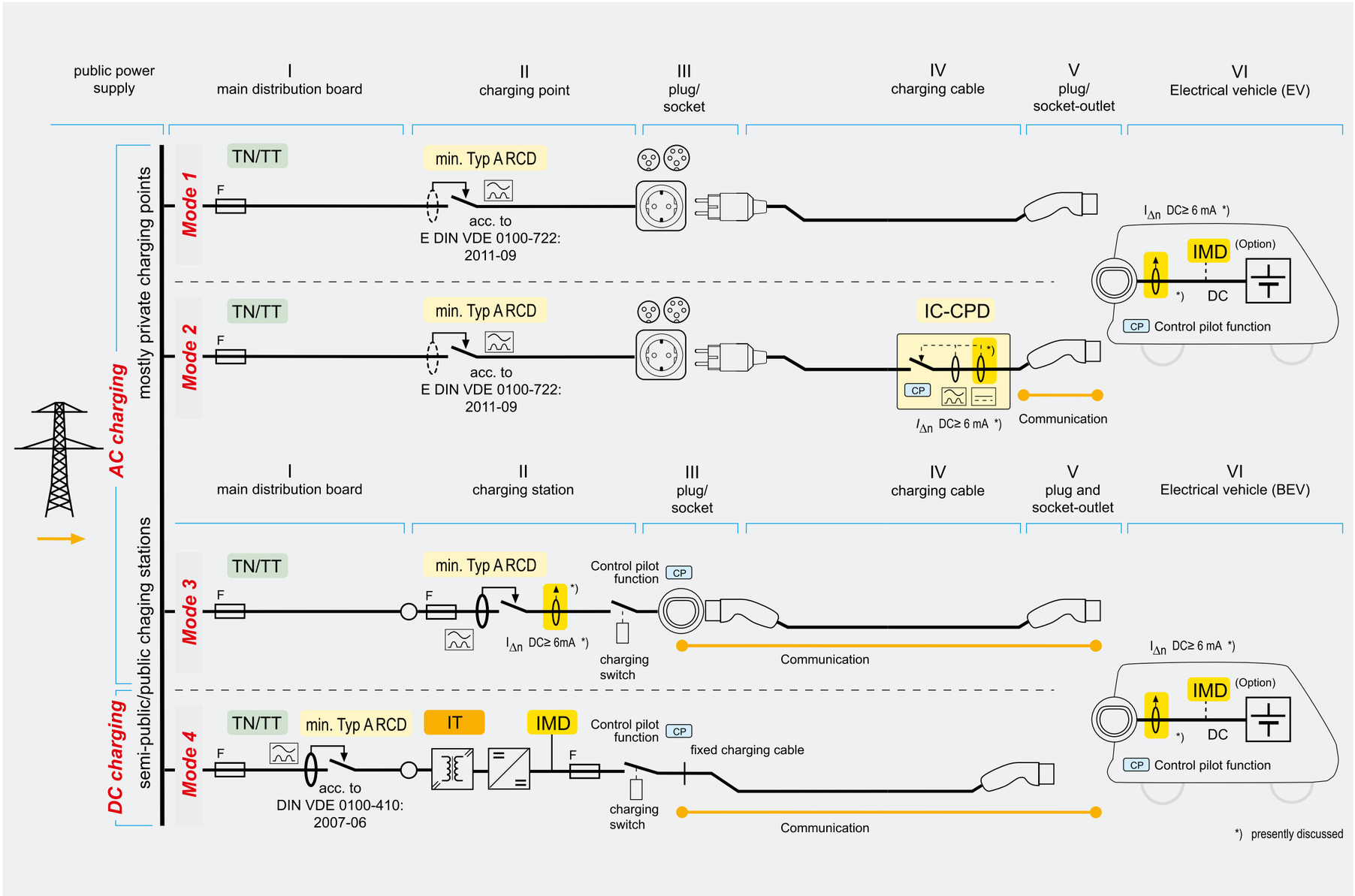
Overview of charging modes and protective measures

Electric vehicles (EV) are normally loaded at different times, in different places or different feed points, requiring different energy input. In order to provide the necessary safety and charging energy to match the demand, four different charging modes are defined in IEC 61851-1:2010-12.



- **Mode 1: Uncontrolled charging**
  - AC charging at a socket 1ph/3ph (Schuko, CEE)
  - Max. charging current: 16 A/11 kW
  - Charger built into the vehicle
  - No communication with the vehicle
  - Locking mechanism of the plug and socket-outlet in the vehicle
  - This is not recommended, as it is not guaranteed that a residual current device (RCD) is included in the building installation.

- **Mode 2: Uncontrolled charging**
  - AC charging at a socket 1ph/3ph (Schuko, CEE)
  - Max. charging current: 32 A/22 kW
  - Charger built into the vehicle
  - Protective device/pilot function in the cable (IC-CPD)
  - Locking mechanism of the plug and socket-outlet in the vehicle

- **Mode 3: Controlled charging**
  - AC charging on type-tested supply units for electric vehicles
  - Max. charging current: 63 A/43.5 kW
  - Charger built into the vehicle
  - Protective device/pilot function integrated into charging station
  - Locking mechanism on both sides of the plug and socket-outlet

- **Mode 4: Controlled charging**
  - DC charging on type-tested DC charging stations for electric vehicles
  - Max. charging power: DC low max. 38 kW/DC high 170 kW (charging voltage and current depend on system)
  - Monitoring and protective device/pilot function integrated into charging station
  - Locking mechanism of the plug and socket-outlet in the vehicle
  - Charging cable built into the charging station