

Novaris<sup>®</sup>

PART OF THE POWERCOM GROUP

# Earth Clamp

## Installation Instructions



**IMPORTANT:** Please read these instructions carefully. Whilst straightforward, the installation of these devices is critical to their performance. Installation should only be carried out by a suitably qualified person in accordance with all relevant standards.

**1. Introduction**

1.1 These installation instructions apply to the range of Novaris earth clamps:

Cat No.: **EC20 -90**  
 $I_{max}$  (kA)  $\rightarrow$   $U_c$  (V)

1.2 Novaris EC provides a means to electrically clamp different earthing systems during transient disturbances. Applications include computer rooms, defence installations, gas pipeline insulated joints and the bonding of cable sheaths to ground where direct bonding would introduce interference and “earth loops”.



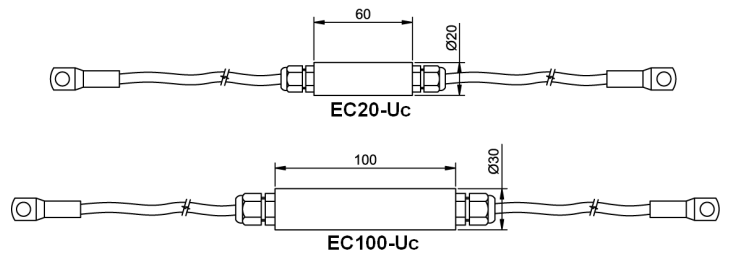
**Figure 1: EC 20 - 90**

**2. Background Information**

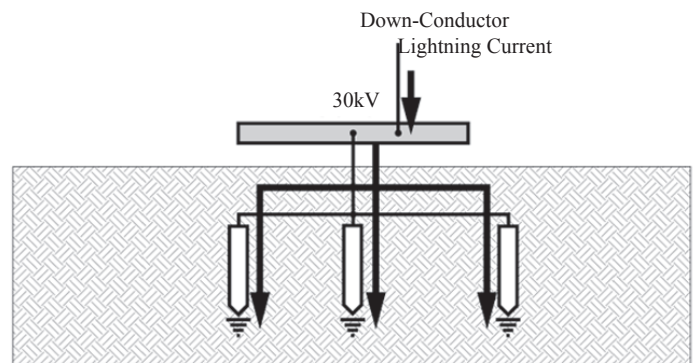
2.1 Experts in the field of lightning protection around the world agree that best practice is to reference all equipment to a single earth point (i.e. a bonded earthing system). This avoids problems associated with earth potential differences (earth loops), minimizing the risk of damage to equipment.

Substantial earth potential rises are unavoidable, even if the earth resistance is low. However, it is not earth potential rise itself, but *differences* in earth potential rise that cause damage to electronic equipment. Having separate earthing systems (lightning protection earth, power earth, data earth, etc) promotes differences in earth potential and causes major problems. Therefore, best practice is to have one earthing system with all equipment (including surge protectors) referenced to a single point on that earthing system (see Example 3.1).

However in some applications separate earthing systems are required. In these cases earth clamps should be connected between the earthing systems. The earth clamp is open-circuit under normal conditions, meaning the two earthing systems are isolated. Under surge conditions the earth clamp switches to a short-circuit, connecting the two earthing systems together. This prevents large earth potential differences and avoids equipment damage. The earth clamp automatically resets after a surge.



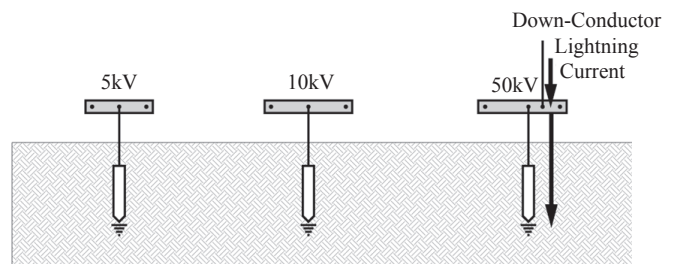
**Figure 2: Dimensions**



**Figure 3.1: Best Practice**

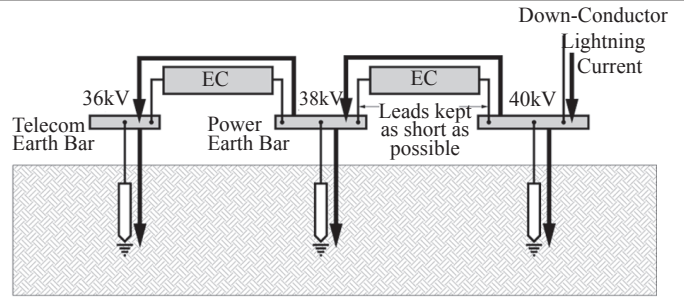
**3. Examples**

3.1 **Best practice:** In Figure 3.1 there is one earthing system with all equipment referenced to a single point (the equipment earth bar shown). During a typical lightning strike the potential of this reference point reaches 30kV, however everything is raised to this potential and so the equipment experiences no potential difference. No earth clamps are required.



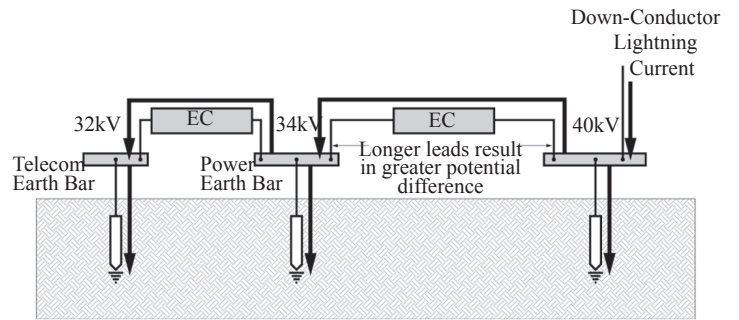
**Figure 3.2: Worst Practice**

**3.2 Worst practice:** In Figure 3.2 there are three separate earthing systems. During a typical lightning strike the lightning protection earth bar (right) reaches 50kV. The other two earth bars have a small rise in potential as the lightning current affects the surrounding soil. There are large potential differences between the earth bars (up to 45kV), which may cause serious problems. This practice should be avoided at all costs.



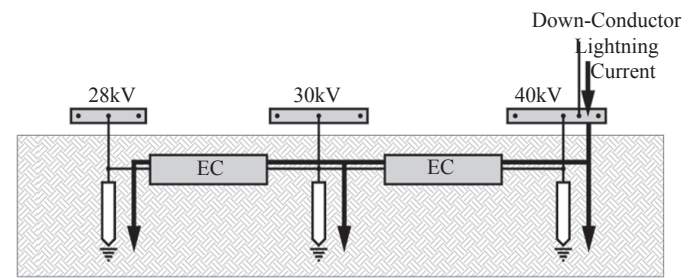
**Figure 3.3: Best practice using earth clamps**

**3.3 Best practice using earth clamps:** In Figure 3.3 the three earth bars are connected together using earth clamps. During a typical lightning strike the earth bars reach 36kV, 38kV and 40kV, so there is a maximum of only 4kV potential difference between them. The most important aspect is that the earth bars are close together and the lead lengths on the earth clamps are as short as possible.



**Figure 3.4: Acceptable Practice using earth clamps**

**3.4** In Figure 3.4 one of the earth clamps has long lead lengths. During a typical lightning strike there is a large potential difference across these leads. The result is 8kV difference between the earth bars, instead of 4kV as in Example 3.3. It is most important that the earth bars be close together and that the lead lengths on the earth clamp be as short as possible.

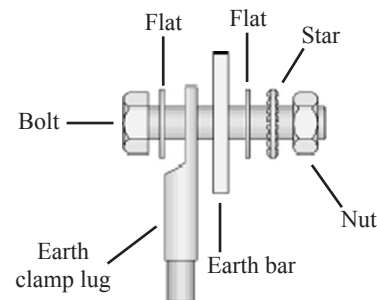


**Figure 3.4: Worst practice using earth clamps**

**3.5 Worst practice using earth clamps:** In Figure 3.5 the earth clamps are connected between the earth rods instead of the earth bars. The result is a longer surge path between the earthing systems and therefore a greater potential difference between the earth bars (up to 12kV in this example). This practice should be avoided where possible.

### 4. Procedure

- 4.1 After reading these installation instructions, decide where the earth clamp should be connected. For further technical assistance please contact Novaris.
- 4.2 Make the lead lengths on the earth clamp as short as possible. Using M8 bolts, securely connect the earth clamp as per figure 4.



**Figure 4: Clamping Procedure**

### 5. Maintenance

- 5.1 Earth clamps require very little maintenance. The clamping component within the earth clamp is extremely robust and very unlikely to fail.
- 5.2 It is recommended that the integrity of the connections be checked periodically.
- 5.3 If the earth clamp appears damaged or defective in any way please contact Novaris about replacing the earth clamp.

