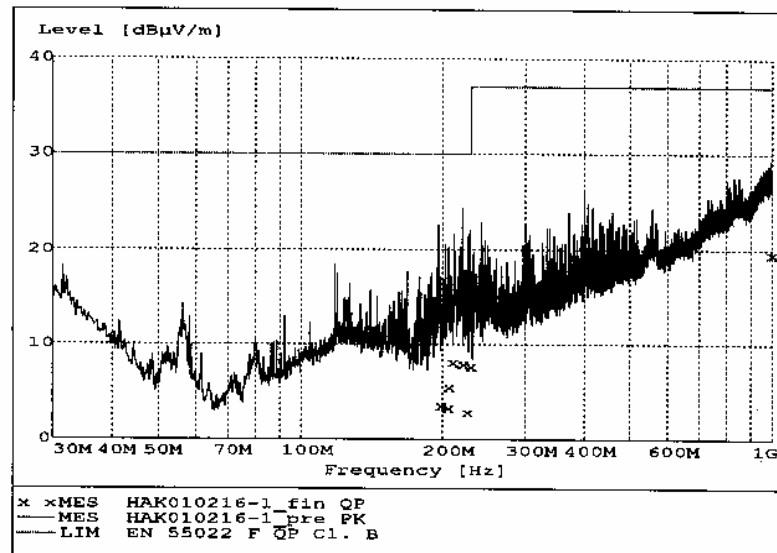
Electromagnetic emissions of the safety switches tested according to EN 50081-2.

The graphs to the right shows the emission of a frequency converter and an EMC Safety switch. The graph to the left is the reference test with only the frequency converter connected.

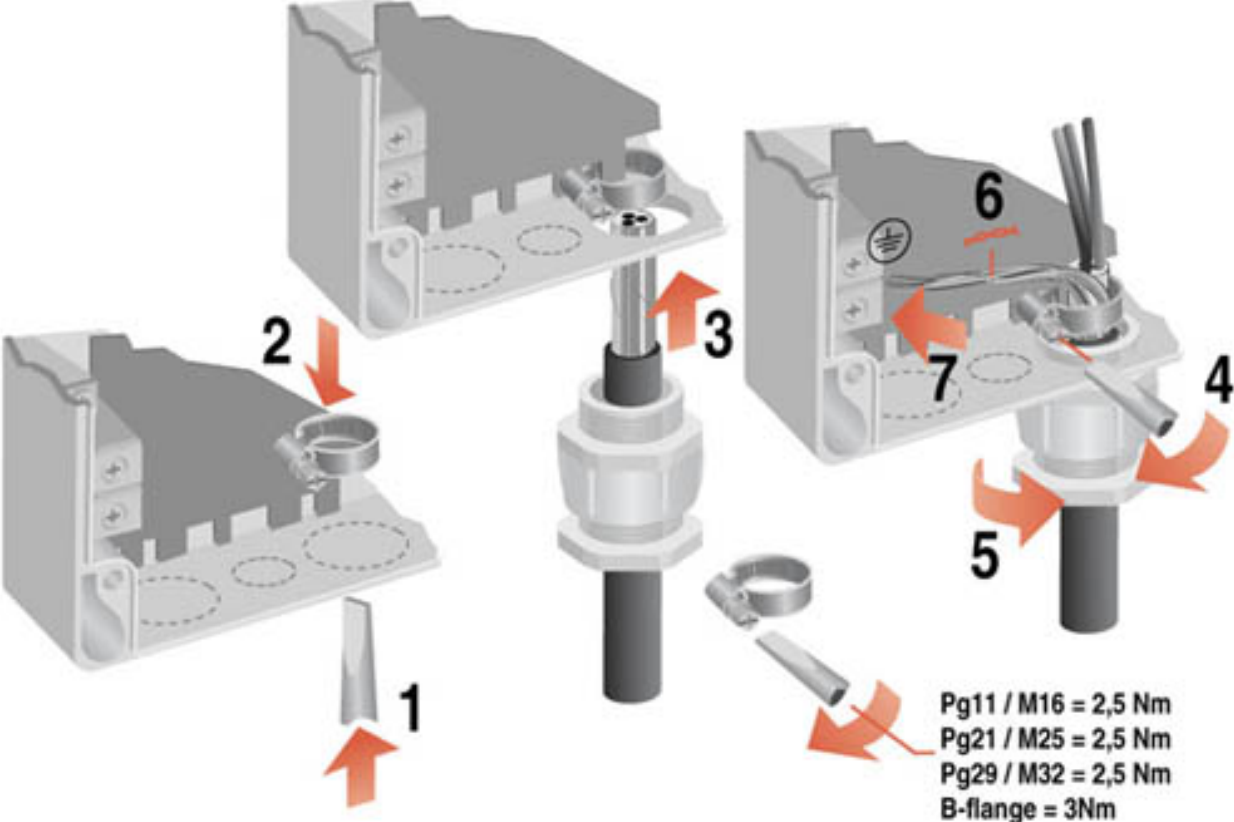
Referans:



Stor brytare

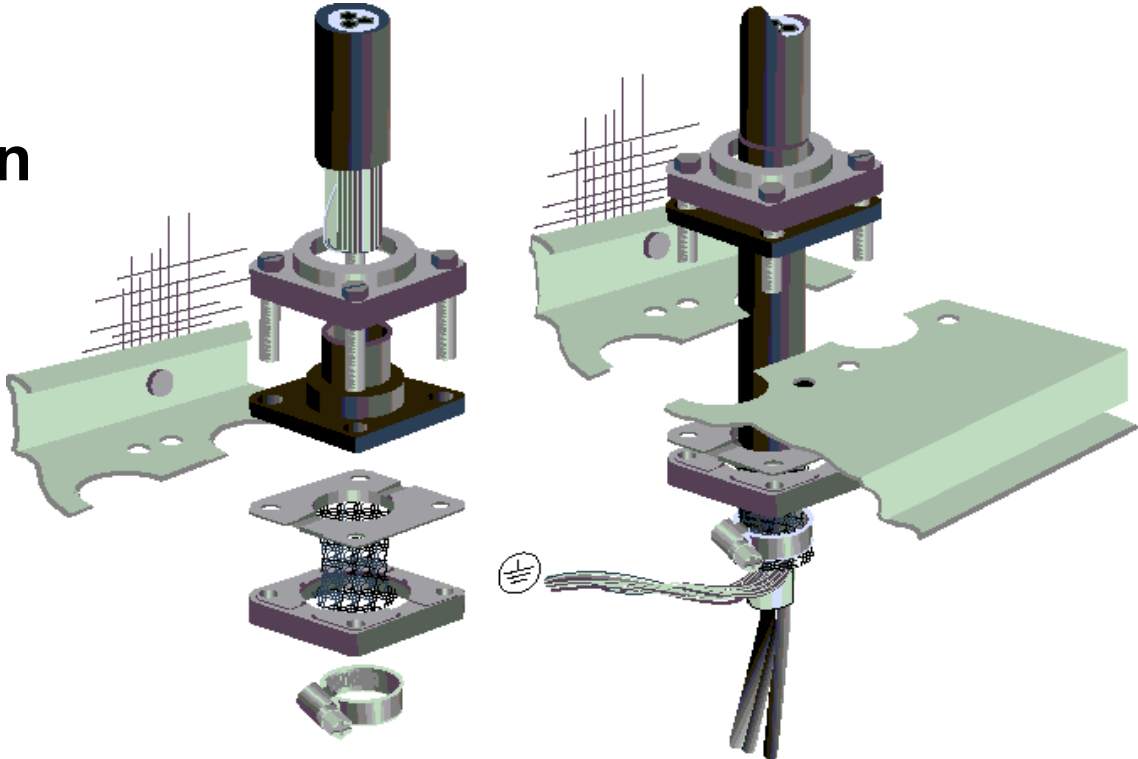


Cable installation



Cable installation

Cable installation accessories



Cables

- Green Line Cables are halogen-free cables without PVC ftalates or bromine flame protection
- 100% copper screened
- No corrosive smoke produced if accidentally set on fire. The smoke is light and transparent
- Fire class F3
- Approved for indoor installation

