

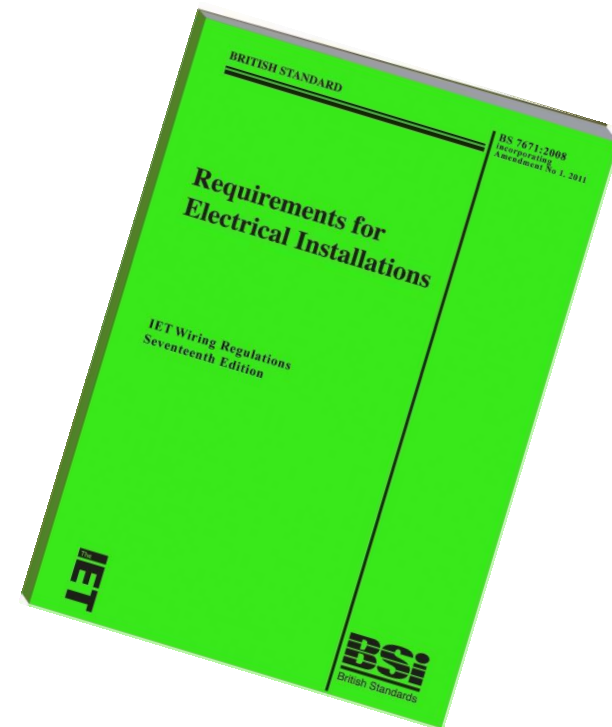
Unit 202: Electrical principles and processes for building services engineering

Outcome 1

Electrical supplies used in domestic plumbing services

Domestic electrics

- BS7671 (design installation and testing)
- The Electricity at Work Regulations
- IET Wiring Regulations 17th edition
- IET on-site guide
- Approved Document part P (Building Regulations)
- Manufacturer's instructions.



Domestic electrics

Low voltage:

- 230v single phase AC
- 110v single phase AC

Extra low voltage for safety:

- 24v DC
- 18v DC
- 12v DC

Domestic electrics

Under this regulation **you do not**, as a plumber, have to be Part P qualified to replace a like-for-like component, **unless** it is in a **danger zone**, when you need to be Part P registered.

For an installation, you need to be a fully qualified electrician.

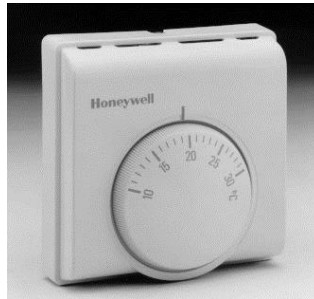
A danger zone is within a bathroom, kitchen or outhouse. If an airing cupboard door is on the landing, that is not a danger zone, but if it is in the bathroom, it is a danger zone. If the boiler is in the loft, it is fine; in the kitchen it is not. To replace parts on these items in these locations, you need to be a Part P qualified plumber.

Domestic electrics



Electricity is used in many plumbing situations:

- Pumps
- Showers
- Programmers
- Thermostats
- Immersion heaters
- Plugs/spurs
- Boilers
- Cookers



Domestic electrics

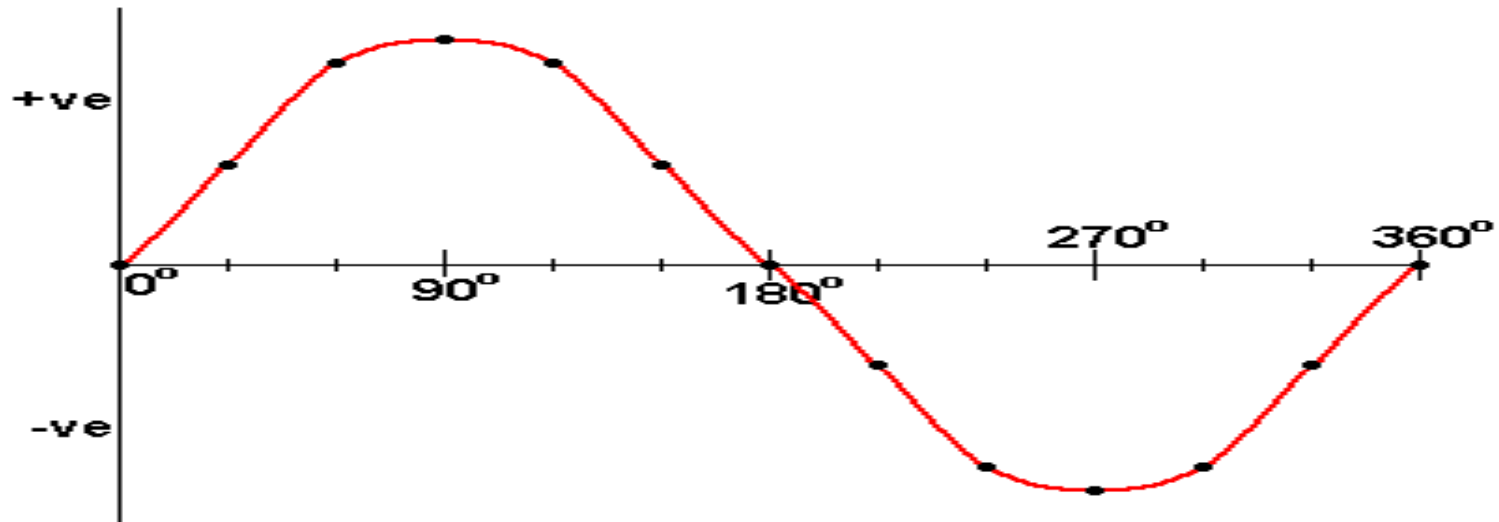
Electricity is a form of energy, and is produced in a variety of ways:

- Friction between materials can create static electricity
- Heat can produce electricity when applied to dissimilar metals; thermocouple
- Pressure acting on certain types of crystals; piezoelectric sparkers
- Coils being rotated within a magnetic field
- Generation of electricity by whichever means results in a flow of electrons which will travel along a conductor.

Domestic electrics

AC = alternating current = mains electricity
(electromagnetically)

www.sciencejoywagon.com/physicszone/otherpub/wfendt/generatoreng

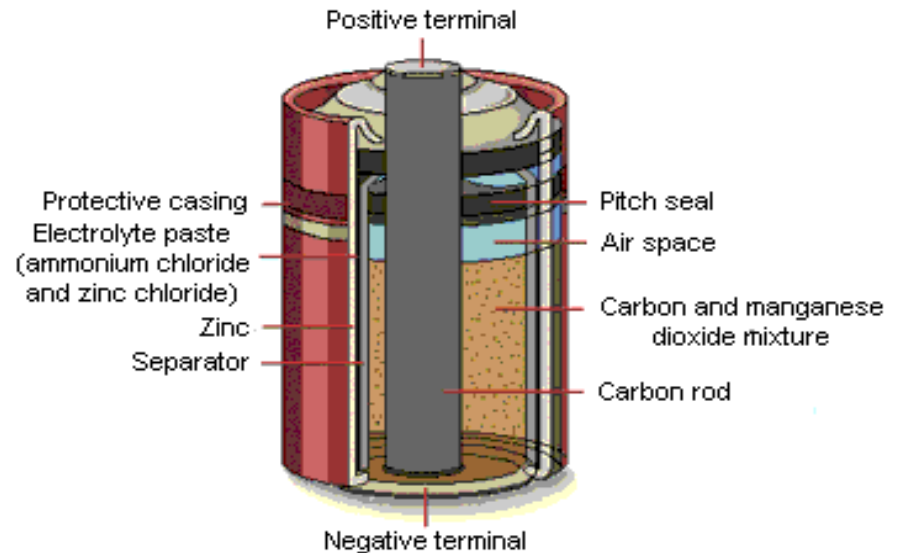
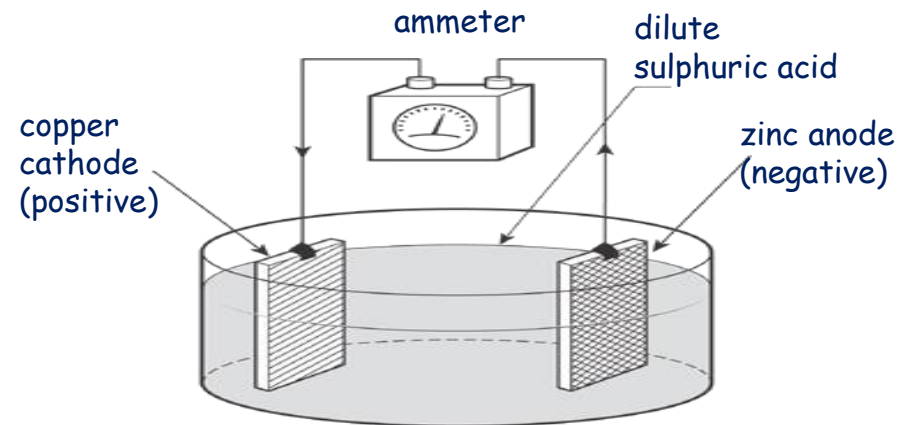


This shows the sinusoidal wave form
Hz = cycles per second = 50Hz in UK

Domestic electrics

DC = direct current = batteries (chemically)

- Dissimilar metals in a dilute acid solution
- Cathode eats away at the anode



Domestic electrics

In a domestic property:

- Sockets are 230v single phase AC
- Use a step-down transformer for 110v single phase AC
- May also use battery operated tools, which will be 24v, 18v or 12v DC.



240v



110v



Step down
transformer



Battery
operated

Domestic electrics

Dedham: Electrocuted builder's death was an accident
Father-of-three, Paul Hamlyn, 44, of Chase Road West in Great Bromley, was killed when he touched a live cable at a house in Forge Street, Dedham.

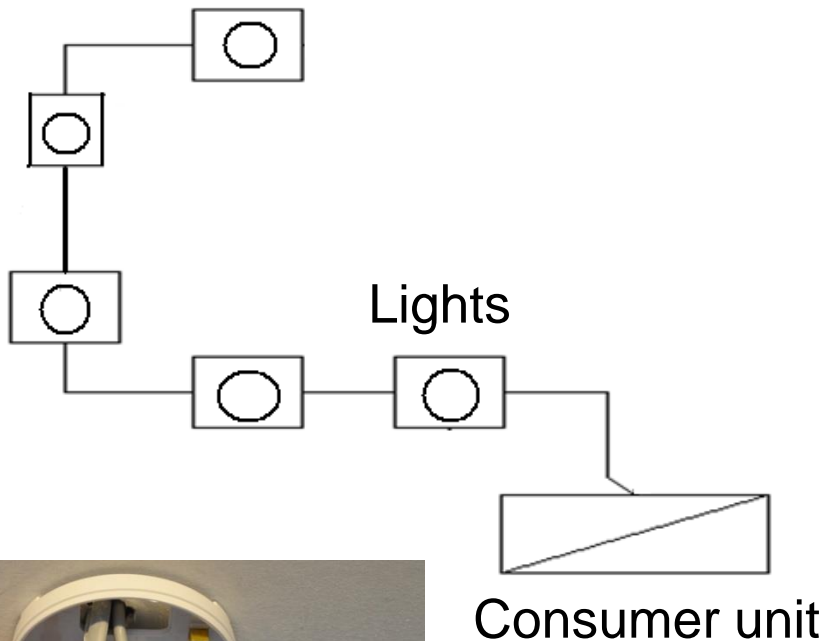
“We had the toilet macerator changed about six or eight weeks ago and the plumber had put it on a normal plug and not re-wired it back into the fuse box,” the customer said.

“Paul said he knew someone who could do any electrical work if it needed doing – I can't think why he moved the wire. I think he was reaching for his tool box.”

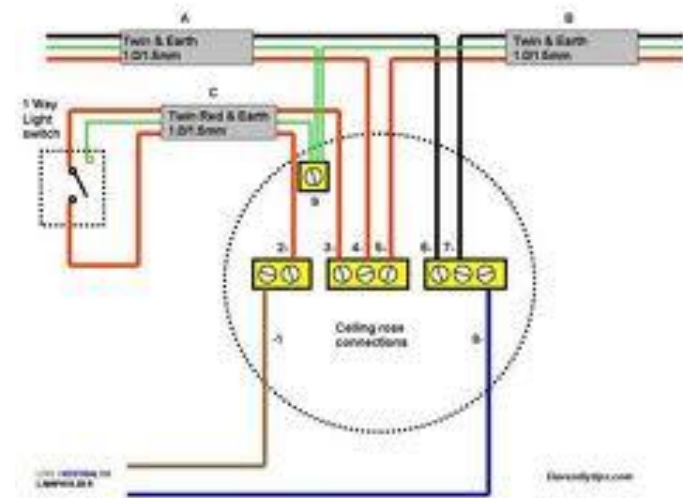
A post-mortem at Colchester General Hospital concluded that the victim had died of electrocution.

Domestic electrics

Lighting circuit:

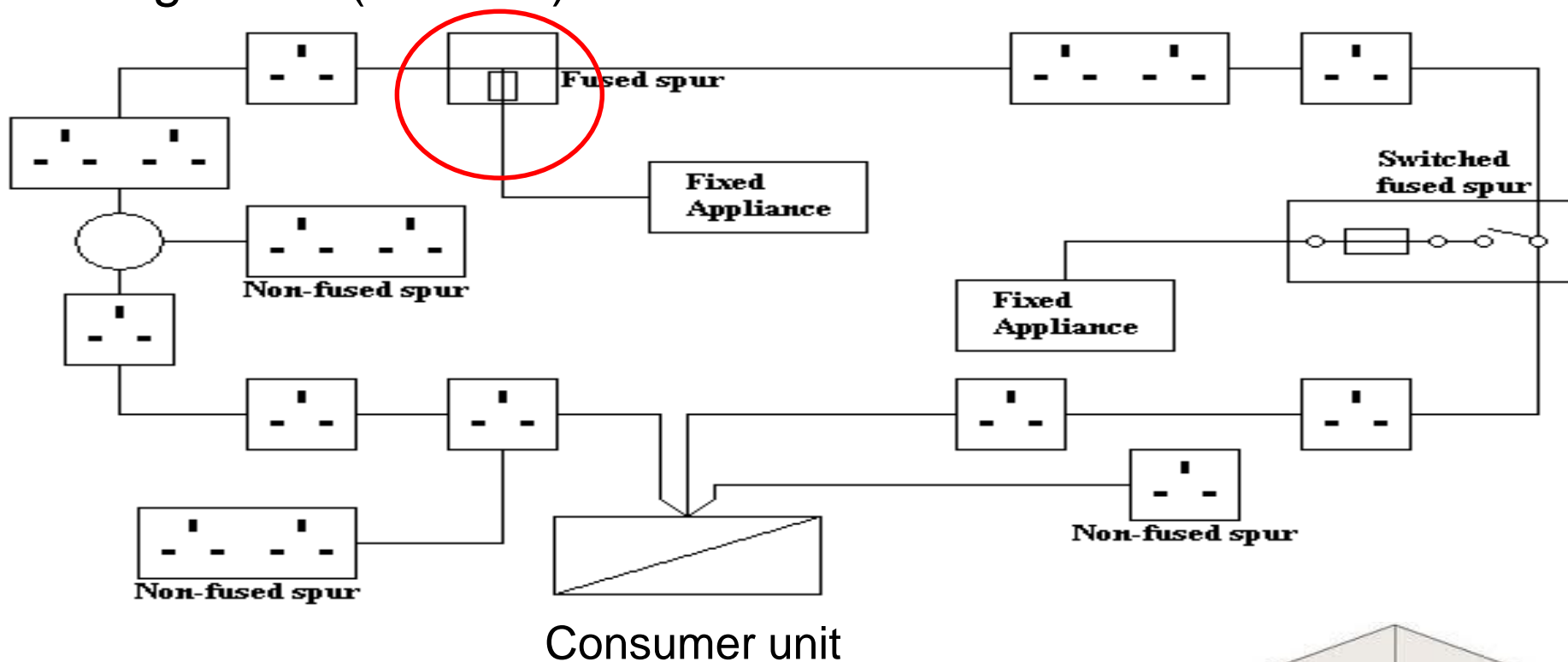


Radial circuit:
Be careful when
going into wall
and ceiling

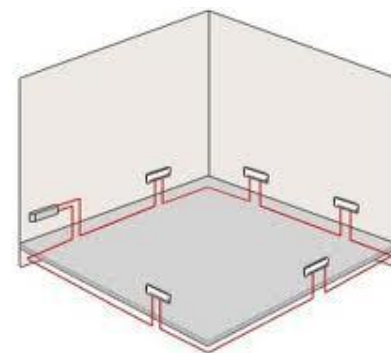


Domestic electrics

Ring main: (sockets)



Be careful when drilling into walls and floors.



Domestic electrics

Lighting circuit:

Radial circuit

1.5mm twin and earth

6 amp circuit protection

One circuit upstairs and one downstairs

Ring main:

Ring circuit

Sockets

2.5mm twin and earth

32 amp circuit protection (consumer

unit)

13 amp appliance protection (plug)

Domestic electrics

Minature circuit breaker (MCB)
protection of circuits



Lighting

Immersion

Water heater

Ring final

Cooker

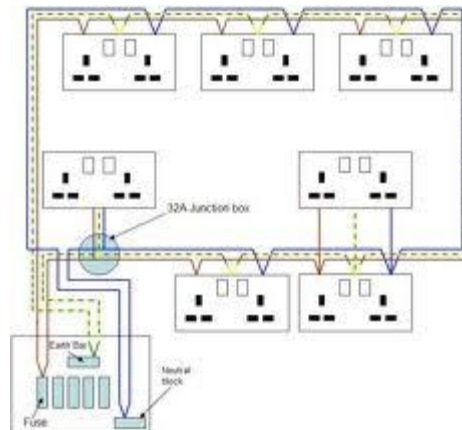
6 amp

16 amp

16 amp

32 amp

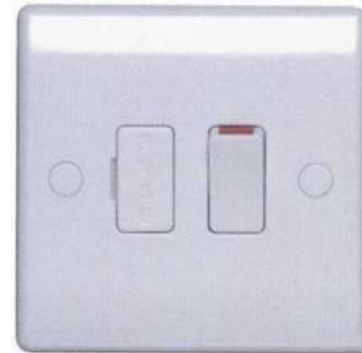
32A-45A (typically) amp



Domestic electrics

As plumbers, we are not allowed to interfere with either the ring final or lighting circuit.

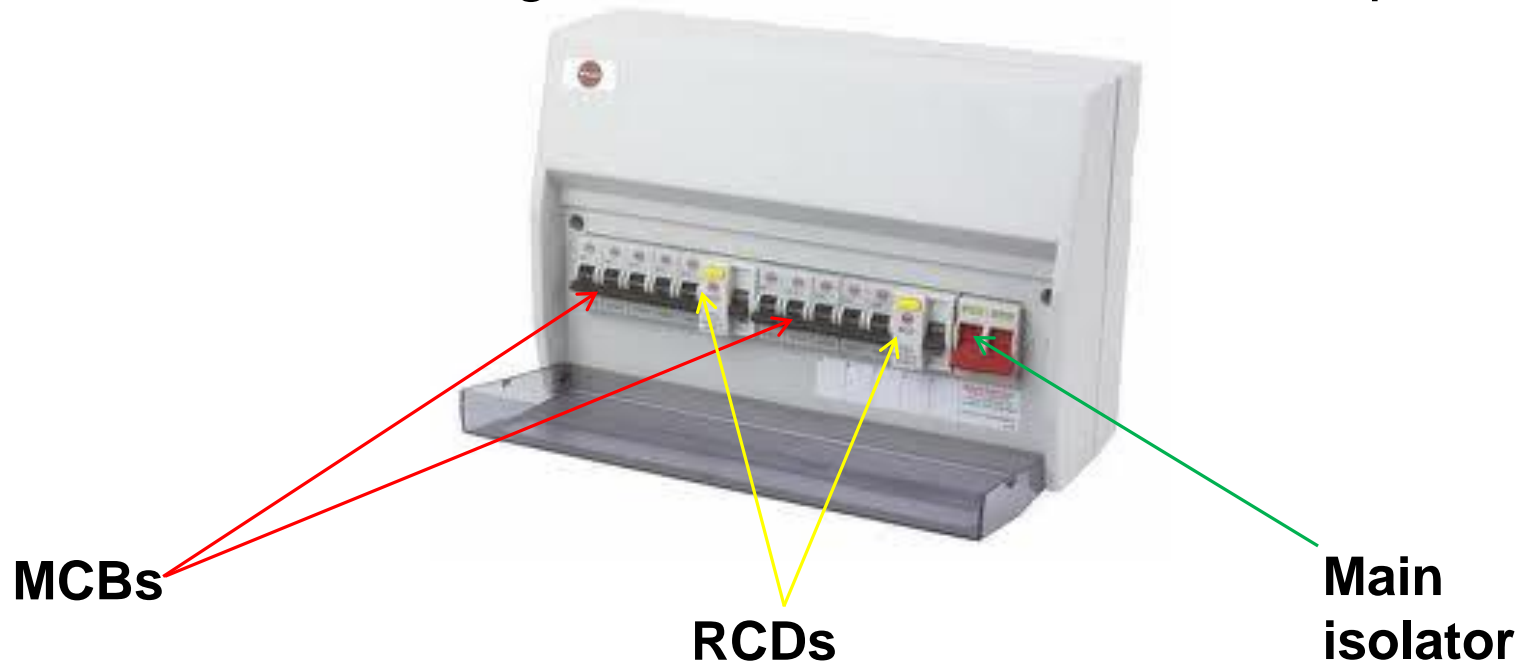
- Only a qualified electrician – competent person
- We can attach an appliance from a fused spur.



Domestic electrics

Consumer unit

- Found where the electrics enter the property
- Contains all MCBs, residual current device, RCDs and main isolator
- Where the single source is divided into multiple circuits.



Domestic electrics

Consumer unit

If an MCB needs replacing, the main isolator in the consumer unit would have to be isolated while an electrician replaced the item.

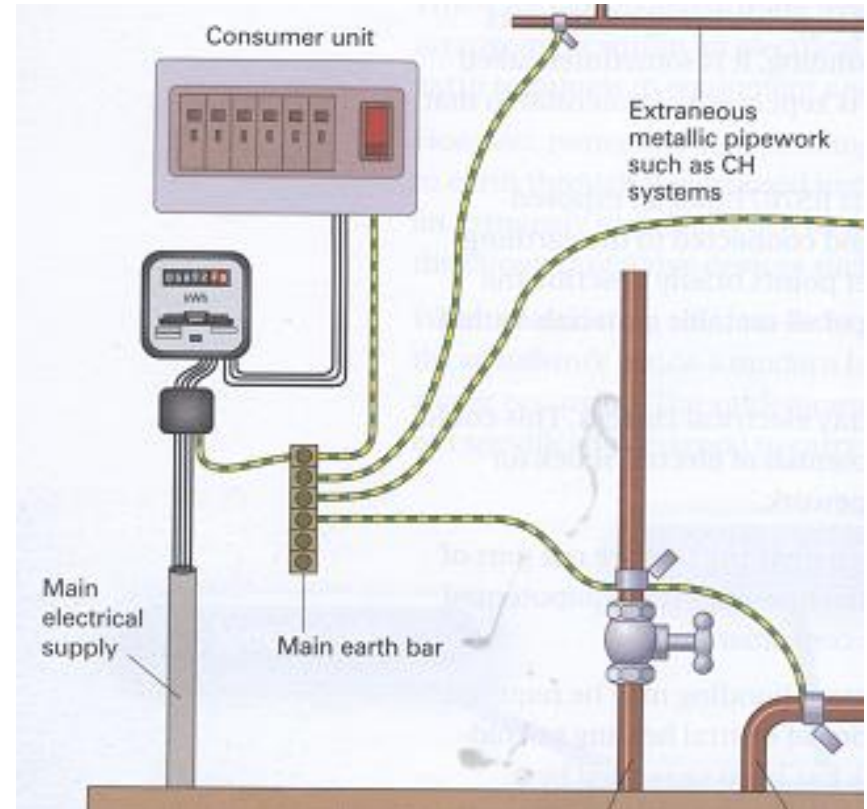


Domestic electrics

- Mains supply
- Suppliers fuse
- Meter
- Consumer unit
- Feeds the circuits

Earth bar

Up to the meter is the responsibility of the supplier. From the meter tails onward is the responsibility of homeowner.



Domestic electrics

Central heating S plan

Wire in from switched fused spur:

- Programmer
- Cylinder thermostat
- Room thermostat
- Boiler
- Pump
- 2 x two port valves



Domestic electrics

Central heating Y plan

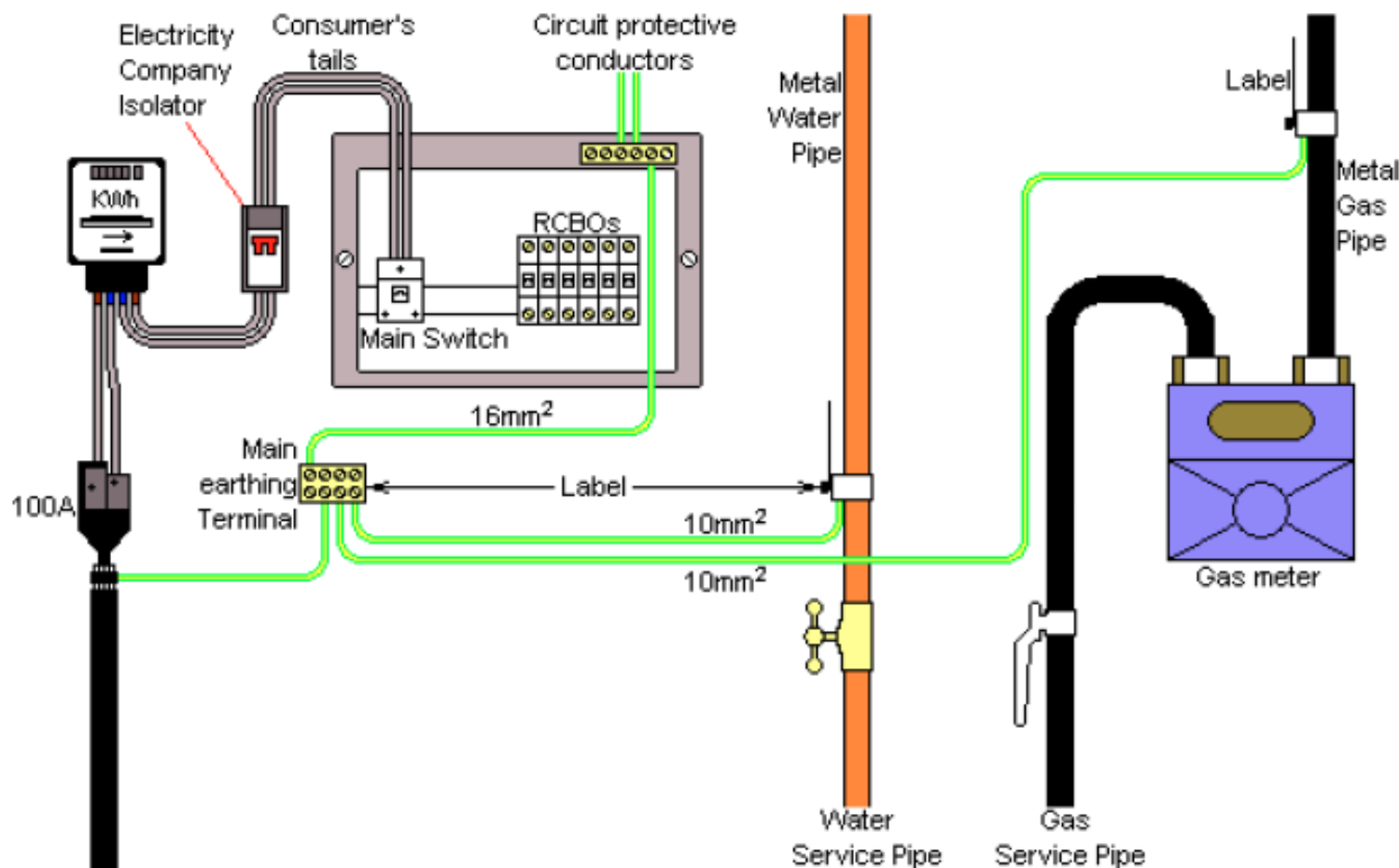
Wire in from switched fused spur:

- Programmer
- Cylinder thermostat
- Room thermostat
- Boiler
- Pump
- 1 x three port valve



Domestic electrics

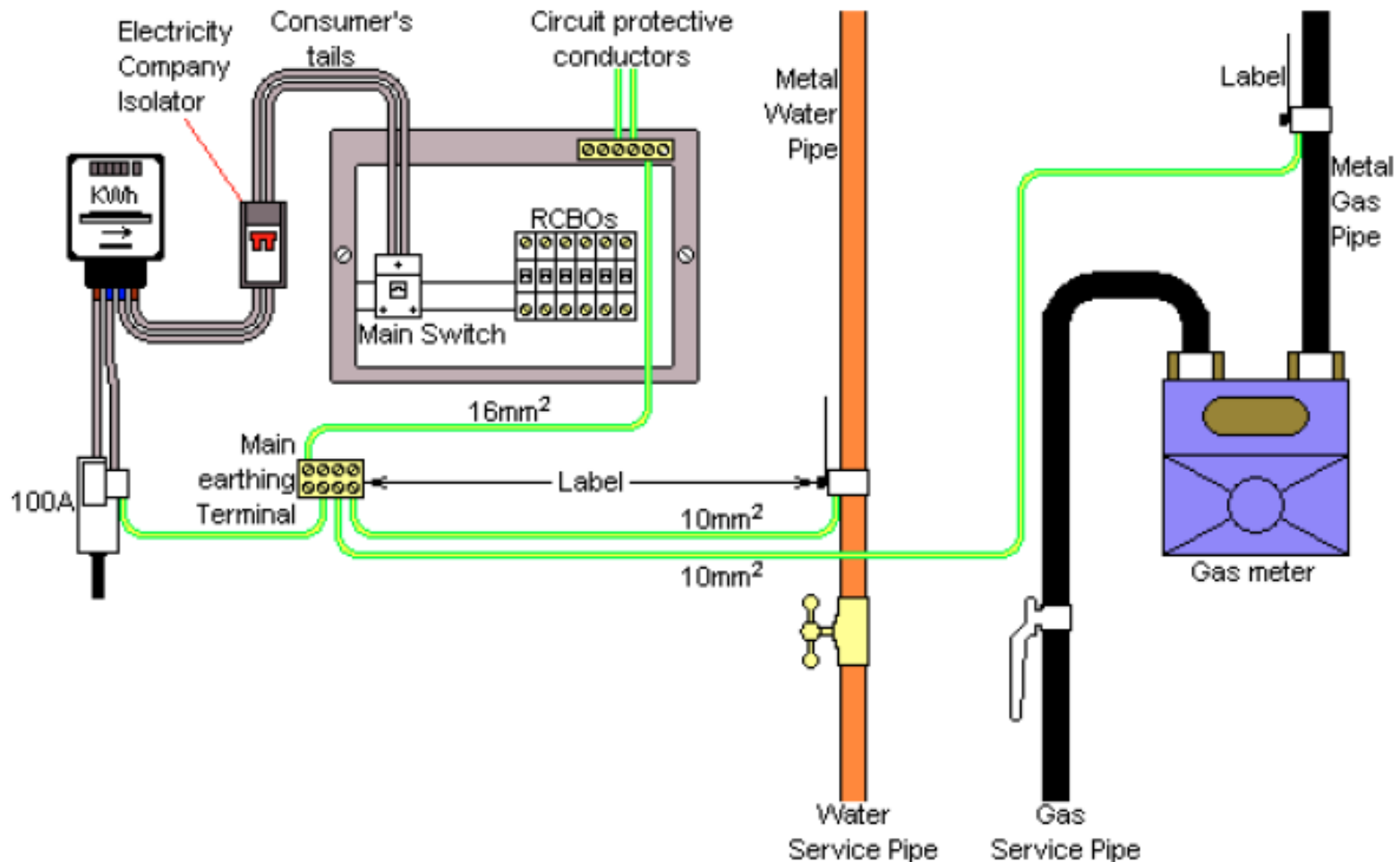
Earthing to keep us safe from electric shocks:
TNS from armoured cable



Domestic electrics

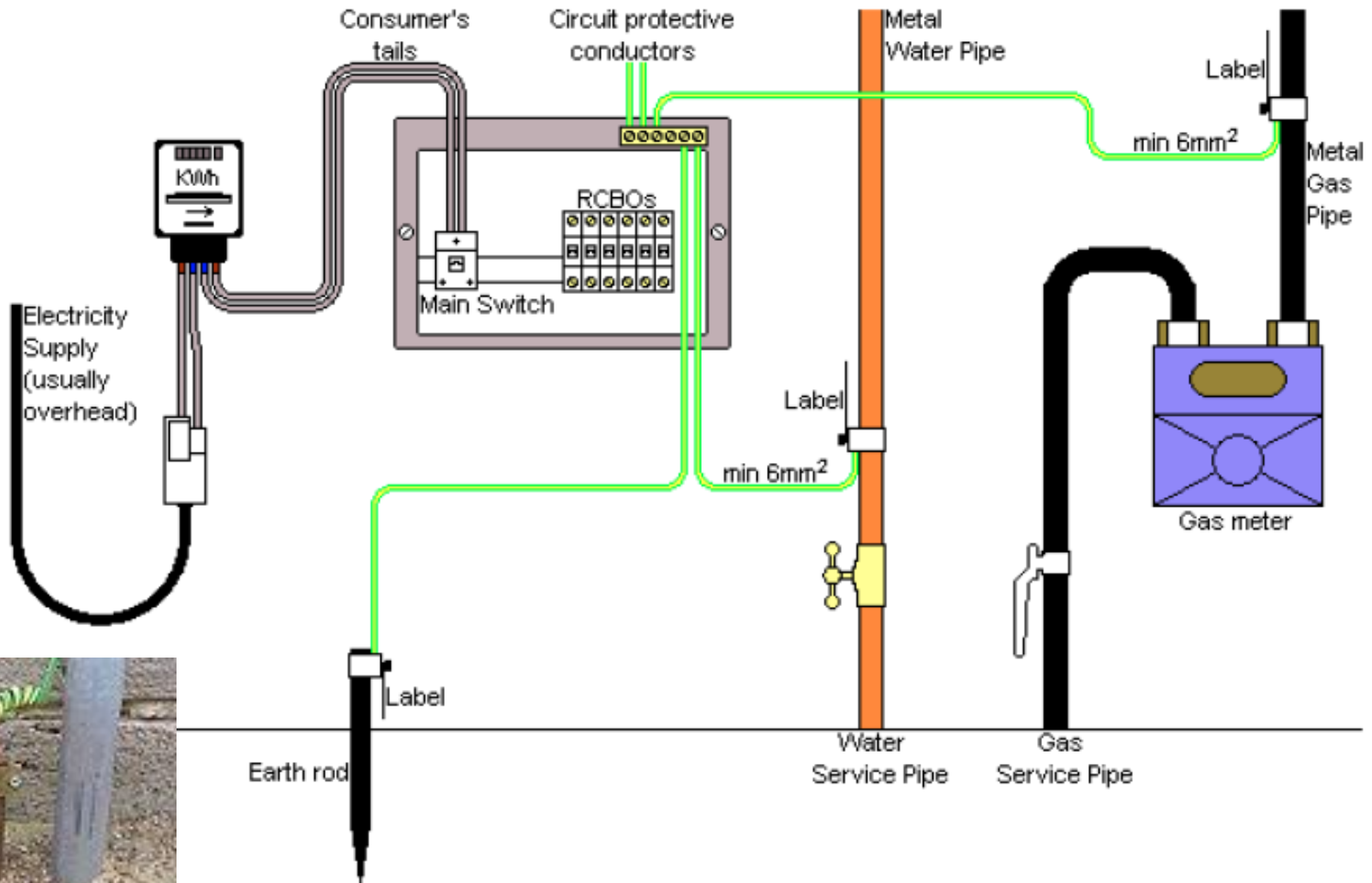
Earthing to keep us safe from electric shocks:

TNCS from neutral



Domestic electrics

Earthing to keep us safe from electric shocks:
TT from earth rod or electrode



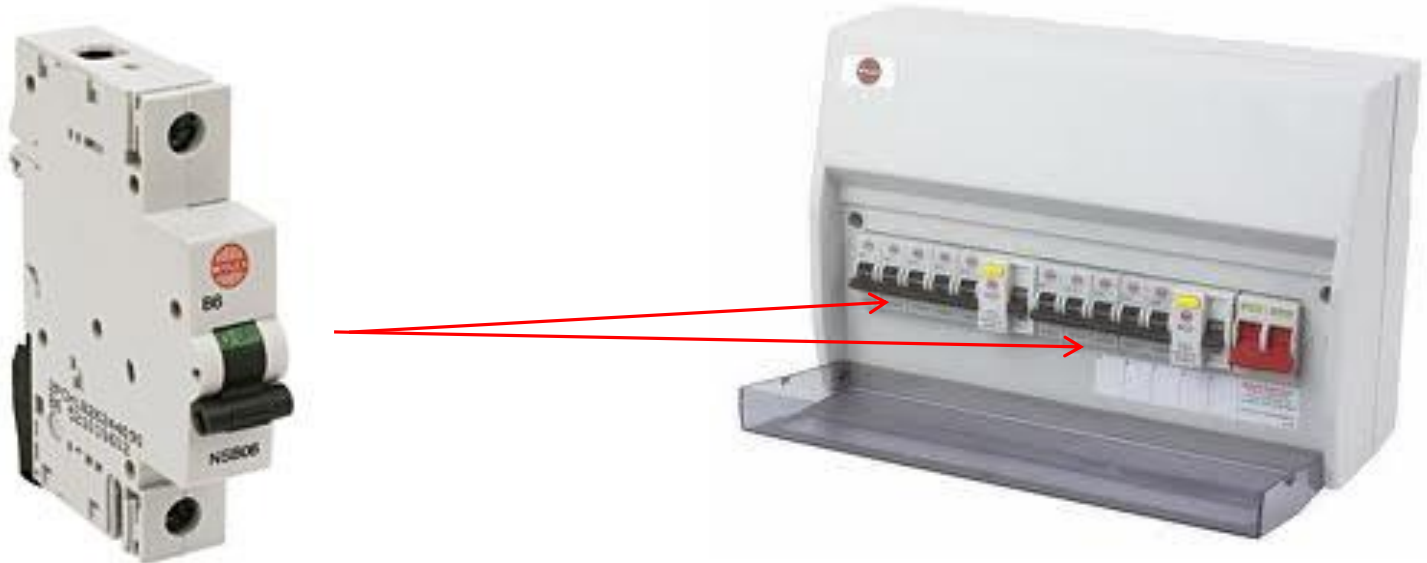
Domestic electrics

- Correct earthing is very important, as the majority of electric shocks and electrocutions are due to incorrect earths or earthing faults
- Any problems should always be reported to the customer.

Domestic electrics

Miniature circuit breakers (MCB):

- Found in the consumer unit and protect one appliance or circuit
- Trip out if an overload is detected.



Domestic electrics

Residual circuit breakers (RCD):

- Found in modern consumer units
- Trip out if there is an earth fault (test and re-set switch)
- Plug-in RCDs should be used with 230v tools.



Trip at 30ma



Domestic electrics

Residual current breaker with overload (RCBO):

- This is located in the consumer unit and contains the MCB and RCD for one appliance or circuit
- Can be used to bring older circuits up to current standards.



Domestic electrics

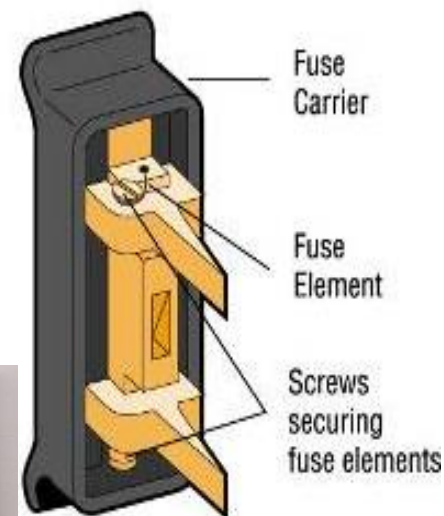
Fuses and MCBs are there to protect the circuit and appliance. If an appliance or circuit is overloaded, the insulation in the cable is the first item to get damaged and possibly burnt.

The fuse inside a fused spur will protect the cable and appliance.

Any visual faults need to be reported to the homeowner or your supervisor for them to make a decision.

Domestic electrics

- Cartridge fuses are the older type of circuit protection and are re-wireable
- Plug tops have cartridge fuses inside.



Domestic electrics

- All circuits and appliances **must** be protected by the use of a fuse or MCB. Modern regulations also require the use of an RCD
- Every circuit and appliance **must** also have a means of isolation
- Permanent de-commissioning is done at consumer unit
- Temporary de-commissioning can be done at appliance.

