

## Operation at Light Load

MDI specifies the converter performance when the rated minimum values of load current as defined for each part number in MDI's catalog is applied.

In addition, the following information applies:

### All Converters:

MDI DC-DC Converters can not be damaged by light load or no load conditions. Most, but not all, converters continue to regulate at no load or light load. Output regulation is normally tested at 10% and 100% of rated load.

### Single Output Converters:

MDI single output DC-DC Converters do not require a minimum load to produce the nominal output voltage. (An exception is the magnetic feedback series 500, 7000, 8000 and 9000 with single output below 5 VDC.) A minimum load of 10% is recommended, or consult factory for lower minimum loads. However, at load currents below 10% of the full load, the load response, line regulation, load regulation or output ripple may not perform as well as when the minimum load is exceeded. However, the operation below 10% of full load is generally satisfactory for most applications. MDI's single output converters whose output voltage is equal to or greater than 24 VDC are actually dual output converters. The output is connected from end to end and the center tap is not used.

### Dual Output Converters:

MDI dual output DC-DC Converters do not require a minimum load to produce the nominal output voltage. MDI dual output converters are regulated from the positive output to the negative output. The best regulation is obtained when the positive and negative loads are balanced. As discussed in more detail in the MDI application notes, unbalances up to 10%/90% do not produce unsatisfactory results. However, if one output on a dual output converter is essentially unloaded while the other output is heavily loaded, the output voltage unbalance can exceed 10%.

If both outputs are lightly loaded, or unloaded, the balance will remain reasonably balanced.

## Triple Output Converters:

For MDI's standard triple output DC-DC Converters, the main output is always the +5 VDC output. On all Semi-custom and Custom DC-DC Converters the main output is almost always the highest power output. This is because MDI usually PWM regulates around the high power output which yields the highest efficiency. The remaining two outputs, with the exception of Cross-regulated triples such as MDI model 3138- TXX, are regulated by two built-in linear regulator IC's.

The voltage produced by the linear regulators, called the auxiliary outputs, is the specified output voltage, and may typically be +/- 15 VDC, +/- 12 VDC or +/- 5 VDC. The unregulated internal voltage preceding the linear regulators is called the header voltage. To achieve reasonable efficiency, the drop across the linear regulators is minimized. Therefore, the header voltage is minimized, since the desired output voltage is fixed.

The header voltage changes in proportion to the load on the main regulated output. When the output load current on the main regulated output is low, the header voltage feeding the linear regulators is also low. When the output current on the main regulated output is below the specified minimum current, down to no load, the header voltage on the linear regulators may drop even lower.

A triple output converter whose main output is loaded at less than the minimum load can produce regulated voltage on the auxiliary outputs provided the load current on the auxiliary outputs is also low. A triple output converter whose main output is lightly loaded cannot produce full regulated voltage on the auxiliary outputs if the load current on the auxiliary outputs is high or at full rated output. The reason for this is that the header voltage produced is too low for full regulation.

The loads on the auxiliary outputs of a triple output converter can regulate down to zero current.

## In Case of Doubt

To specify a particular MDI DC-DC Converter to be used with unbalanced loads or loads below minimum rated currents, contact us. As our first choice, we may be able to suggest a MDI standard part to fulfill the requirement. If a standard part cannot do the job, MDI can fabricate semi-custom units that have suitable performance for conditions other than specified in the catalog. This may just involve a simple modification such as adding a turn or two on the transformer or changing a diode part number.