



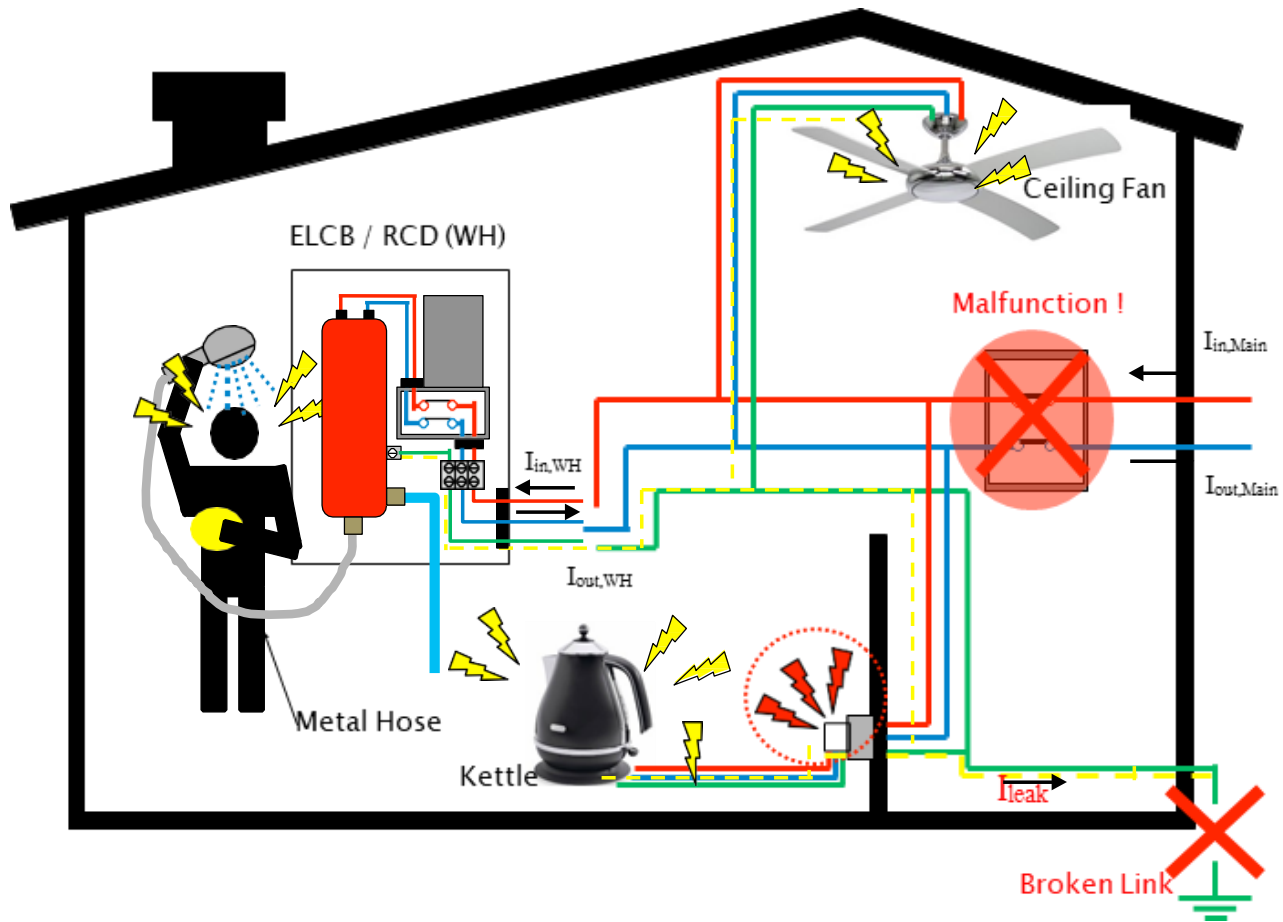
KNOWLEDGE SHARING **INSTALLATION & MAINTENANCE OF** **WATER HEATER FOR DOMESTIC USED** **BY** **MOHD FAIROS BIN ABU BAKAR** **MAKMAL PENYELIDIKAN ELEKTRIK**

STATISTIC

- **Reported cases within past 7 years (by ST) :**
 - All main RCD not functioning
 - All cannot find fault in the water heater, including built-in RCD
 - 1 case with undersize incoming cable
 - Were dead holding on to the shower head
 - Has burnt hand and/or body parts
 - **The rest all has electrified earth wire, leakage from somewhere else, killed through water heater**



EARTHING & RCD FUNCTIONS



**Broken Earth + RCD
malfunction + Metallic
hose
= SURE DIE!**

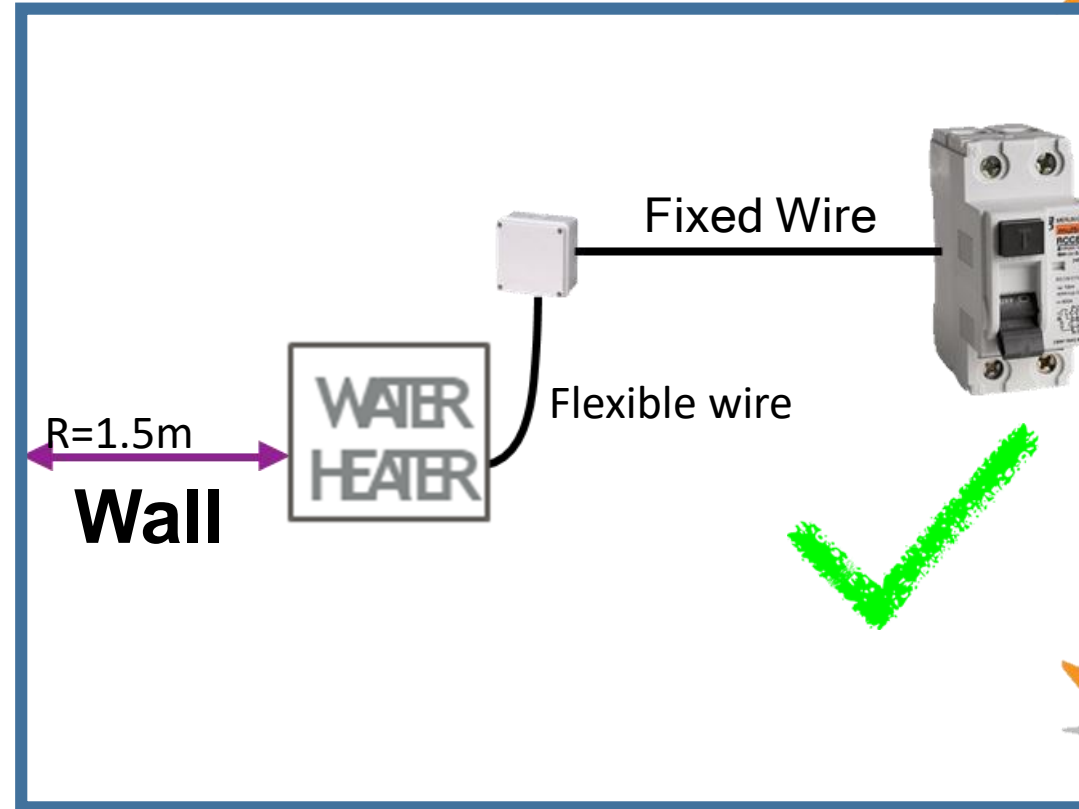
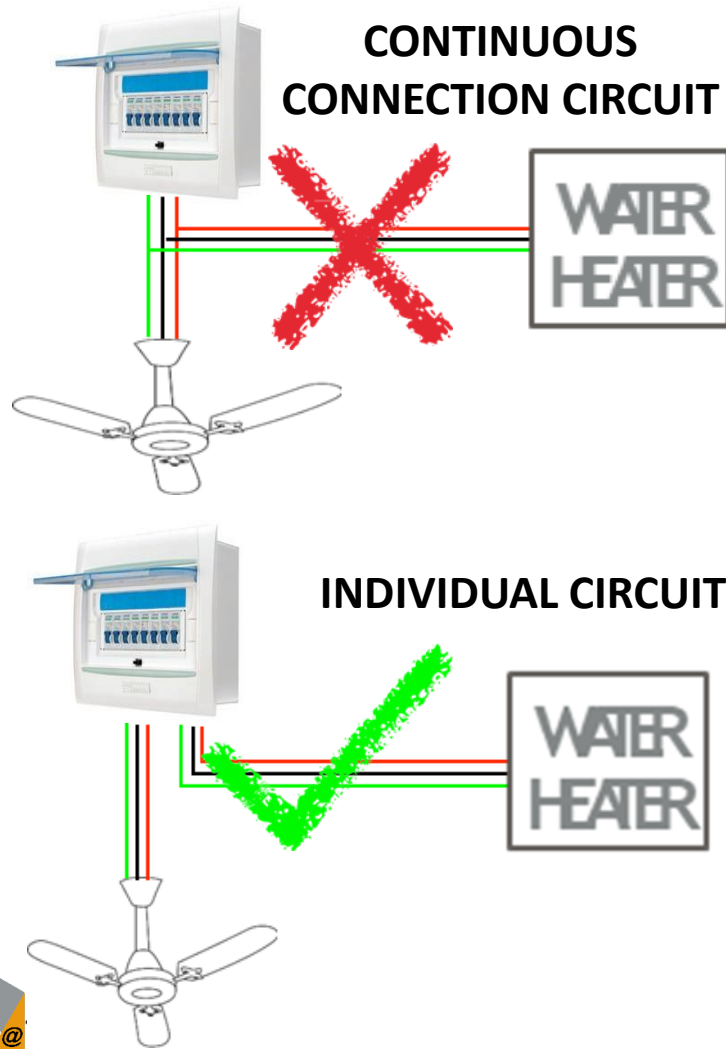
CABLE SIZING

MCB & Cable Size

Water Heater Rating @ 230V	Load	MCB / RCD (Min)	Live	Neutral	Earth
$\leq 2,856 \text{ W}$	12.4 A	16A	4mm ²	4mm ²	4mm ²
$> 2,856 \text{ W to } \leq 3,570 \text{ W}$	15.5 A	20A	4mm ²	4mm ²	4mm ²
$> 3,570 \text{ W to } \leq 4,462 \text{ W}$	19.4 A	25A	4mm ²	4mm ²	4mm ²
$> 4,462 \text{ W to } \leq 5,711 \text{ W}$	24.8 A	32A	4mm ²	4mm ²	4mm ²
$> 5,711 \text{ W to } \leq 7,139 \text{ W}$	31 A	40A	6mm ²	6mm ²	6mm ²
$> 7,139 \text{ W to } \leq 8,924 \text{ W}$	38.8 A	50A	10mm ²	10mm ²	10mm ²

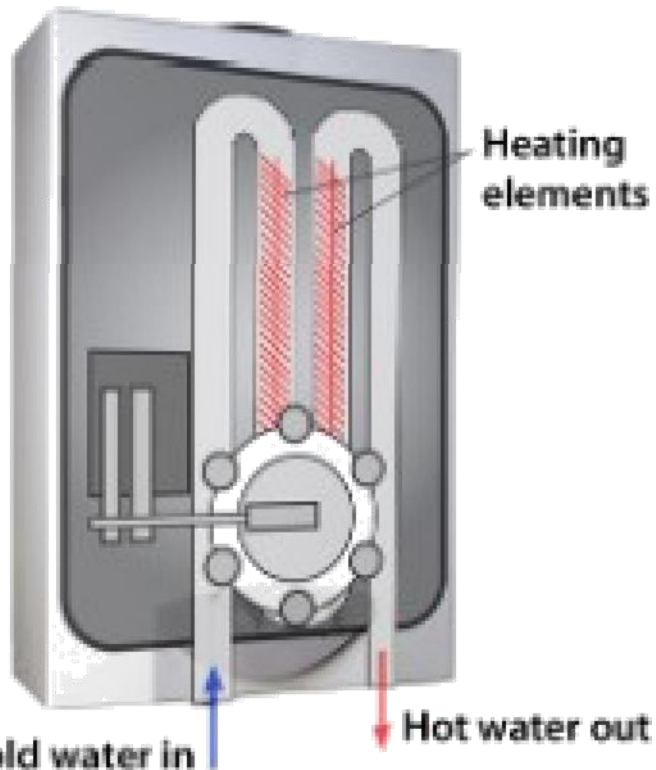


CABLE CONNECTION

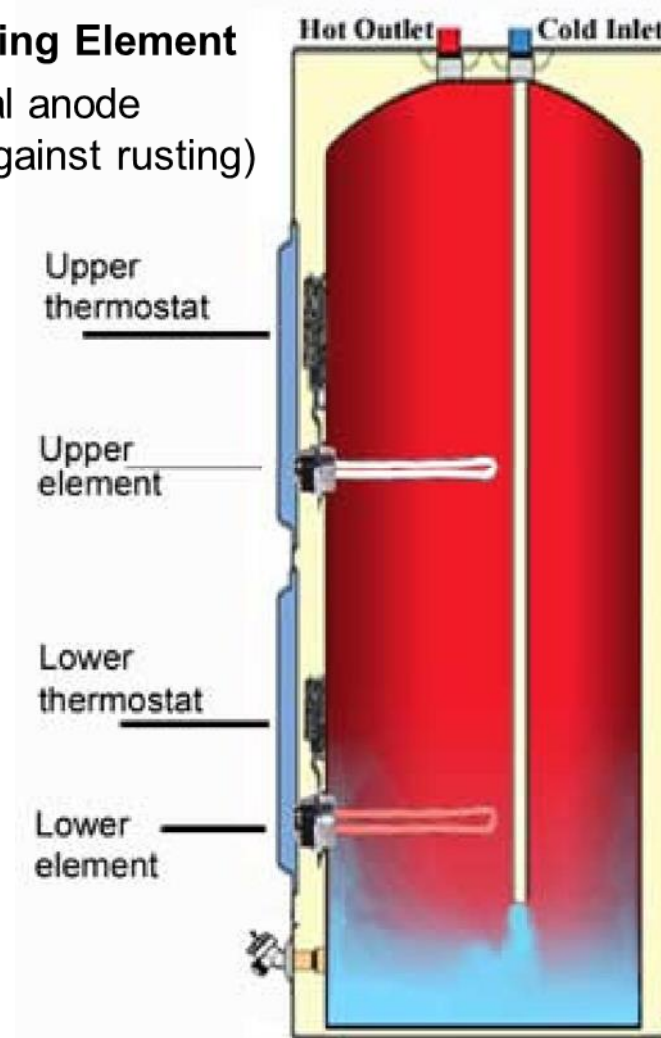


TYPES OF DOMESTIC WATER HEATER

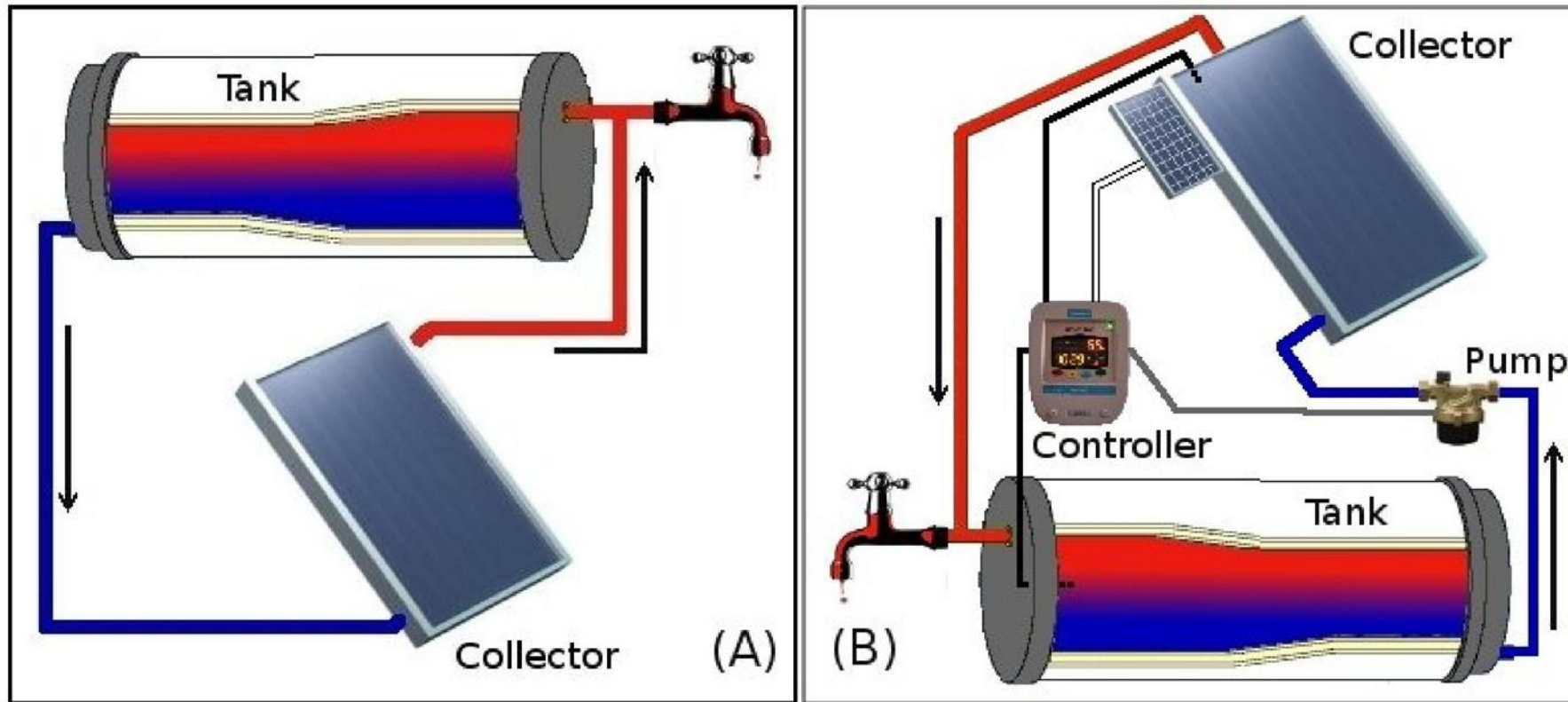
Single Element



Double heating Element
with sacrificial anode
(protection against rusting)



TYPES OF DOMESTIC WATER HEATER



Passive solar collector

Active solar collector



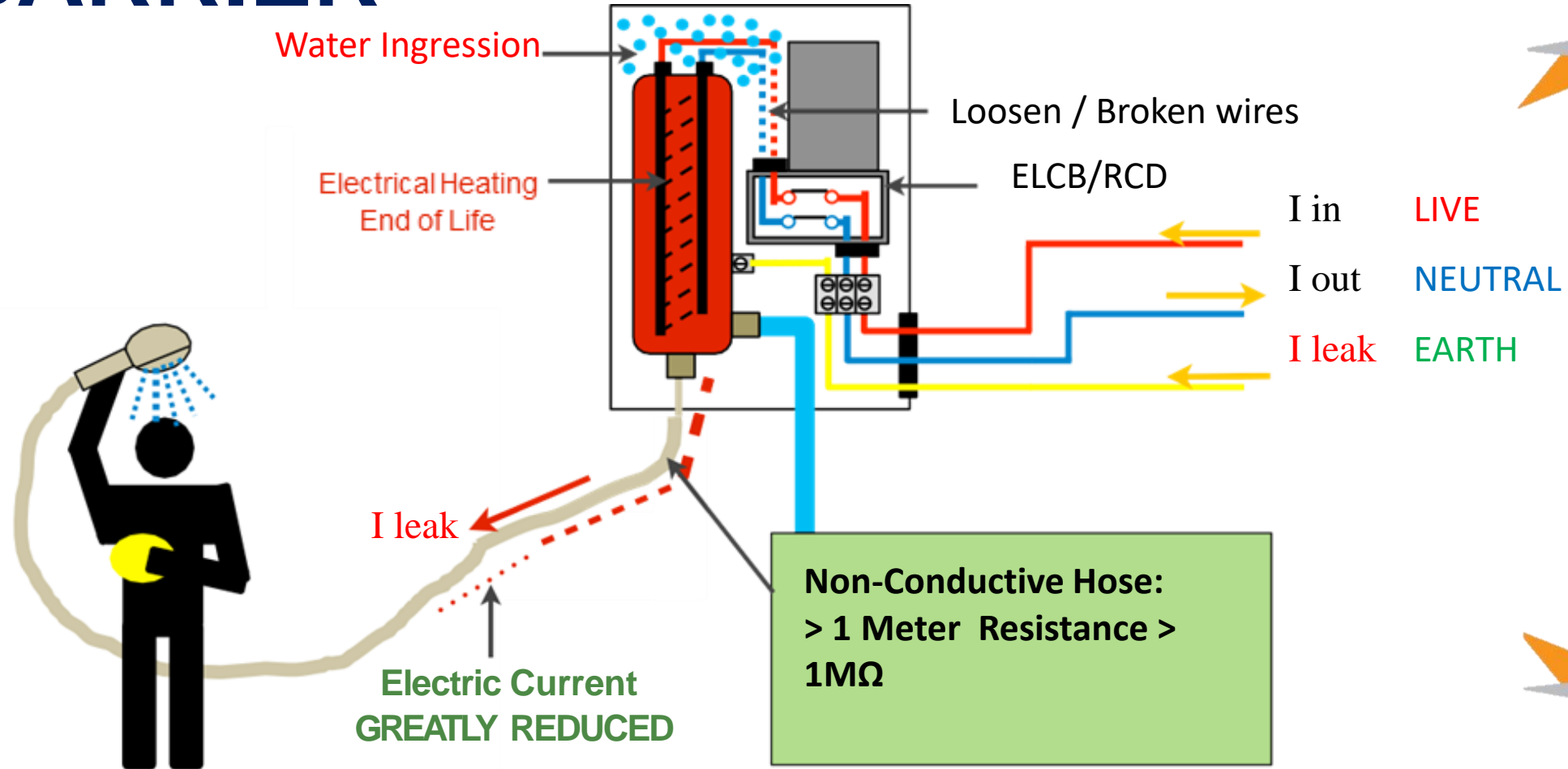
WATER CONDUCTIVITY

- Pure water is non-conductive
- Dissolved salt increases water conductivity
- Conductivity reduce with smaller cross section area and longer in length

	Electrical Conductivity (S·m-)
Copper	59.6×10^6
Aluminium	37.8×10^6
Sea water * An average salinity of 35 g/kg	5
Drinking water	0.0005 to 0.05
Deionized water	5.5×10^{-6}



NON CONDUCTIVE HOSE / ISOLATION BARRIER



THANK YOU

