

CTC AppNotes

A series of technical documents written by members of the CTC community

Cable Length Calculation for Hazardous locations.

This edition of CTC's AppNotes will focus on calculating the maximum distances for cables used with CTC and PRO sensors designed for use in Hazardous locations and conditions where intrinsically safe sensors are required.



LP832-1B, Class I div 2 certified loop power 4-20 mA output-sensor,

Many industries have areas in their plants of manufacturing facilities where dangerous conditions are of special concern. These areas may at times harbor dangerous concentrations of dusts, gases or other potentially dangerous items. As a general category these are termed "Hazardous locations" and carry special ratings or classifications based on the types of materials that are encountered in a particular manufacturing process.

As the cable length in these situations is determined by the formula $C_a > C_{cable} + C_i$ where C_a is the fixed value for maximum capacitance based on the energy limiting barrier, C_{cable} is the capacitance per foot of the cable multiplied by the

length of the cable in feet. And C_i is the capacitance of the sensor selected for use in the hazardous location. CTC's original sensors for hazardous areas had a capacitance of 70 picofarads, this limited the length of cable that could

be used between the sensors and barriers to a maximum of about 200 feet. Based on the cables capacitance and the energy limiting properties of the barrier being used. The newest lines of CTC sensors have reduced the sensor capacitance to zero. This allows much longer runs of cable to be used between the sensor and the barriers. The chart below illustrates the calculations for CTC's most popular cables.



New Low capacitance Intrinsically safe sensor AC916-1A (100mV/G)



AC963-1A IECEx certified sensor, 50mV/g

If you have any questions or for further information please contact CTC directly via Email at dgripe@ctconline.com or jsmith@ctconline.com or feel free to call 1-800-999-5290 in the US and Canada or +1-585-924-5900 internationally.

$$C_a > C_{cable} + C_i$$

Cable Type	Cap/Ft (pF/ft)	Length (ft)	C _{cable} (pF)	C _i (pF)	C _a (pF)	C _{cable} + C _i	C _a > C _{cable} + C _i ?
CB102	58.3	500	29150	0	83000	29150	Pass
	58.3	750	43725	0	83000	43725	Pass
	58.3	1400	81620	0	83000	81620	Pass
	58.3	1425	83077.5	0	83000	83077.5	Fail
CB103	49.2	500	24600	0	83000	24600	Pass
	49.2	750	36900	0	83000	36900	Pass
	49.2	1500	73800	0	83000	73800	Pass
	49.2	1700	83640	0	83000	83640	Fail
CB111	45.4	500	22700	0	83000	22700	Pass
	45.4	750	34050	0	83000	34050	Pass
	45.4	1750	79450	0	83000	79450	Pass
	45.4	1850	83990	0	83000	83990	Fail
INPUT YOUR CABLE		100	0	0	83000	0	Pass
		750	0	0	83000	0	Pass
		1500	0	0	83000	0	Pass
INPUT YOUR LENGTH			0	0	83000	0	Pass

If any CTC vibration analysis hardware product should ever fail, we will repair or replace it at no charge.

