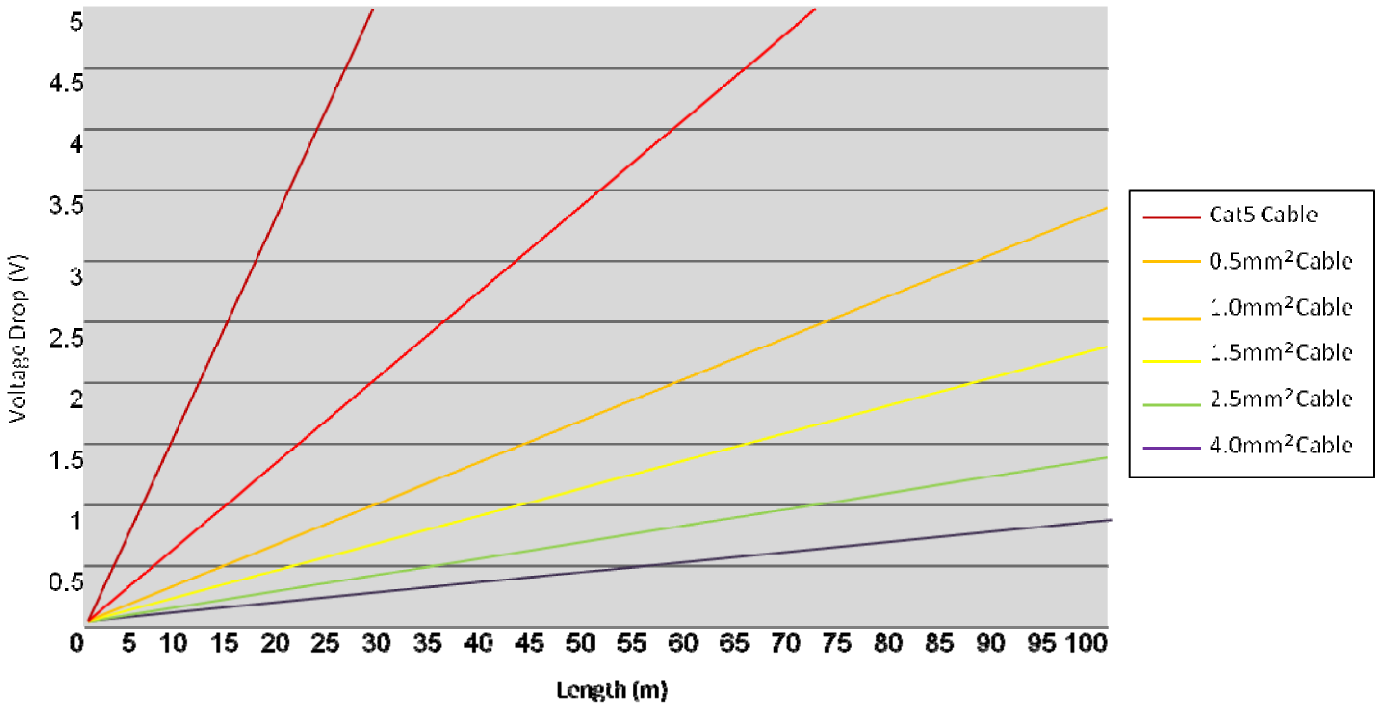
Cable Length & Voltage Drop Information

A potential cause of a great deal of trouble for the unwary installer is the problem of volt drop. A power supply unit may well output (for example), 12.3V DC however, this will not necessarily mean that the lock (or other device) connected at the other end will receive this voltage. The longer a cable run AND the thinner the cross-sectional area of the copper in the cable, the lower the end voltage will be. The chart that follows shows the amount of voltage drop that will occur at any given length (up to 100m), of various common thicknesses of cable based on a load of 1 Amp.



To calculate the amount of volt drop it is necessary to multiply the circuit current by the circuit resistance (Ohm's Law). The circuit resistance is calculated using this formula: $2\rho L/S$, where ρ = the resistivity of the conductive element, L is the length of the cable run and S is the cross-sectional area of the conductive element (all multiplied by 2 because there are two cores in the cable run). This gives us the formula: Resistance = 2 x 0.017 x length in metres / cross-sectional area in millimetres. The chart given above is a 'best case scenario' for volt drop: if the current being drawn causes the cables to warm up then the resistivity will increase (resistivity figure used above is based on a temperature of 20^0C.)

As may be seen, longer cable runs can require surprisingly thick cables to ensure that the voltage received by the lock is anywhere near that which is required. The chart illustrates well the unsuitability of CAT5 cable for all but the shortest of runs and lowest of currents.