



Technical Note: 10000002

Cable Lengths

A number of people have asked about the possibility of using longer cables with Maxtek Monitors and Controllers. It all depends on which cable. The cable between the oscillator and the Monitor/Controller is not critical. It can be as long as 100 feet without significantly degrading crystal life.

On the other hand, the cable between the sensor head and the feedthrough (the internal cable) as well as the cable between the feedthrough and the oscillator are critical. This is due to the fact the capacitance of these cables shunts the crystal.

The oscillator incorporates compensation for the expected cable capacitance. If the actual cable capacitance is significantly larger or smaller than that for which the compensation is designed, a stronger crystal is required to control the oscillator frequency. This means that the crystal will fail earlier than normal. In extreme cases the oscillator will oscillate on the cable capacitance causing erratic and meaningless operation of the monitor.

Longer cables require more compensation and because the compensation is not ideal, the performance (ability to support oscillation of a weak crystal) of an oscillator with a long cable will be less than that of an oscillator with a shorter cable, even with the compensation.

There seems to be no good reason for the cable between the feedthrough and the oscillator to be any longer than its nominal length of six inches. If necessary however, it could be increased to twelve inches with some degradation in crystal life.

There are many instances when a longer cable internal to the vacuum system is desirable or necessary. This is possible even though increasing the length of the internal cable will compromise the oscillators ability to work with weak crystals and in general will result in some shortening of crystal life.

If the internal cable is lengthened or shortened by more than 50% the compensation in the oscillator must be changed in order to avoid erratic operation. An internal cable of less than fifteen inches or more than sixty inches is not recommended. The exact decrease in crystal life is hard to quantify, but we would expect a 10 to 20% decrease in crystal life when using a sixty-inch internal cable.

A 56 pfd capacitor must be added to the oscillator to compensate for sixty inch cables. The addition of this capacitor is described in Technical Note: 10000001, originally released as Technical Note V-101, Oscillator Modification For Sixty Inch Internal Cable.

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