Apart Audio

Audiocontrol 12.8 peripheral devices: how to calculate maximum cable length

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Audiocontrol 12.8 has a built-in power supply to feed the peripheral hardware, such as mics and wall panels. There is a limit to the maximum current supplied by the audiocontrol unit. This maximum is determined by the internal power supply from the audiocontrol unit and is not dependent on cable lengths. The supply is protected by a self-resetting multifuse.

For wall panels and microphones (and/or slave units), the maximum amount of units powered by audiocontrol is 8 pieces: 8 pieces of DIWAC and 8 pieces of DIMIC1 or DIMIC12 can be powered by the Audiocontrol unit. However, in case you want to use long cables between the peripherals and the Audiocontrol, the internal resistance of the cable will influence the supply voltage at the microphone/wall controller. This could have a negative impact on the reliability of the installation.

In the table below, we show you a few standard applications and the maximum cable length. The values are theoretical values. Additional factors such as connector resitance and interference have not been taken into account.

Unit or combination of units	Number of units (combinations)	Maximum cable length CAT5	Maximum cable length CAT6
DIMIC1 or DIMIC12	1	1060 m	1200 m*
DIMIC1 or DIMIC12	8	132 m	264 m
DIMIC1 or DIMIC12 with DIMIC12S	1	607 m	1200 m*
DIMIC1 or DIMIC12 with DIMIC12S	4	151 m	302 m
DIWAC	1 (dedicated cable per DIWAC required !)	580 m	1160 m

** DIMIC units use the RS485 protocol. Maximum allowed twisted pair cable length is 1200 m.*

DIWAC wall panels can be connected with normal (thick) electric wires. DIWAC has been successfully tested with cable lengths up to 1800 m.

In the table below, the minimum working voltage and power consumption of the peripheral devices is shown:

Unit	Minimum supply voltage	Nominal supply voltage	Maximum supply current
DIMIC1	12V	24V	60mA
DIMIC12	12V	24V	60mA
DIMIC12S	12V	24V	45mA
DIWAC	12V	24V	110mA

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If you want to calculate your specific situation, please refer to the text below:

Standard CAT5 cable has a resistance of 18.8Ω/100 m per wire. Maximum current allowed through CAT5 cable is 577 mA.
Standard CAT6 cable has a resistance of 9.4Ω/100m per wire. Maximum current allowed through CAT6 cable is 1.5 A. Because the power supply flows through 2 wires (from positive to negative), we have to multiply these resistance values by 2:

CAT5: 37.6Ω/100m

CAT6: 18.8Ω/100m

If you are planning to connect a DIMIC1 unit via 500 meters of CAT 5 cable, the current through the cable will cause a significant voltage drop. The cable resistance = 37.6Ω x 5 (5 x 100m) = 188Ω. The DIMIC1 unit has a max current consumption of 60mA. This current flows through the CAT5 cable and causes a voltage drop of: (using Ohm's law) U (voltage) = R (resistance) x I (current)

voltage drop = 188Ω x 0.06A = 11.28V

The supply voltage from the Audiocontrol is 24VDC, the minimum working voltage for a DIMIC unit is 12 volt. The unit will receive a supply voltage of 24V – 11.28V = 12.72V. This is only marginally more than the absolute minimum supply voltage. In this simulation, we have not included the resistance of connectors and their negative impact on reliability. Therefore, using 500 m of CAT5 with a DIMIC1 is possible but risky.

Adding a second DIMIC1 unit on the same cable would result in a voltage drop of:

Voltage drop = 188Ω x (2 x 0.06A) = 22.56V. The microphones would receive a supply voltage of 24V – 22.56V = 1.44V. This is far below the minimum operating voltage and therefore not acceptable. A possible solution would be to add an external power supply or to feed the units via separate CAT5 cables.

If you prefer reliability, choose CAT6 cable. The voltage drop using 1 mic and 500 meters of cable would be : voltage drop = 18.8Ω x 5 x 0.06A = 5.64V.The supply voltage at the mic = 24V – 5.64V = 18.36V. This voltage is not critical and will guarantee a reliable operation.

Instead of daisy chaining the microphones, it is always better to have a dedicated cable running from the Audiocontrol unit (via a RJ45 splitter) to the microphone.

The same calculation rules apply to the DIWAC wall panels. Please note that DIWAC panels always require a dedicated cable per unit.

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