

Application Note 1021

M&P Series High Altitude Applications

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Introduction

This Application Note provides an overview related to the reduced operating capacity of M&P Series equipment at high altitudes.

Capacity Reduction

When air conditioners and heat pumps are installed in areas above sea level, operating capacity is reduced due to decreased air density. Because of this equipment size may need to be increased to meet the load requirements. The following correction factors apply to M&P Series air conditioners and heat pumps for both heating and cooling operation. The indoor and outdoor units need to be sized based on the capacity reduction due to the decreased air density.

Table 1. Capacity Correction Factors

Altitude [feet above sea level]	Indoor Unit	Outdoor Unit
0	1.00	1.00
1,000	0.96	0.99
2,000	0.93	0.98
3,000	0.90	0.98
4,000	0.86	0.97
5,000	0.83	0.96
6,000	0.80	0.95
7,000	0.77	0.94
8,000	0.74	0.94
9,000	0.71	0.93
10,000	0.69	0.92

Single Zone Systems

A single zone M or P series system installed at 5,000 feet above sea level, would operate at 83% its normal capacity when compared to its performance at sea level. This is because, for single zone systems, the outdoor unit is required to have the same rated capacity as the indoor unit, so the whole system is affected by the indoor unit derate. Therefore the whole system would need to have at least 17% higher capacity to provide the same cooling and heating performance as it would at sea level conditions.

Multi Zone Systems

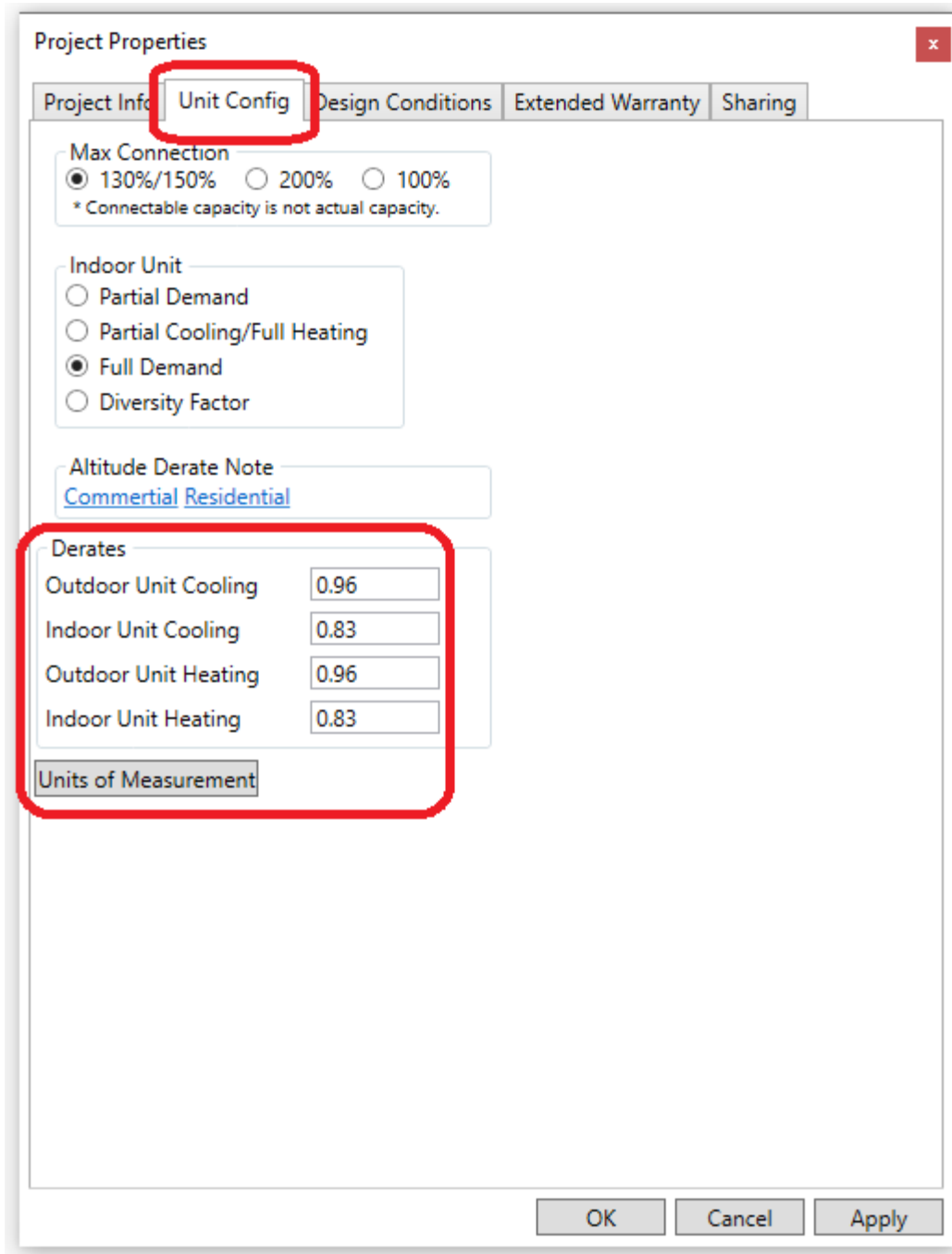
For Multi Zone M&P systems installed at 5,000 feet above sea level, the indoor units would operate at 83% normal capacity when compared to its performance at sea level. The indoor units would need to have at least 17% more capacity to provide the same cooling and heating performance they would at sea level.

Outdoor units installed at 5,000 feet above sea level would operate at 96% its normal capacity when compared to its performance at sea level. Therefore, the outdoor unit(s) would need to have at least 4% more capacity to provide the same cooling and heating performance as the units would at sea level.

This means that the indoor connected capacity may have to be increased to meet the maximum connected capacity requirement.

Using Altitude Correction Factors in Diamond System Builder

Diamond System Builder allows a user to easily incorporate correction factors, such as those in Table 1, into system design. The user can adjust these values on the Unit Config tab in Project Properties:



Project Properties

Project Info **Unit Config** Design Conditions Extended Warranty Sharing

Max Connection
☒ 130%/150% ☐ 200% ☐ 100%
* Connectable capacity is not actual capacity.

Indoor Unit
☐ Partial Demand
☐ Partial Cooling/Full Heating
☒ Full Demand
☐ Diversity Factor

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Derates

Outdoor Unit Cooling	0.96
Indoor Unit Cooling	0.83
Outdoor Unit Heating	0.96
Indoor Unit Heating	0.83

Units of Measurement

OK Cancel Apply

Figure 1: Unit Config Tab in Project Properties

For Single Zone M&P Series the correction factors from Table 1 should only be entered in the indoor unit fields. This will apply the capacity reduction to the whole system. The factors in the outdoor unit fields should be left as 1.

For Multi Zone M&P Series the correction factors from Table 1 should be entered in the corresponding fields for the indoor unit as well as for the outdoor unit.

Once the correction factors are applied in Diamond System Builder, the user can utilize the estimated performance provided by the program to appropriately size the system, matching the performance with the calculated loads for spaces.

No other adjustments are necessary for system design and application.