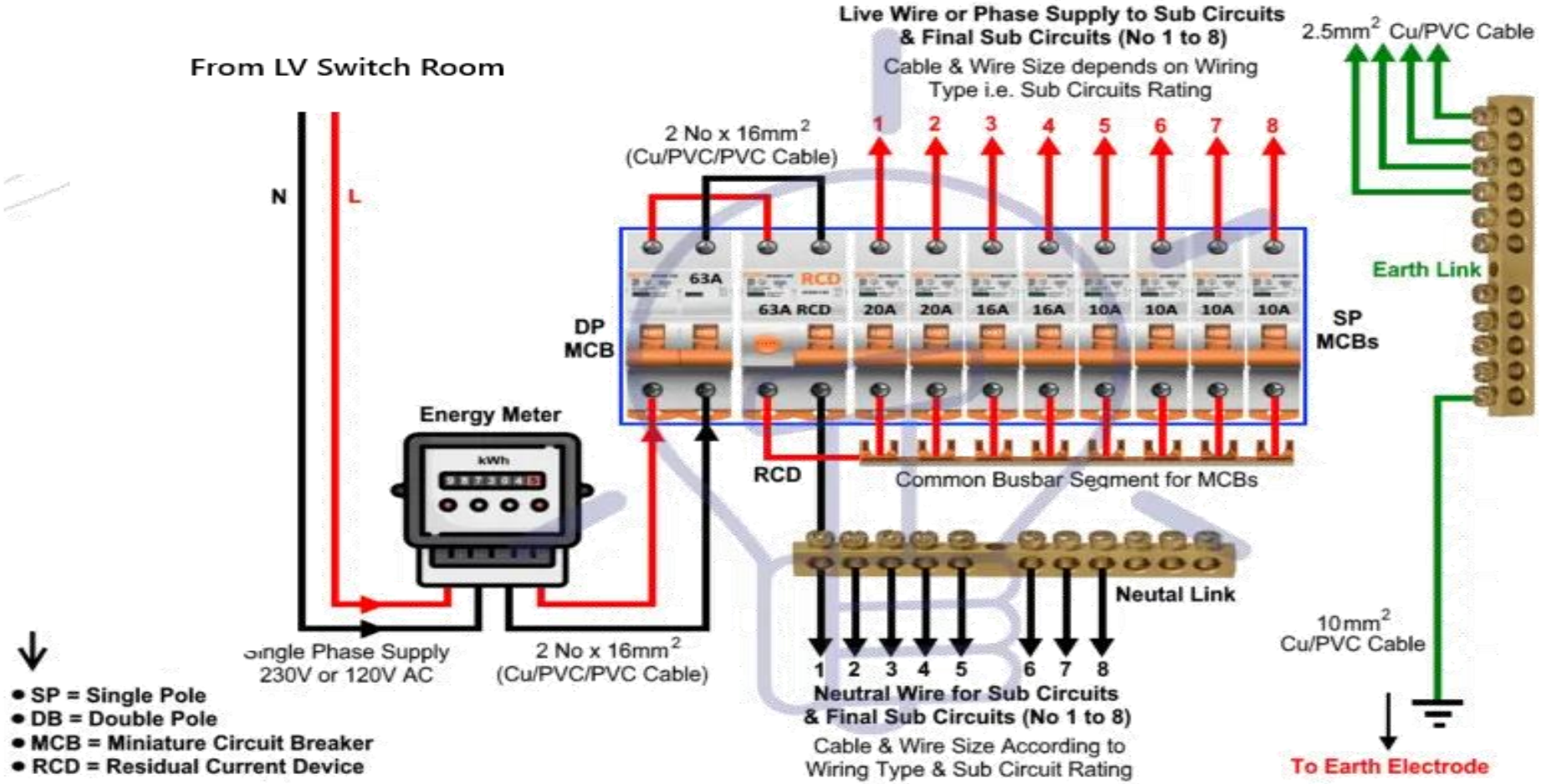
Slide 1: Objectives of the Session

- Identify Live, Neutral, and Earth wires at the Distribution Board (DB)
- Learn correct connections for:
  - 13A 3-pin plug
  - Socket outlet
  - Isolator
  - Lighting fittings
- Understand MCB and RCCB wiring for single-phase and 3-phase systems
- Follow proper safety procedures before starting work

Identify Live, Neutral, and Earth wires at the Distribution Board (DB)



Wiring of the Distribution Board with RCD (Single Phase Supply)
(From Utility Pole & Energy Meter to the Consumer Unit)

Description of MAIN MCB, RCD & final MCB

Double Pole MCB (DP) = The Isolator or Main Switch)

This is the main operating switch which is used to control the electric power supply in the building(s). The main switch can be used to immediately turn ON or OFF the main electric supply to the connected appliances in case of emergency like short circuits, electric shock, fire, or while working on the main board, sub circuit or final sub circuits to troubleshoot and for maintenance purposes. Multiple or separate mains switch board or fuse board may be used if more supply unites are installed in the system i.e. storage heater etc.

RCD (DP) = Residual Current Devices for Safety

A (RCD) Residual-Current Device, or (RCCB) Residual-Current Circuit Breaker, is an electrical wiring device or switch that disconnects or trip a circuit whenever it detects that the electric current is not balanced between the energized conductor (L) and the return neutral conductor (N). And then instantly disconnect the electricity flow in the connected circuits by operating in the safe mode automatically to avoid electric hazards.

CB (SP) = Single Pole Circuit Breakers

Circuit Breaker is a device like a fuse which makes and breaks the circuit. In other words, Circuit Breaker is a device which switch ON and OFF electric supply at normal and abnormal condition respectively. These are automatic protection devices in the Main Switch Board or Fuse-Box that switch off a circuit if they detect a fault. Circuit Breaker may be Single Pole (SP), DP-Double Pole (DP) and Triple Pole (TP). The size of the fuse and Circuit Breaker are similar to use, but Circuit Breaker is more safe to use as compared to fuses due to automatic operation as you can reset it again if it trips ever.

Description of LIVE, NEUTRAL & EARTH

1. Live Wire (Hot / Line)

- **Color (common):** Brown
- **Purpose:** Carries **current from the power source** (e.g., electrical grid) to the appliance.
- **Voltage:** Typically at **full mains voltage** (e.g., Single Phase 230V and 3-Phases in Singapore).
- **Safety Note:** This wire is **dangerous to touch** when powered, as it is energized.

2. Neutral Wire

- **Color (common):** Blue
- **Purpose:** Completes the **circuit by carrying current back** from the appliance to the power source.
- **Voltage:** Usually close to **0 volts** (but can still be dangerous if wiring is faulty or unbalanced).
- **Safety Note:** While it's not "live," it should still be treated with caution.

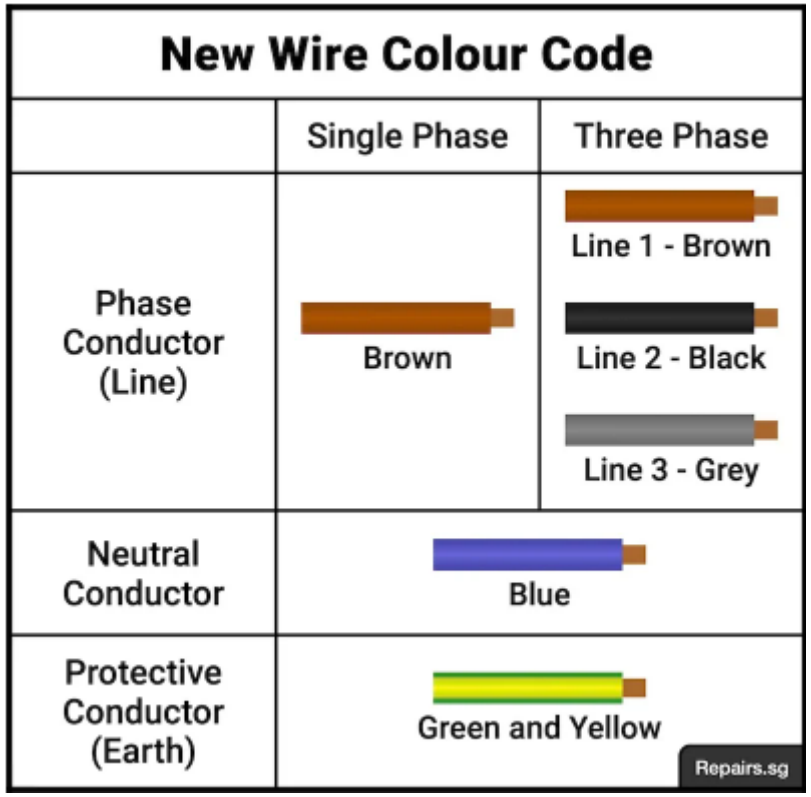
3. Earth Wire (Ground)

- **Color (common):** Green with yellow stripe
- **Purpose:** Provides a **safety path** for electrical current to flow to the ground in case of a fault (e.g., if the live wire touches a metal appliance body).
- **Voltage: Normally no voltage** unless there's a fault.
- **Safety Note:** Protects users from electric shock by triggering circuit breakers if a fault occurs.

Electrical Wire Colour Code in Singapore

Electrical wire colour codes allow us to understand the purpose of a wire in an electrical installation. In this article, our electrician will explain the colour codes for the live, neutral, and earth wires before and after the Energy Market Authority (EMA) moved Singapore to the new colour code on 1st March 2009.

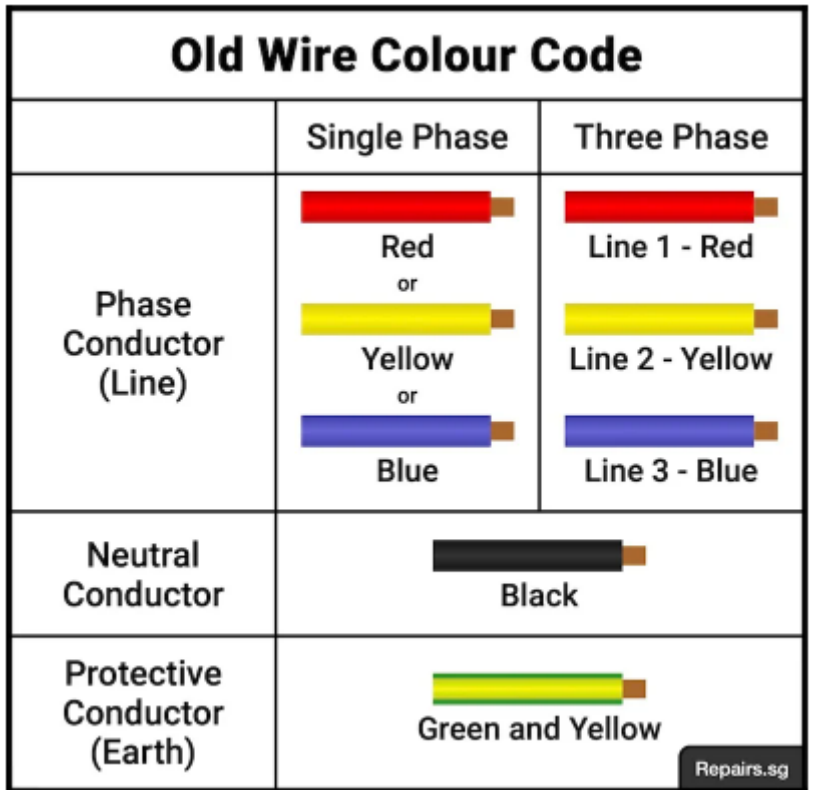
- **New Electrical Wire Colour Code in Singapore (after 2009)**



In a single-phase power supply, the electrical wire colour code in Singapore for the live wire is Brown, the neutral wire is Blue, and the earth wire is green and yellow.

In a three-phase power supply, the electrical wire colour code in Singapore for the live wire is Brown (L1), Black (L2), and Grey (L3). The neutral wire is Blue, and the earth wire is green and yellow.

Old Electrical Wire Colour Code in Singapore (before 2009)



In a single-phase power supply, the electrical wire colour code in Singapore for the live wire was Red, the neutral wire was Black, and the earth wire was green and yellow.

In a three-phase power supply, the electrical wire colour code in Singapore for the live wire was Red (L1), Yellow (L2), and Blue (L3). The neutral wire was Black, and the earth wire was green and yellow.

Why is there more than one colour code used on my property?

If you have a property built before 2009 that had electrical addition and alteration work done by an electrician after 2009, you may find a mix of the old and new colour codes in the property.

If the fixed electrical wiring on your property has multiple colour codes, you may find the following warning notice placed at your distribution board:

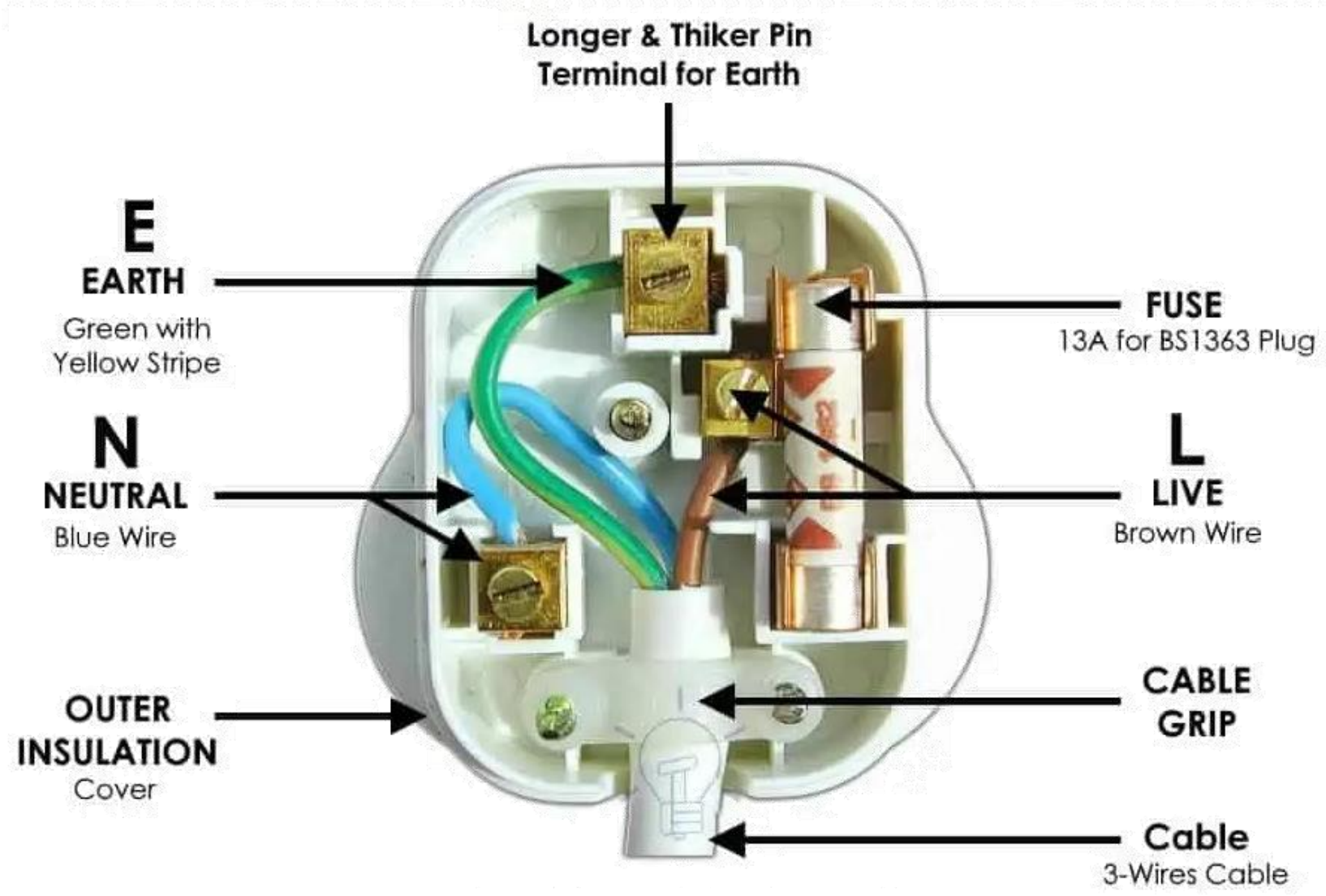


Does the colour code apply to cables for appliances?

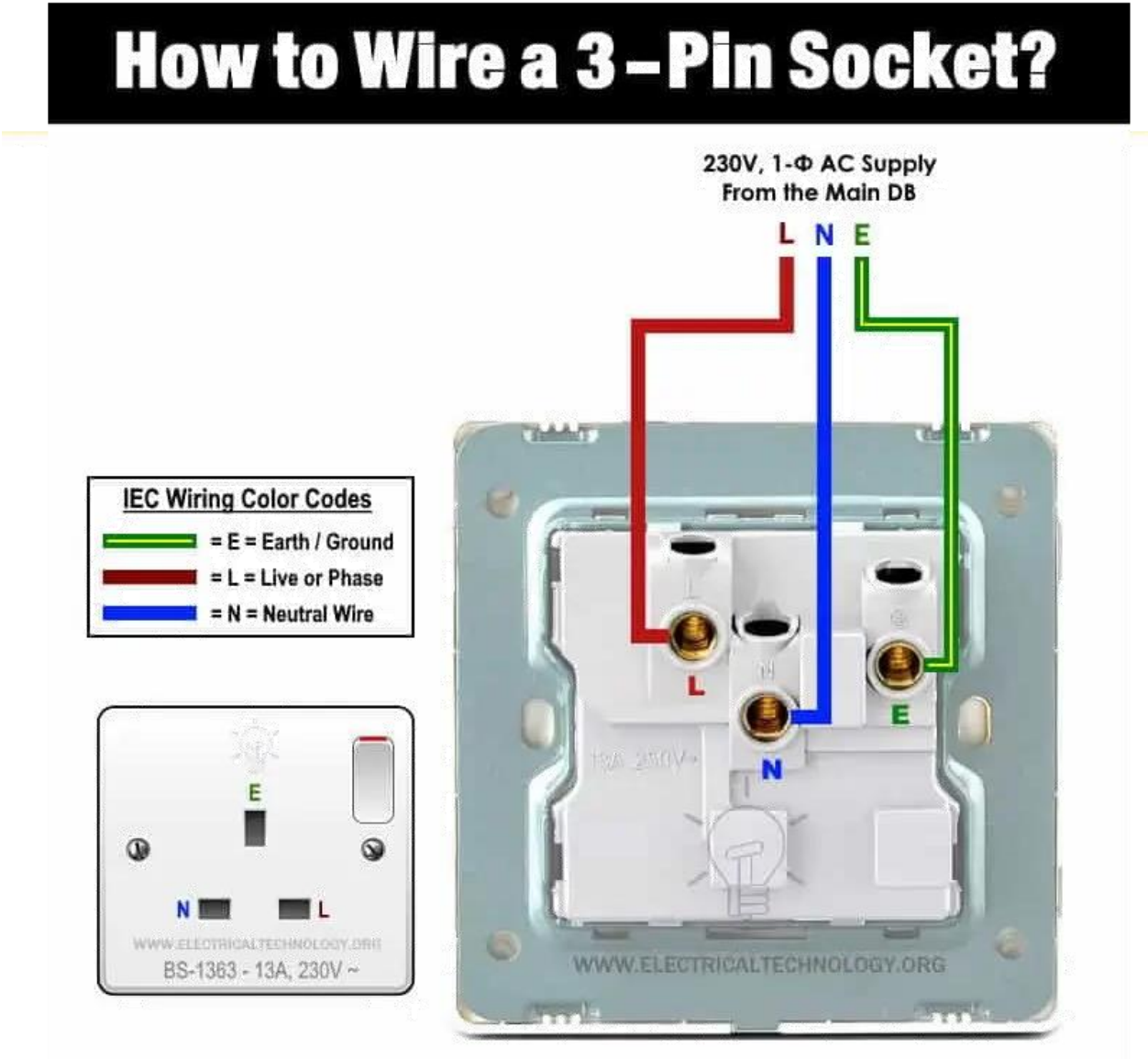
- The new colour code does not apply to flexible cables used to connect electrical appliances to a wall socket.

- You may find colours other than those listed in the colour code table above used for the wires in electrical appliances.

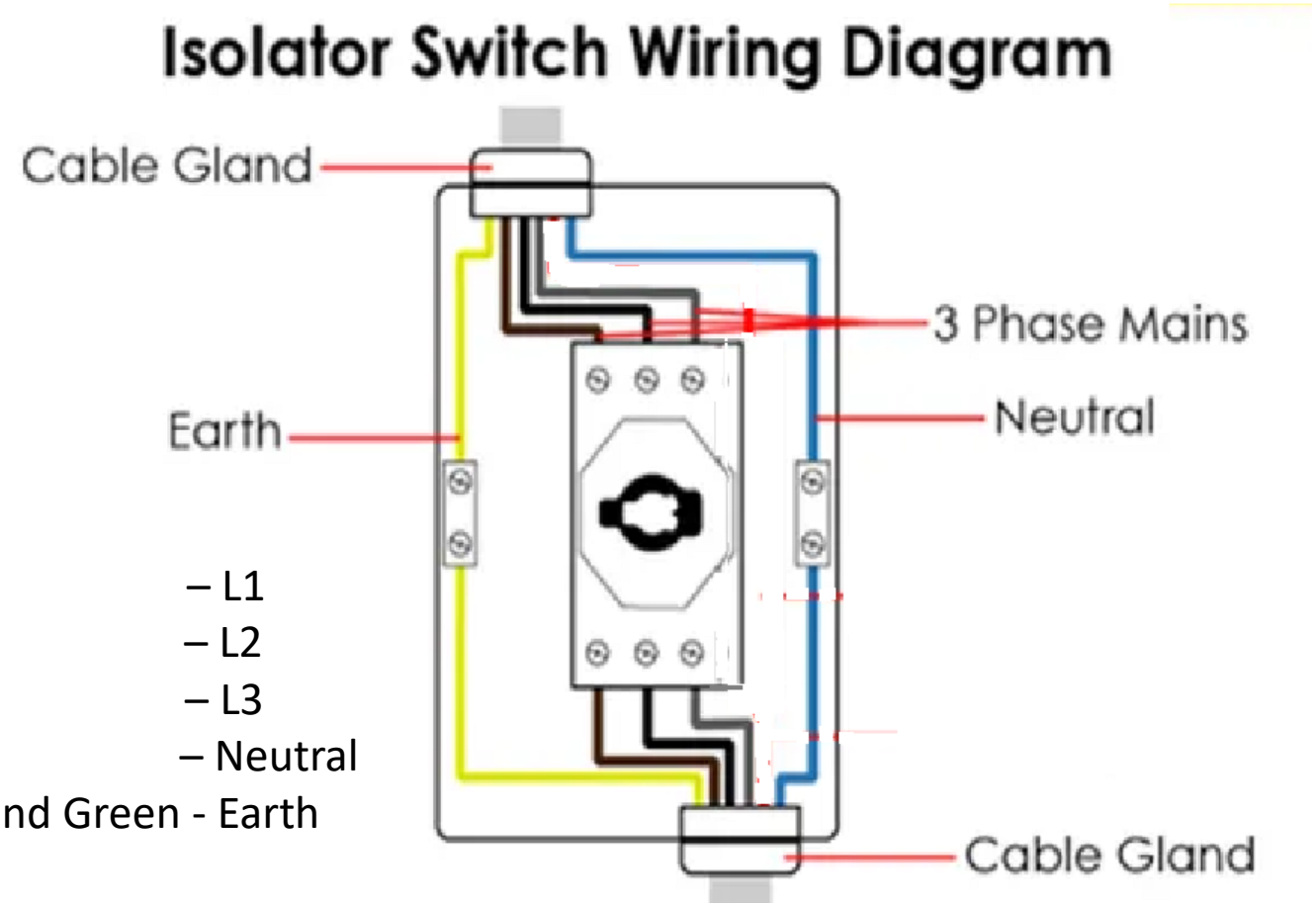
Learn correct connections for 3 Pin-Plug



Learn correct connections for 13A Socket Outlet

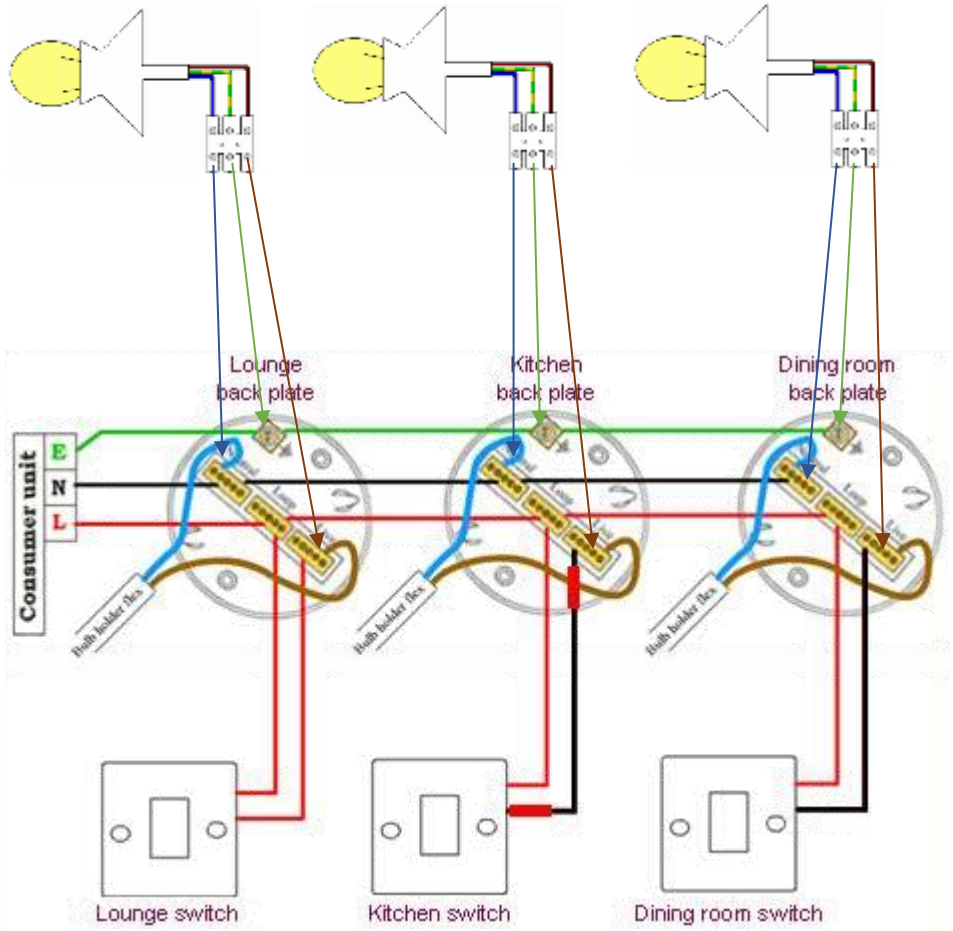


Learn correct connections for Isolator



Brown – L1
Black – L2
Grey – L3
Blue – Neutral
Yellow and Green - Earth

Learn correct connections for Lighting Fitting

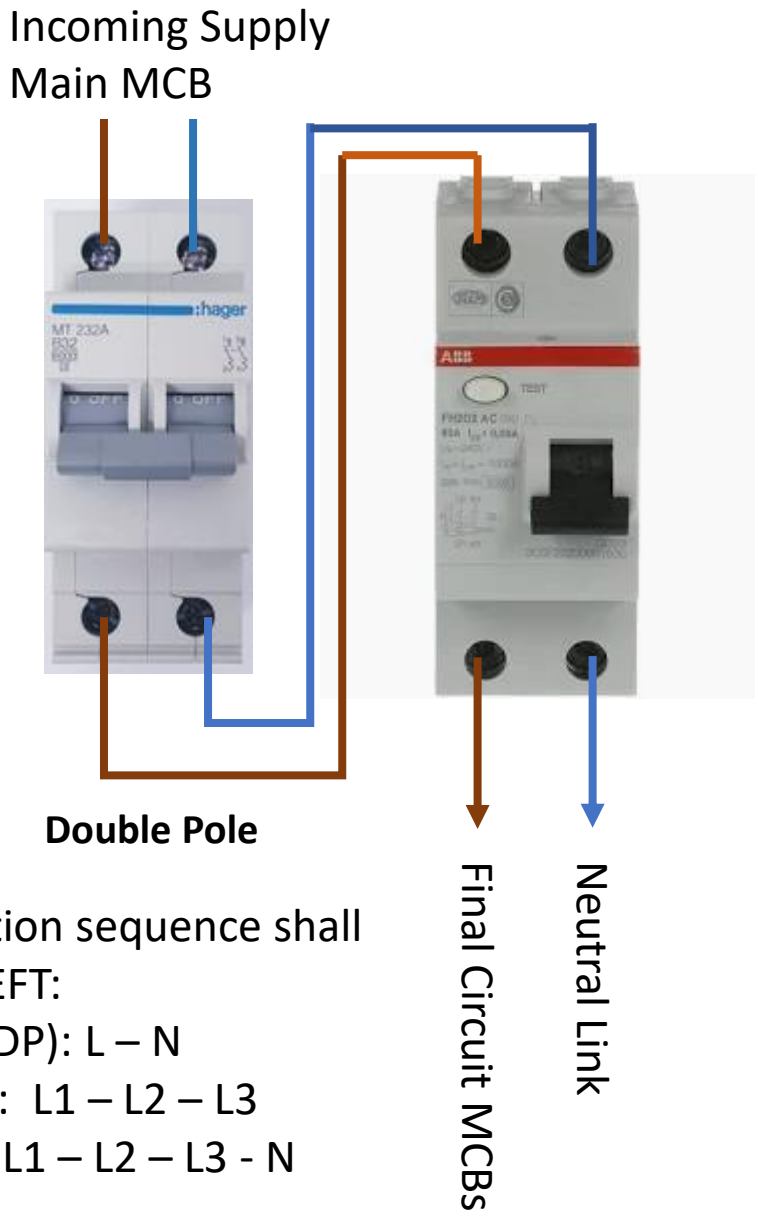


Lighting Fitting Wiring

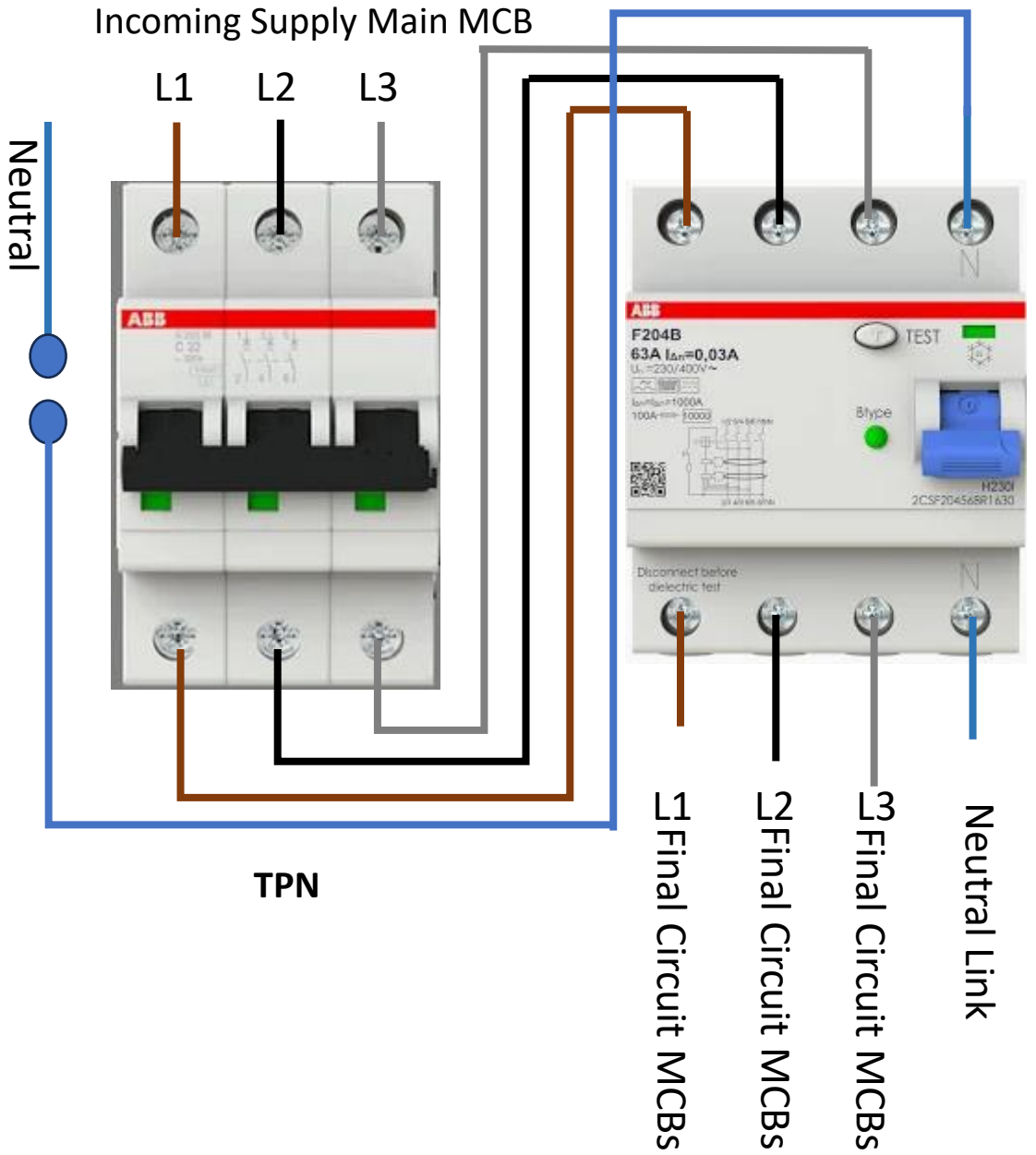
- Switch controls Live (Brown) wire
- Neutral (Blue) goes directly to the light fitting
- Earth wire connects to metal casing or terminal if present

Note: Use correct MCB rating usually 6A or 10A.

Understand MCB and RCCB wiring for single-phase and 3-phase systems



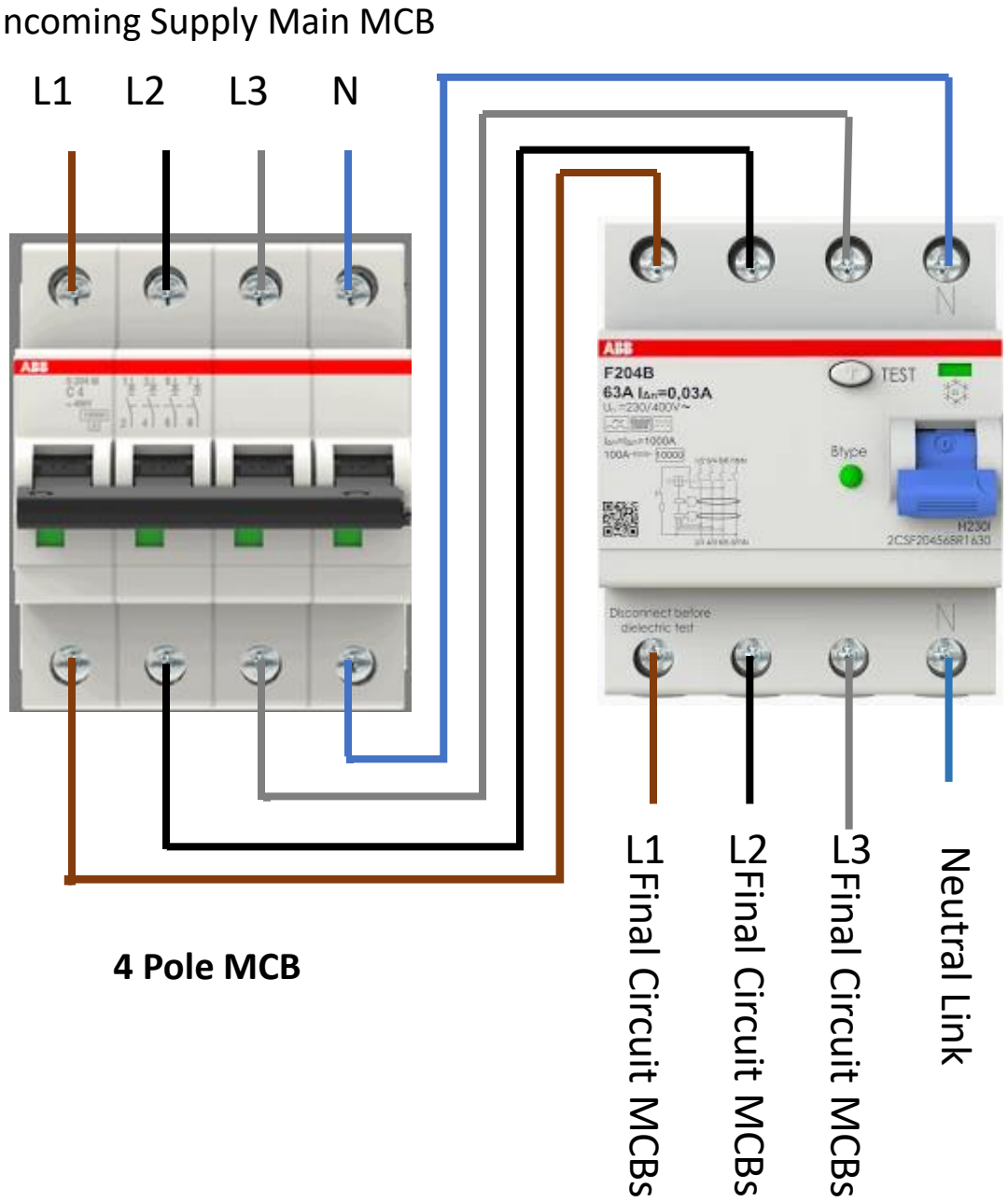
Double Pole



TPN

Note:
The cable connection sequence shall be started from LEFT:
For Single Phase (DP): L – N
For 3-Phase (TPN): L1 – L2 – L3
For 3-Phase (4P): L1 – L2 – L3 - N

Understand MCB and RCCB wiring for single-phase and 3-phase systems



4 Pole MCB

Note:
The cable connection sequence shall be started from LEFT:
For Single Phase (DP): L – N
For 3-Phase (TPN): L1 – L2 – L3
For 3-Phase (4P): L1 – L2 – L3 - N

Follow proper safety procedures before starting work

- Isolate the supply of Switchgear.
- Apply lockout and tag out to the Switchgear
- Use a proven voltage detector to confirm the Switchgear is dead.
- Display a warning sign to SG before starting work.
- Use the Insulation Resistance test to check the cable insulation before turning on.
- Supervision by a competent person

PPE: Safety shoes & electrical insulated rubber hand gloves.

Thank You