

Neutral earthing in low voltage

Sector Energy PTI NC

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Content

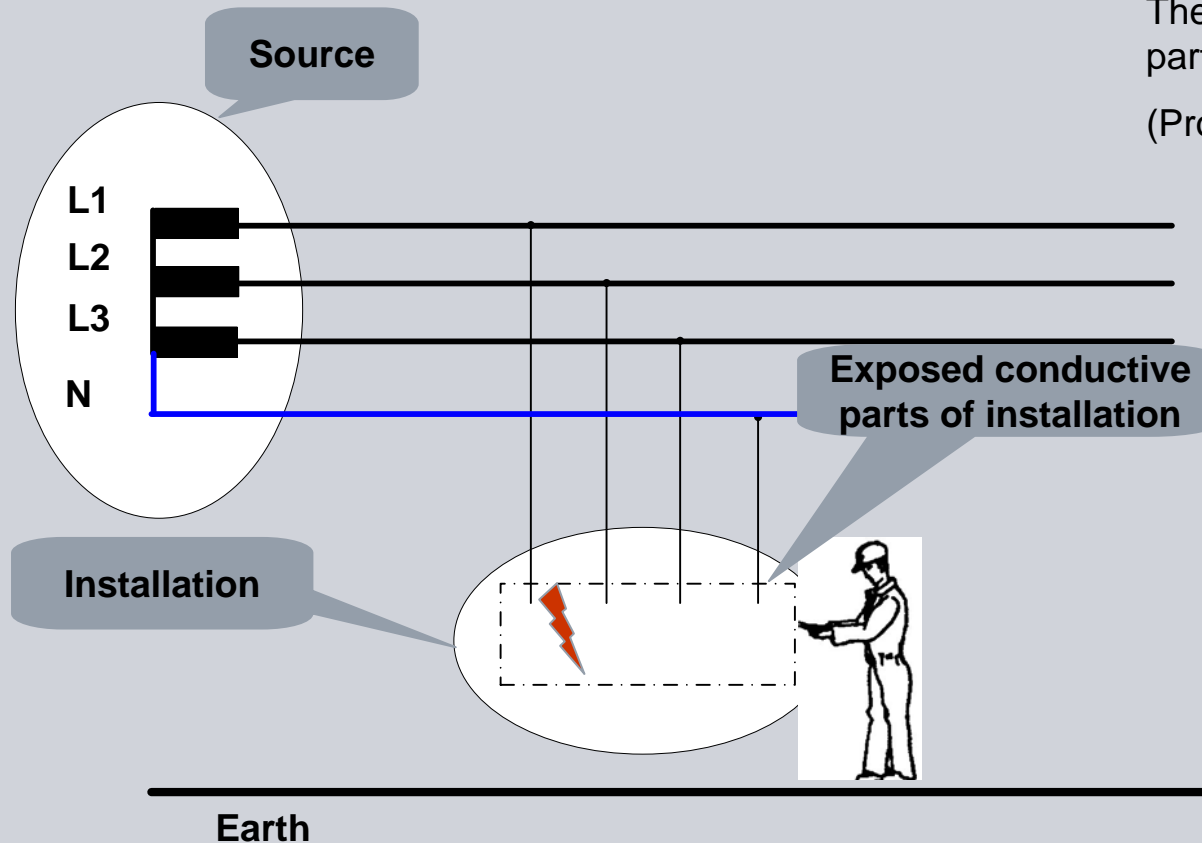
Neutral earthing principle

Load flow

Fault conditions

Types of system earthing (Fault Protection) according to IEC 60364-1 (2005-11) (part1)

The system earthing is an essential part of protection against faults
(Protection against indirect contact)



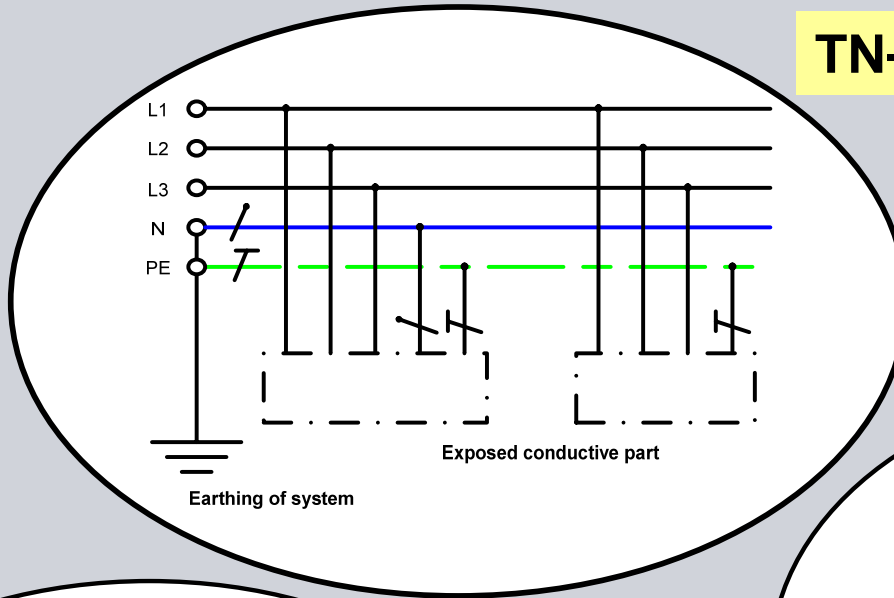
Types of system earthing according to IEC 60364-1 (2005-11) (part2)

The types of system earthing are defined via the relationship of power system and of exposed conductive parts to earth.

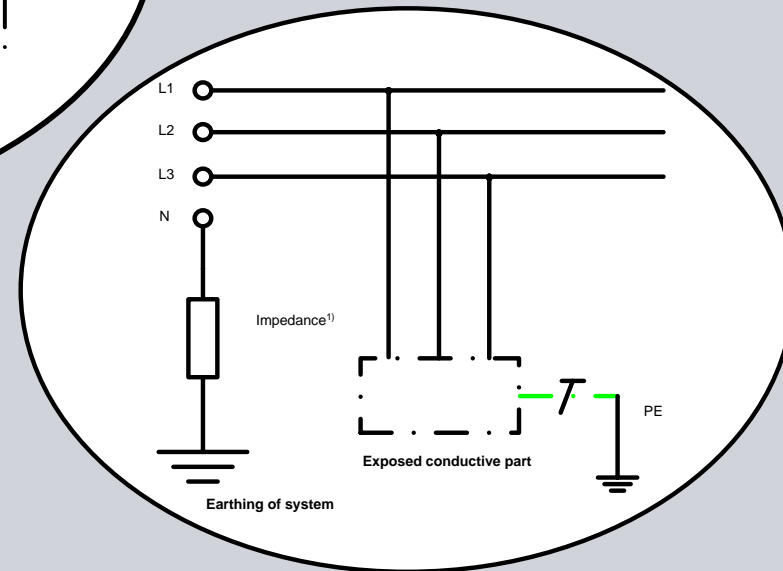
- The first letter shows the relationship of power system to earth.
 - T: Direct connection of one point to earth
 - I: All live parts isolated from earth
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- The second letter shows the relationship of exposed conductive parts to earth
 - T: Direct electrical connection of exposed conductive parts of the installation to earth, independently of the earthing of any point of the power system
 - N: Direct electrical connection of the exposed conductive parts to the earthed point of the power system.
 - Subsequent letter if any shows the arrangement of neutral and protective conductor: S: separated protective and neutral conductor (5wire); C: Neutral and protective function combined in a single conductor (4wire)
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Low voltage systems

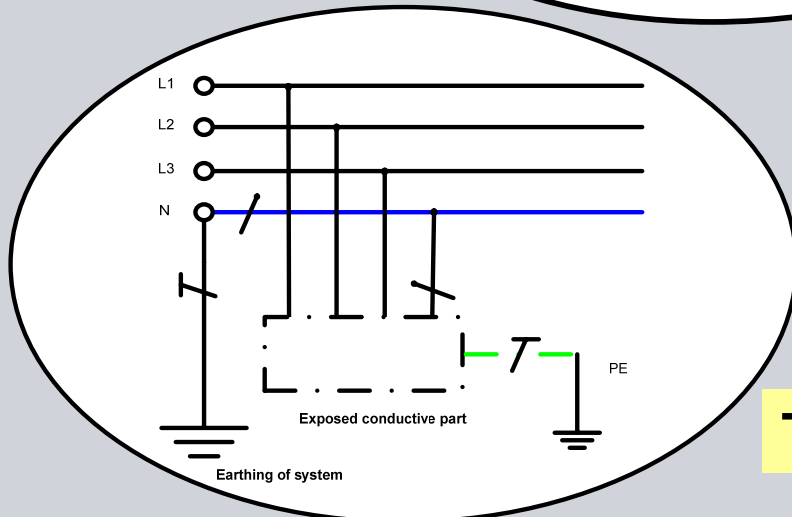
TN-S-System



IT-System

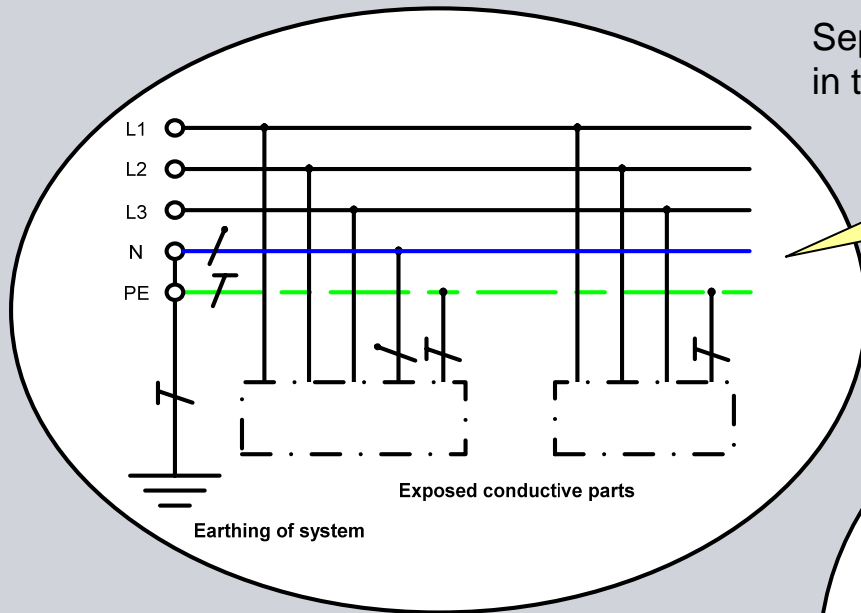


TT-System

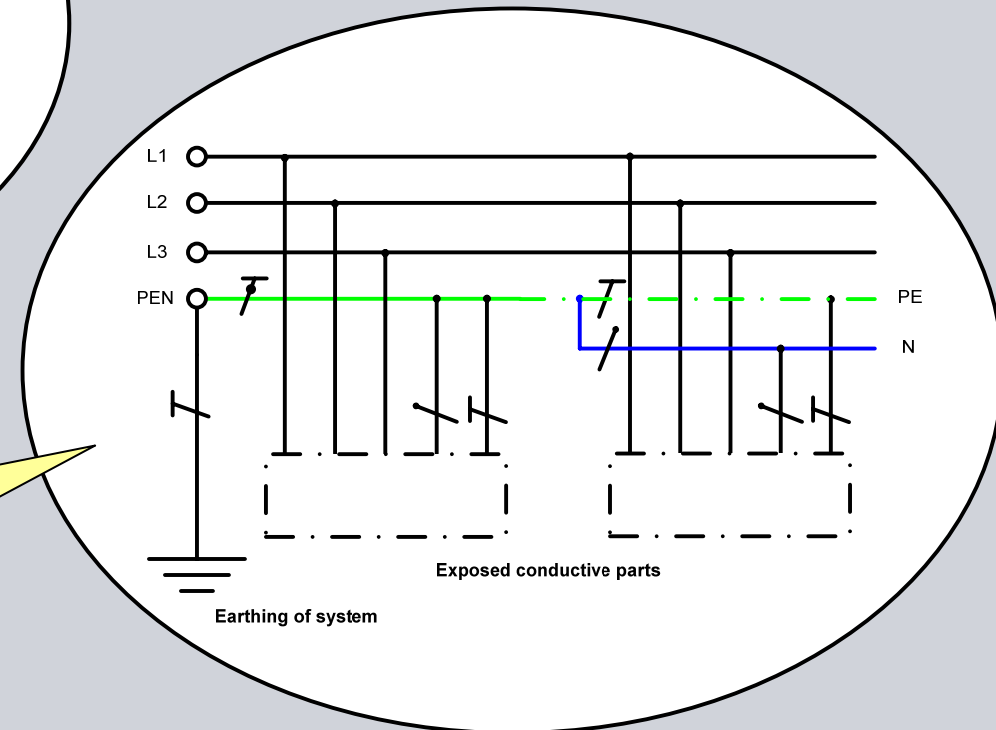


Definitions according IEC 60364-3

Separated PE – and Neutral conductor in the whole interconnected LV-system



TN-S-System

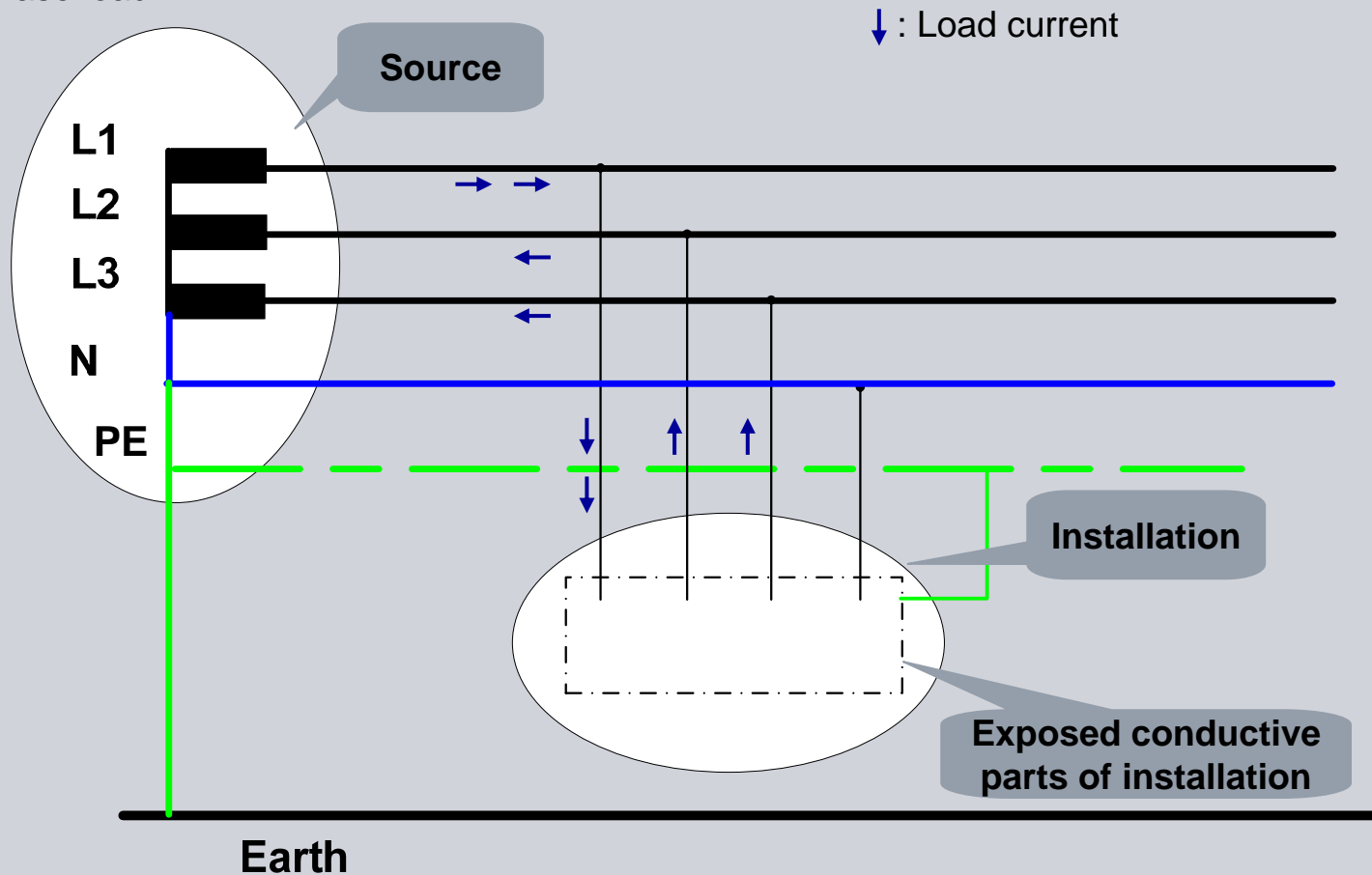


TN-C-S-System

PE- and Neutral conductor combined in the feeding part of LV- system

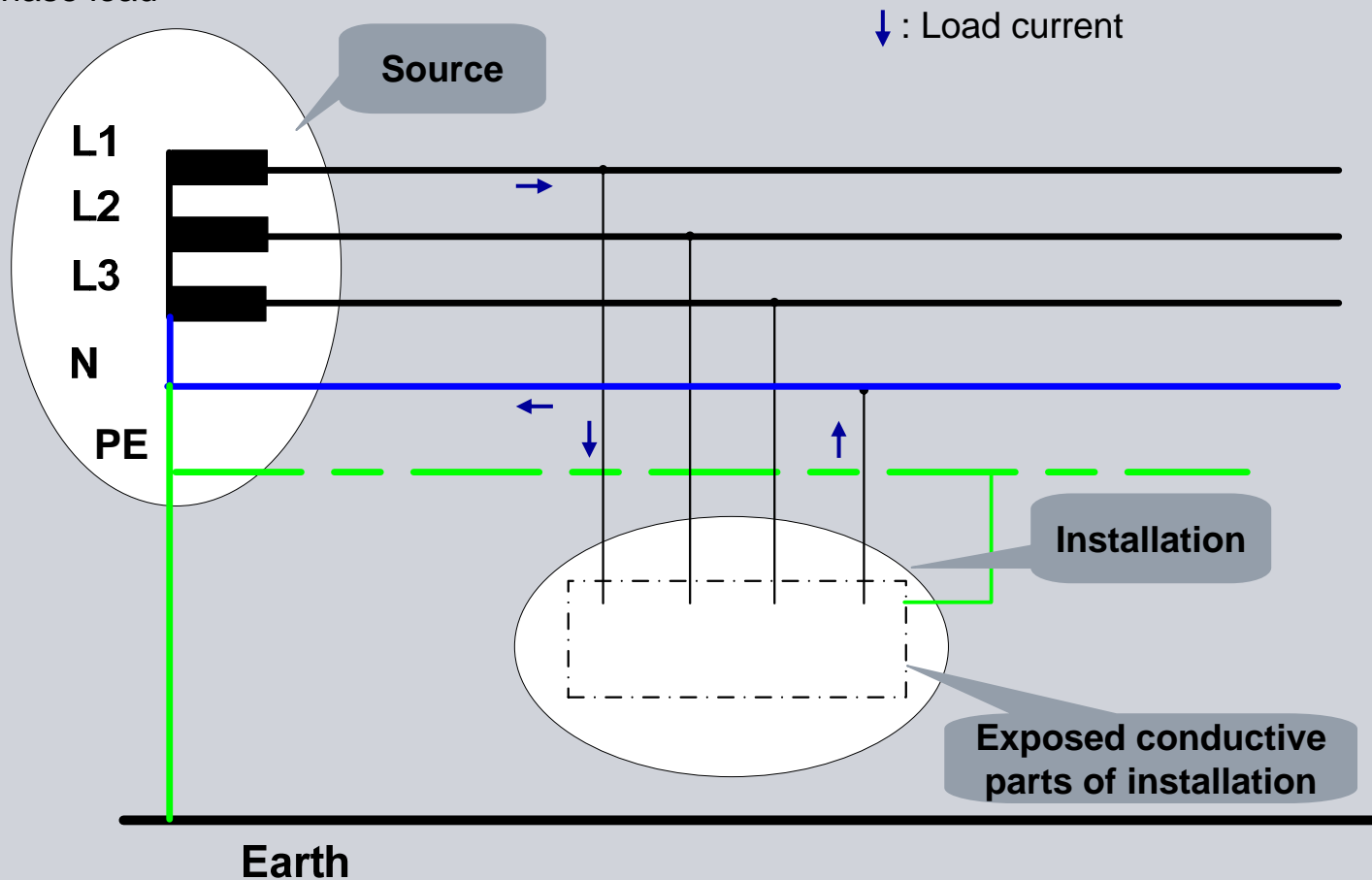
Types of system earthing according to IEC 60364-1 (2005-11) (TN-S System)

Three phase load



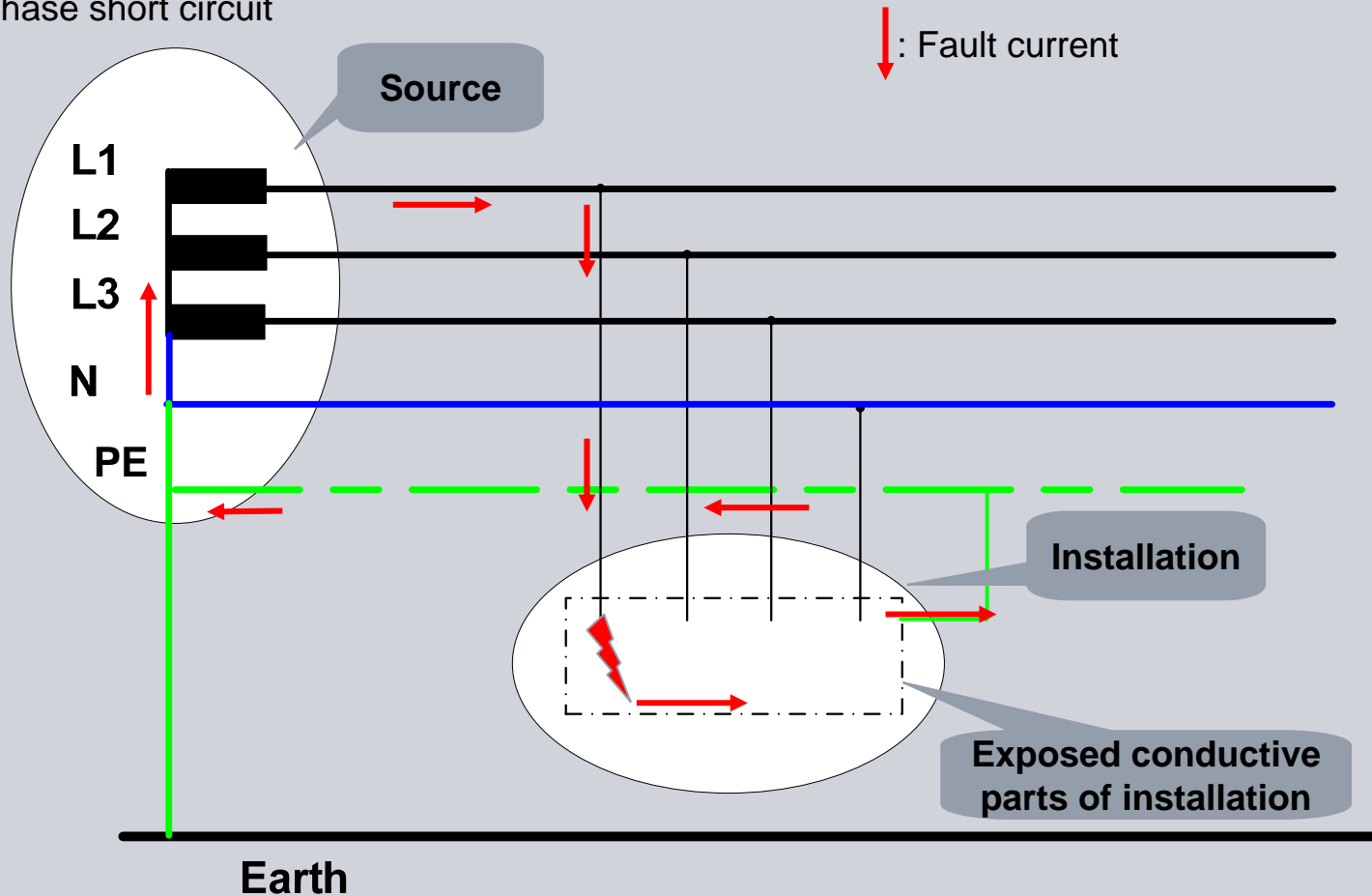
Types of system earthing according to IEC 60364-1 (2005-11) (TN-S System)

Single phase load



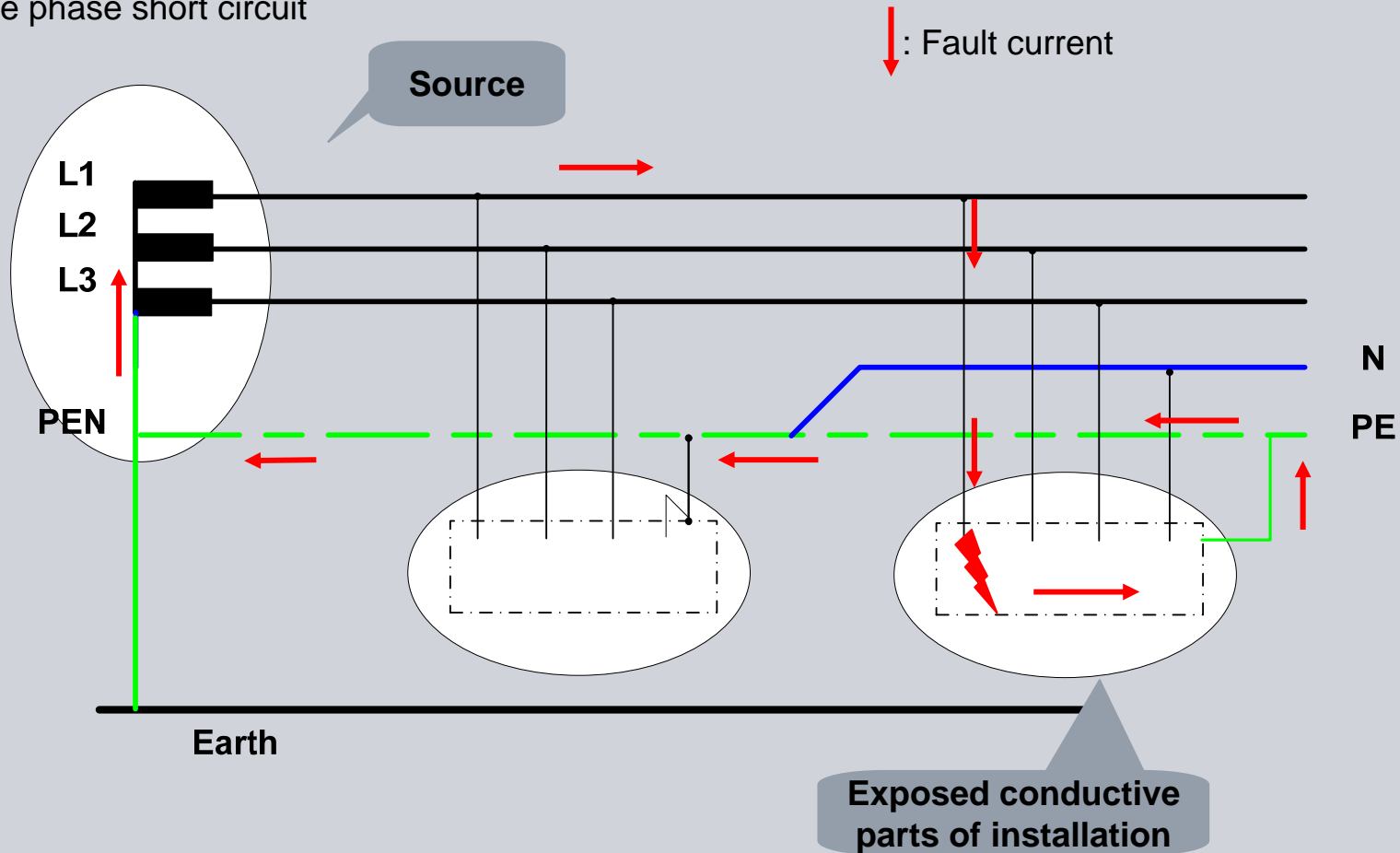
Types of system earthing according to IEC 60364-1 (2005-11) (TN-S System)

Single phase short circuit

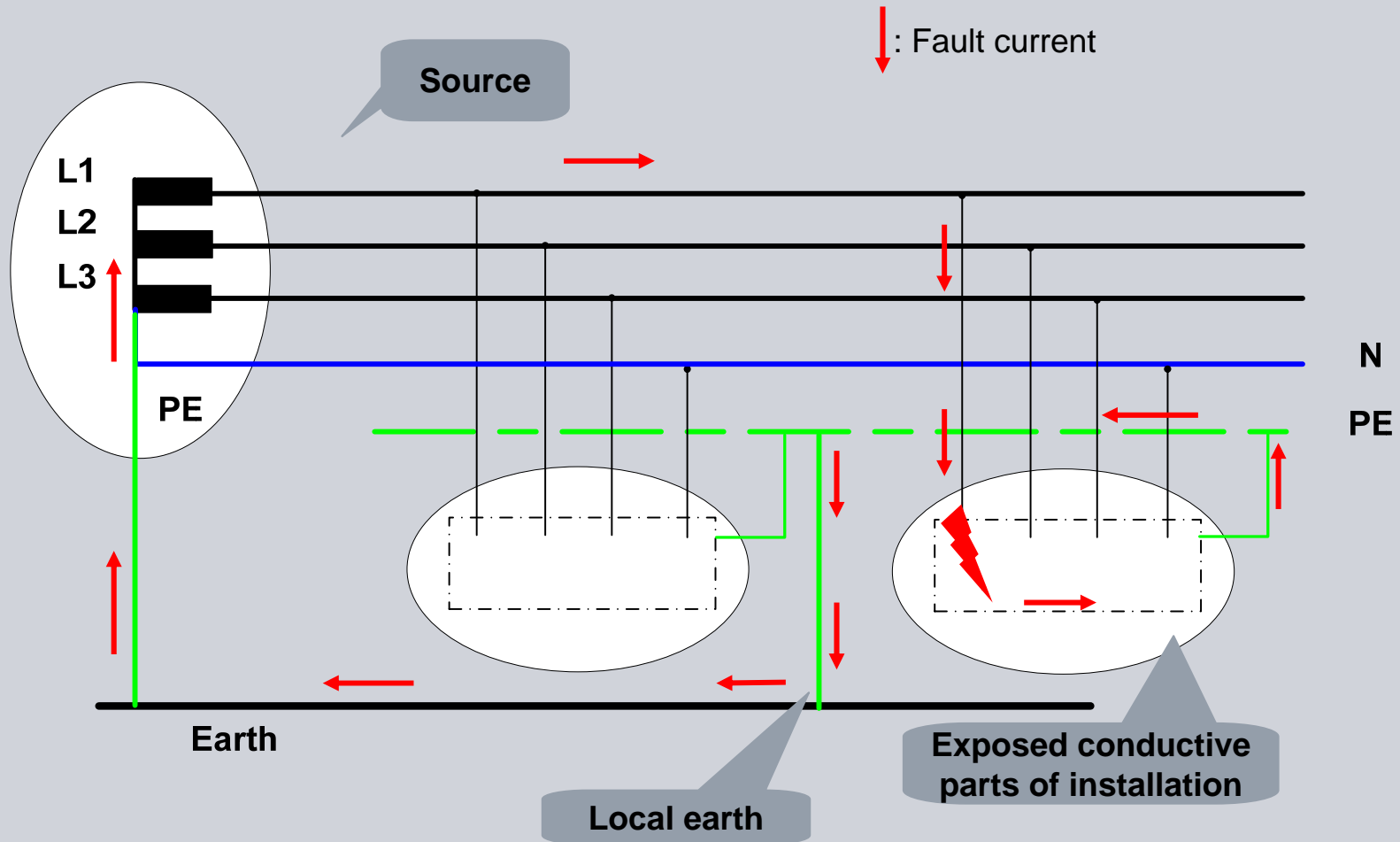


Types of system earthing according to IEC 60364-1 (2005-11) (TN-C-S System)

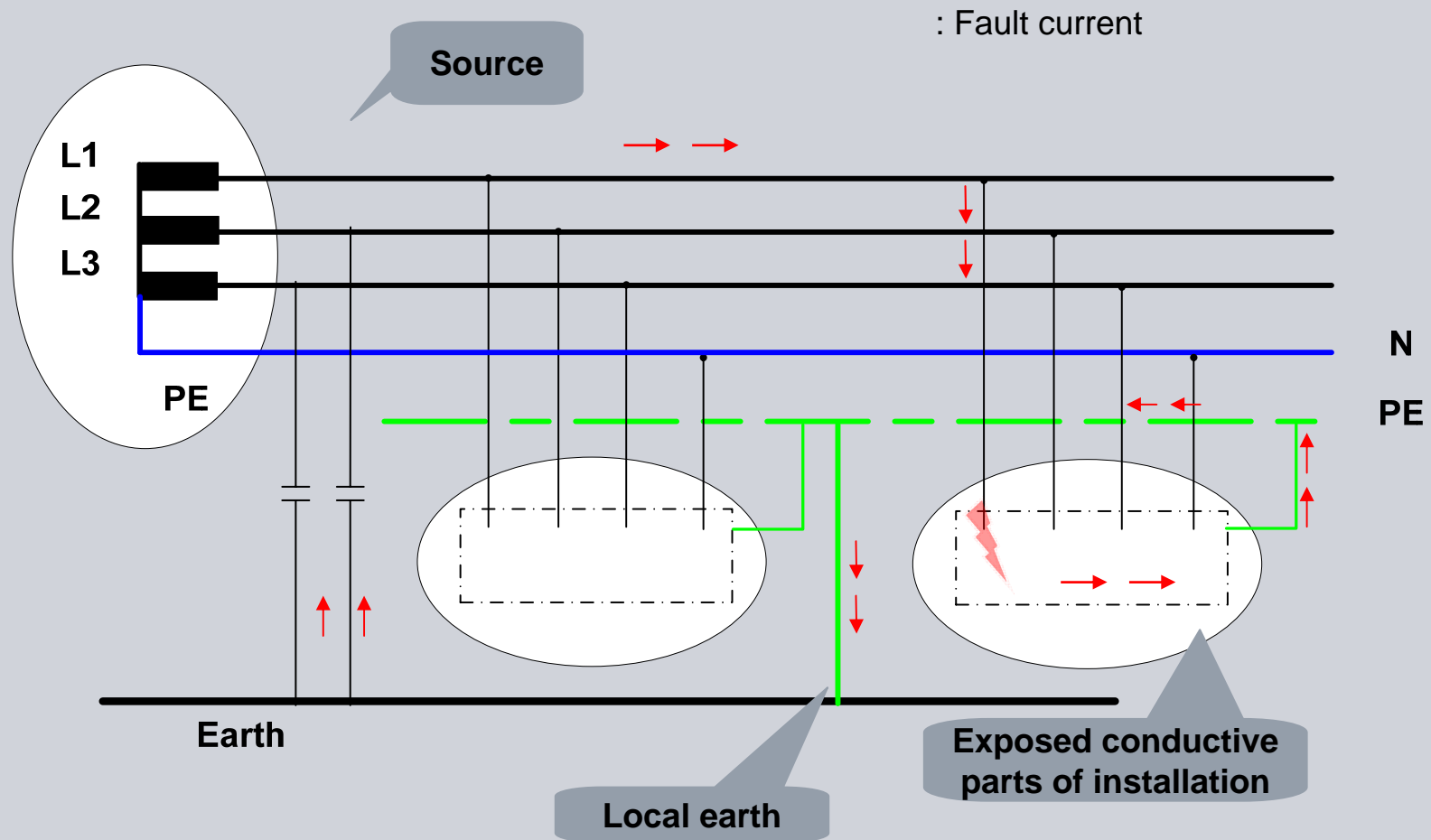
Single phase short circuit



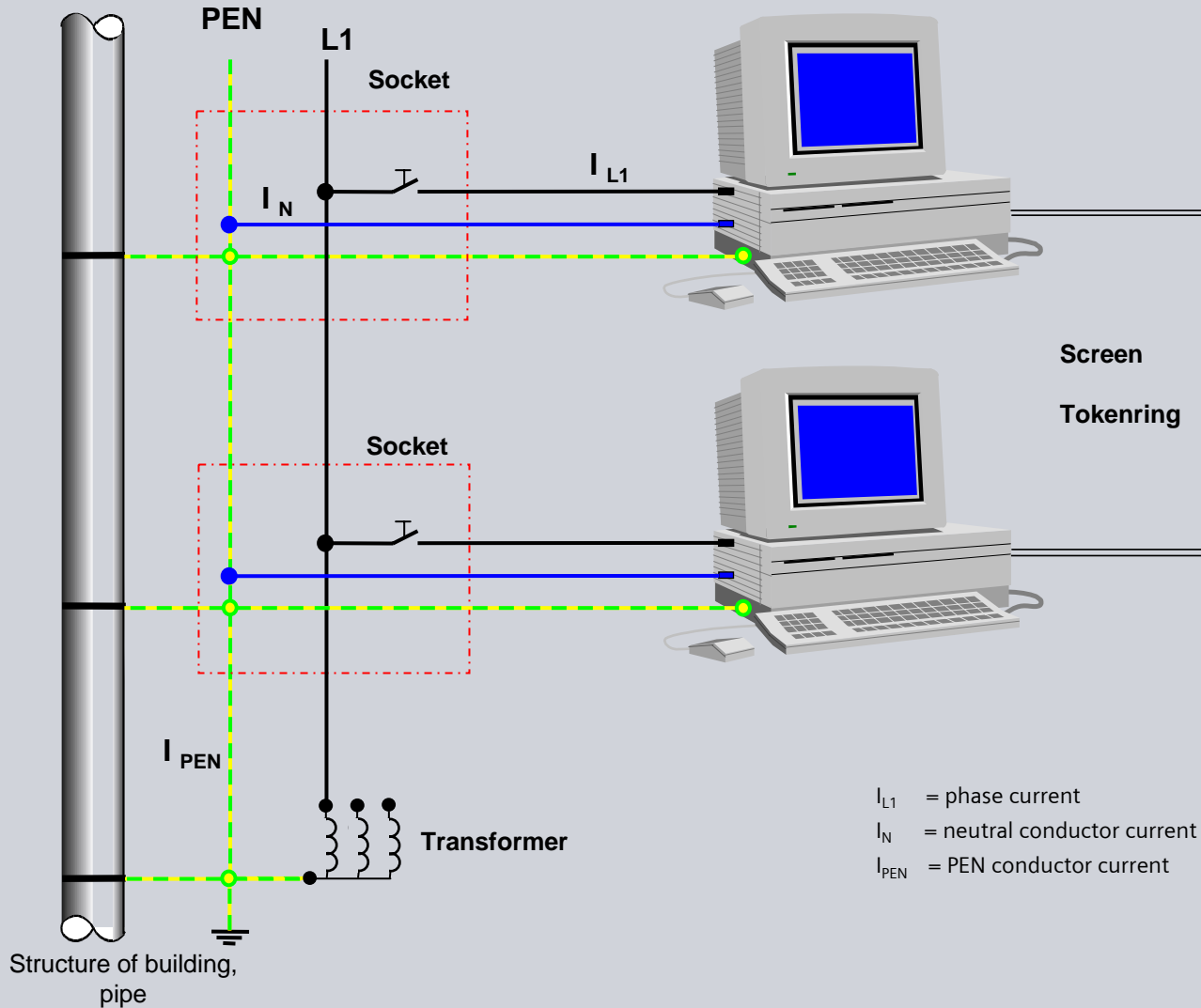
Types of system earthing according to IEC 60364-1 (2005-11) (TT System)



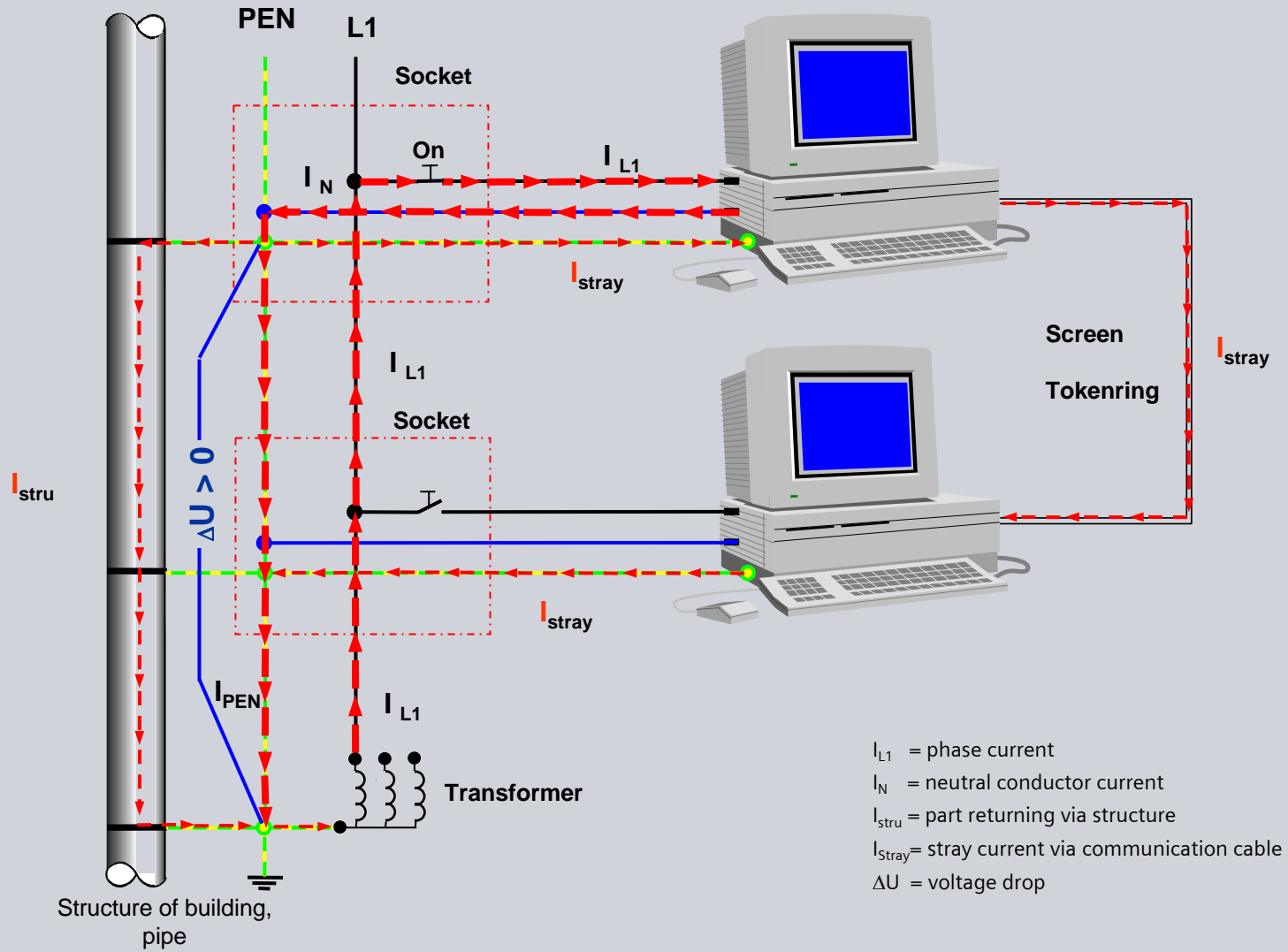
Types of system earthing according to IEC 60364-1 (2005-11) (IT System)



Low voltage supply by TN-C



Low voltage supply by TN-C



I_{L1} = phase current
 I_N = neutral conductor current
 I_{stru} = part returning via structure
 I_{stray} = stray current via communication cable
 ΔU = voltage drop

Low voltage supply by TN-S

