Electrical cable calculator australia

Picture: Example of the EleStudy web-based application, courtesy of EleStudy.After many frustrating years using bugging software, electrical engineer Andrew Cripps has developed a user-friendly free application to perform cable scaling calculations on Australian Standards.We caught up with Andrew to find out how he came to develop the app, EleStudy.What is the EleStudy app? EleStudy performs cable sizing calculations according to Australian standards. It's mobile friendly, so engineers can use it to perform or check calculations easily wherever they are, and it's transparent in displaying how these calculations have been made. It also makes it a good learning tool for new engineers as they can look at the operation of how the outputs were calculated and why. What's your current role? Recently, I held an electrical project engineering role at Schneider Electric's own Brisbane office, working with Roy Hill Package 3 and Chevron Wheatstone Upstream.What motivated me to develop the app? When I first started working in the industry, the software I was provided with had errors and inaccuracies that made my work harder and time consuming. With each new software update, some problems seemed to be resolved, but new ones appeared in their place, which was frustrating. The software at the time did not give any operation - it only gave inputs and outputs - so there was no easy way to check how it performs the calculations. Since I learned a little programming at school and continued doing it as a hobby in my spare time, I decided to challenge myself to the computational program I could use to make my work easier. EleStudy is the result of that. How do you develop it? My original was launched as a developing desktop application, but with the growing need to adapt to new mobile technologies, I needed to be more flexible to stay relevant and useful. I wanted to remove as many barriers for users as possible, and since most people have access to the Internet on their phones and devices, it was the quickest and easiest to make it web-based – rather than a downloadable app. It was also important that the interface was simple and streamlined, so engineers really want to use it and it doesn't take training or a lot of time to learn how to use the app. An engineer can easily open it on his computer or mobile and start using it right away. What have you learned about yourself while developing the app? I've learned that you have to take minor steps, and I'm not trying to involve everything. I originally tried to build a lot of additional capabilities into the app, but doing so was less intuitive and harder to pick up and run. The trick was to get something that works and be useful and then build onto it. I plan to grow it into a complete system modeling app in the future, but I'm currently focused on getting the current version known as the advice do you have someone who is just starting their engineering career? Do your best to talk early to engineers from different industries and roles to find out which stream is best for you. Use the EleStudy app www.AS3008.com. Calculate the AC or DC voltage drop with this free online voltage drop calculator. Supports AS/NZS 3008. Includes voltage drop formulas and examples. Select what you want to calculate: Voltage reduction, Minimum cable size or Maximum cable distance Nominal voltage (V): Enter the voltage in the volt and select the phase layout: 1 PHASE AC, 3 Phase AC or DC. Load (kW, kVA, A, LE): Enter the load in A, HP, kW or kVA. Enter the power factor (cosl) if the electrical load is in kW or LE. Cable size (mm2): Select a standard electrical cable size in mm2 as defined in AS/NZS 3008. Distance (m, feet): Enter the estimated cable length in meters or feet. Permissible voltage drop (%): Specify the maximum permissible voltage drop as a percentage of the nominal voltage. What's allowed? Click here for more information. The voltage drop is the loss of voltage of the wire due to the electrical resistance and reaction of the wire. The problem with voltage reduction is as follows: This may cause the device to malfunction. It reduces potential energy. It's causing a loss of energy. For example, a 21 Ω heater is supplied from a 230V power supply. And the resistance of the wire is Ω. Then the current will be I = 230 V / (21 Ω + 2 × 1 Ω) = 10 A. The voltage drop Vdrop = 10 The × 2 × will be 1 Ω = 20 V. Therefore, only 210 V will be available for the device. And P = 20 V × 10 A = 200 W in the wire is wasted as heat. What is the allowable voltage drop? As/NZS 3008 in Australia and New Zealand sets the following values: Final subcircle only.3% From transport point to final load5% From transformer LV terminals to final load7% Simply put, the total permissible voltage in the socket is 7%. For residential applications, this means: The utility limits the voltage drop from the delivery point to 2%. The voltage fall shall be limited to 2 % between the supply point and the main switchboard (or any distribution plate). And the voltage drop in the last subcircele should be limited to 3%. Therefore, 2% + 2% + 3% = 7 %. Typical voltage drop applications can be seen below: Residential and light trading 5% AS /NZS 3000:2007. Between the supply point and the load. Industrial and large trading 7% AS / NZS 3000:2007. Between the supply point and the load. Where the point of the power supply low voltage terminals is a transformer. Industrial 3% General practice. Between the switchboard and continuous loads, e.g. motors. Where the transformer and switchboard are part of the installation (location). Industrial 5% General practice. The switchboard and intermittent loads, e.g. between valves. Where the transformer and switchboard are part of the installation (location). How do we calculate the voltage drop? Voltage drop formulas are formulas AC and dc are shown in the table below. Phase 1 AC\(\Delta V_{1\phi-ac}=\dfrac{L 2 Z_c}{1000}\) 3-phase AC\(\Delta V_{3\phi-ac}=\dfrac{L \sqrt{3} Z_c}{1000}\) DC\(\Delta V_{dc}=\dfrac{I 2 R_c}{1000}\) Where am I at the load current ampere(A) L is the wire distance in meters (m). Zc is the Ω/km. Rc the wire resistance to the Ω/ km. The impedance of the voltage drop calculator is calculated as follows: \(Z_c = \sqrt{R_c^2 + X_c^2}\) Where Rc is the line resistance in Ω/km. The Xc is the Ω/km. The above formula is Zc in the worse case. This is when the cable and load power factor are the same. The Volt drop calculator is the 35th percent of the table in table 35 of AS/NZS 3008 3008 3008. We use the following column: 75°C, AC, multi-core circular wires. Note that the standard does not specify DC resistance. The cable rating shown in the calculator results is as/nzs 3008 13. It is thermoplastic (PVC), three- and quad-core cables with unsealing and distributed surfaces. For additional cable types, use the AS/NZS3008 cable scaler. Voltage drop calculation Examples 1 example: Voltage drop calculation for example, a 230 VAC residential property, 15 A, single-phase load. Voltage230 VAC, single-phase load15 Distance30 m Driver size8 mm2 AS/NZS 3008 resistance and reaktitúcis values for an 8 mm2 dual-core cable: Rc = 2.23 Ω/km, 35-multi-core circular 75 °C. Xc = 0,0906 Ω/km, 30. The impedance is calculated as: \(Z_c = \sqrt{R_c^2 + X_c^2}\) \(Z_c = \sqrt{2.23^2 + 0.0906^2}\) \(Z_c = 2.232 \,\Omega/km \) The voltage drop is calculated as: \(\Delta V_{1\phi-ac}=\dfrac{I L 2 Z_c}{1000}\) \(\Delta V_{1\phi-ac}=\dfrac{15 \cdot 30 \cdot 2 \cdot 2.232}{1000}\) \(\Delta V_{1\phi-ac}=2.01 \, V\) The percentage voltage drop is calculated as: \(\% V_{1\phi-ac}= \dfrac {2.01} {230} \cdot 100 \) \(\% V_{1\phi-ac}= 0.87 \, \% \) Example 2: Voltage drop calculation example for a residential 230 VAC, 10A socket outlet. Voltage230 VAC, 1 phase LoadOne 10 The socket Distance20 m Driver size2.5 mm2 As 3000: 2007 C 1 Table 1 10 The socket in a room 10 A. You can also calculate this with the maximum demand calculator with AS/NZS 3000 examples The resistance and reactivation values of AS/NZS 3008 for a 2.5 mm2 dual-core cable are as follows: Rc = 9.01 Ω/km, 35-multi-core circular 75°C. Xc = 0,102 Ω/km, 30. Impedance is calculated as follows: \(Z_c = \sqrt{R_c^2 + X_c^2}\) \(Z_c = \sqrt{9.0 01^2 + 0.102^2}\) \(Z_c = 9.01 \,\Omega/km \) Calculation of voltage drop: \(\Delta V_{} {1\phi-ac}=\dfrac{L 2 Z_c}{1000}\) \(\Delta V_{1\phi-ac}=\dfrac{10 \cdot 2 \cdot 9.01}{1000}\) \(\Delta V_{1\phi-ac}=3.61 \, V\) The percentage voltage drop is calculated as follows: \(\% V_{1\phi-ac}= \dfrac {3.61} {230} \cdot 100 \) \(\% V_{1\phi-ac}= \, \% \) Example 3: Voltage drop calculation example is a residential 230 VAC, swimming pool pump. Voltage230 VAC, 1-phase load0,75 kW, power factor 0,85 Distance40 m Driver size4 mm2 AS/NZS 3008 resistance and reaktitúcis values for 4 mm2 dual-core cables: Rc = 5,61 Ω/km, circular from table 35 at 75 °C. Xc = 0,102 Ω/km, 30. The impedance is calculated as: \(Z_c = \sqrt{R_c^2 + X_c^2}\) \(Z_c = \sqrt{5.61^2 + 0.102^2}\) \(Z_c = 5.61 \,\Omega/km \) The current is calculated as: \(I = \dfrac{750}{230 \times 0.85} = \text{3.84 A}\) The voltage drop is calculated as: \(\Delta V_{1\phi-ac}=\dfrac{I L 2 Z_c}{1000}\) \(\Delta V_{1\phi-ac}=\dfrac{3.84 \cdot 40 \cdot 2 \cdot 5.61}{1000}\) \(\Delta V_{1\phi-ac}=1.72 \, V\) The percentage voltage drop is calculated as: \(\% V_{1\phi-ac}= \dfrac {1.72} {230} \cdot 100 \) \(\% V_{1\phi-ac}= 0.75 \, \% \) Example 4: Voltage drop calculation example for an industrial 400 VAC, 3-phase motor. Voltage400 VAC, 3-phase Load22 kW engine, pf 0.86. Efficiency ignored. Total load current: 36.92 Distance100 m Driver size16 mm2 AS/NZS 3008 resistance and reaktitúcis values for a 16 mm2 dual-core cable: Rc = 1.4 Ω/km, 35.-multi-core circular 75°C. Xc = 0,0861 Ω/km, 30. The impedance is calculated as: \(Z_c = \sqrt{R_c^2 + X_c^2}\) \(Z_c = \sqrt{1.4^2 + 0.0861^2}\) \(Z_c = 1.403 \,\Omega/km \) The voltage drop is calculated as: \(\Delta V_{3\phi-ac}=\dfrac{I L \sqrt{3} Z_c}{1000}\) \(\Delta V_{3\phi-ac}=\dfrac{36.92 \cdot 100 \cdot \sqrt{3} \cdot 1.403}{1000}\) \(\Delta V_{3\phi-ac}=8.97 V \, V\) The percentage voltage drop is calculated as: \(\% V_{3\phi-ac}= \dfrac {10.2} {400} \cdot 100 \) \(\% V_{3\phi-ac}= 2.24 \, \% \) Example 5: Voltage drop calculation example for a 12 VDC, 1 A load. Voltage12 VDC Load1 Distance30 m Driver size4 mm2 AS/NZS 3008 resistance for a 4 mm2 dual-core cable: Rc = 5.61 Ω/km, 35-multi-core circular at 75°C. Note that Reedeka does not apply to DC circuits. Also note that AS/NZS 3008 is not found in a separate table for DC resistance. The voltage drop is calculated as follows: \(\Delta V_{dc}=\dfrac{L 2 R_c}{1000}\) \(\Delta V_{dc}=\dfrac{1 \cdot 30 \cdot 2 \cdot 5.61}{1000}\) \(\Delta V_{dc}=0.34 \, V\) The percentage drop in voltage is calculated as follows: \(\% V_{dc}= \dfrac {0.34} {12} \cdot 100 \) \(\% V_{dc}= 2.83 \, \% \) \) \)

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