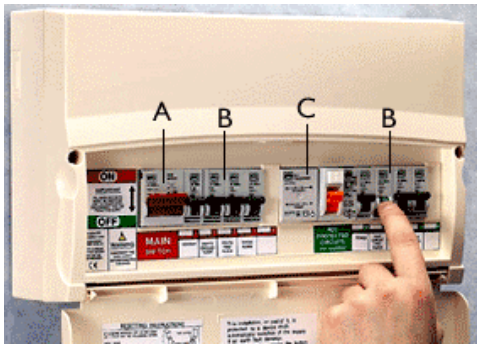
Mains Wiring

(Ref.:ww\Kbase\Mains)

Consumer Unit (Fuse Box)



A consumer unit is the "fuse box" which goes between the electricity meter and all the electrical circuits in the house.

Nowadays units use MCBs (Miniature Circuit Breakers) instead of fuses which “trip” if a circuit shorts or is overloaded.

Consumer Units often also contain an extra protective device called an RCD (Residual Current Device) or ELCB (Earth Leakage Circuit Breaker). These devices trip if there is a insulation fault allowing current to “leak to earth”.

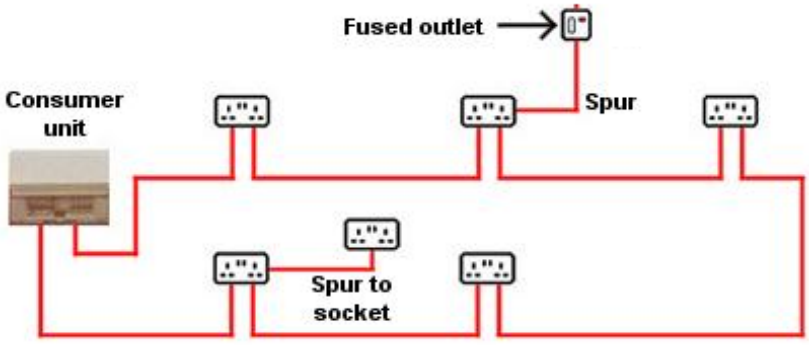
A= Main Switch, B= MCBs, C= RCD protecting the circuits to its right.

Ring circuits

In the UK thirteen amp sockets are normally connected to a ring main. The is made by a cable going from the consumer unit (fuse box) to the first socket, then on to the second socket and then the next socket etc. until the cable returns to the consumer unit. The cable used for ring circuits is usually 2.5 mm^2 twin and earth.

Each ring circuit is protected by a 32 ampere trip or in older systems a 30 ampere fuse fitted in the consumer unit. Modern installations incorporate a Residual Current Device (RCD) before the consumer unit which trips the whole system off if a fault is detected.

A ring circuit is considered to be rated at 30amperes (7200 watts). A ring may serve up to 100 square metres of floor area and, in theory, may have any number of sockets outlets or fused connection units connected to it. Normally there is a limit of twenty outlets per ring. It is unlikely that the variety of domestic appliances being used at any one time will exceed 30 amperes.
The length of cable used in a ring circuit is limited to 50 metres



It is advisable to have at least two ring circuit in all premises. The kitchen may have a large number of electrical high load appliances so a separate ring circuit for the kitchen may also worthwhile.

Spurs off the ring

A spur is a socket connected into the ring by a single cable run from the ring. A spur extension can be connected to the ring circuit provided that it supplies no more than two 13 amp socket outlets. Over the whole ring, the total number of spurs must not exceed the number of socket outlets directly on the main ring. No more than two separate spurs may be connected from each outlet on the ring.

Where connection to a fixed appliance is required, a fused spur unit may be connected into the ring main (instead of using a plug socket) . These outlets require the correct fuse rating for the appliance and are connected to the appliance by a cable or flex. The outlet may be switched or unswitched and may be fitted with an indicator light to show when the supply is connected.

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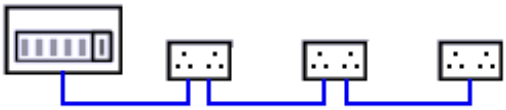
Radial Circuits

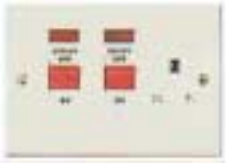
In a radial final sub-circuit supplying socket outlets, the cable originates from the consumer unit and is wired, daisy chain fashion, from socket to socket terminating at the last socket on the run.



Cookers

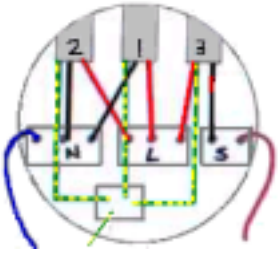
High power electrical appliances (such as cookers, showers etc.) should not be connected to a ring main even if they use less current that the 30 amp rating of the ring circuit.

Such appliances will have their own dedicated connection to the consumer unit. A local isolation switch must be provided near the appliance.



Lighting Circuits

Lighting circuits are usually wired with 1 mm^2. cable, one circuit may serve up to 1200 Watts (12 X 100 Watt lamps) and must not exceed 95 m of cable length measured without the switch length. However, where there are long cable lengths, use 1.5 mm sq. cable instead which allows a maximum cable length of 110 m. The fuse rating for these circuits is 5 amperes with ordinary fuses or 6 amperes with MCBs.



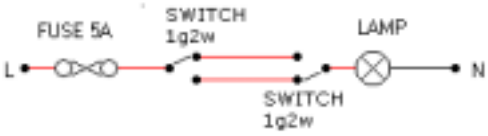
The diagram shows a modern ceiling rose with the cable marked “1” coming from the supply and cable “2” taking the supply to the next light.

The cable marked “3” goes to the switch. The red core is the live feed to the switch and the black core is the live return from the switch. This black core must be sleeved with a red marker to indicate that is the live return.

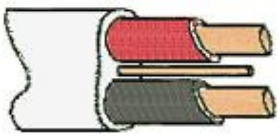
The flexible cables shown going to the bottom of the diagram connect to the bulb holder.

To the right is a diagram of the “two-way” switch circuit.

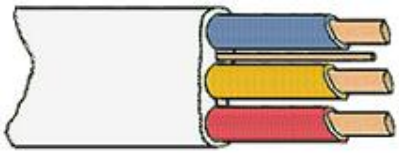
Switch either switch will toggle the light on or off.



Cables



Twin and earth available in many diameters.



Three core and earth used for multi-way switching etc.

The colours used for fixed wiring are Red for Live and Black for Neutral. The earth wire in not insulated but is covered with green and yellow sleeving where the cable is terminated.

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