

Resource R14 Analog input and output

Resource R14.6 Analog initialization

For our project, we will use the analog input channel `CI0` and the analog output channel `CO0` on Connector C. They communicate with the processor through the FPGA.

Before they can be used, they must be initialized using

```
AIO_initialize(&CI0, &CO0);
```

Call it once, where `CI0` and `CO0` are structures that must be of type `MyRio_Aio`. This initialization function is included in the `me477` library.

Resource R14.7 Analog-to-digital converter

The single-channel 12-bit analog-to-digital converter (ADC) measures the current value of the applied voltage in the range $[-10.000, +9.995]$ V. Voltages outside that range *saturate* the conversion as shown in [Figure 06.5](#).

input saturation

The ADC has a resolution of 4.883 mV, with absolute accuracy of ± 200 mV. Each channel has input impedance of > 500 k Ω and overload protection of ± 16 V.

Our library contains a function that reads a specified channel of the ADC and returns the converted value. Its prototype is:

```
double Aio_Read(MyRio_Aio* channel);
```

where `channel` is the pointer to the channel structure defined above: `&CI0`.

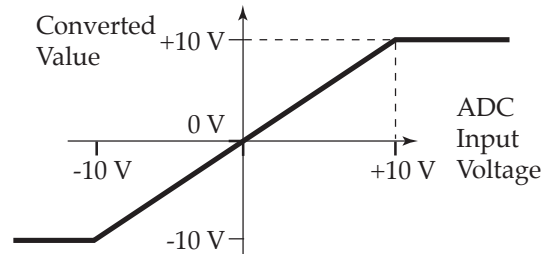


Figure 06.5: ADC saturation.

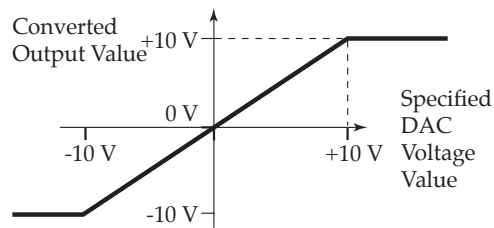


Figure 06.6: DAC saturation.

Resource R14.8 Digital-to-analog converter

The single-channel 12-bit digital-to-analog converter (DAC) produces a voltage at the output terminal in the range $[-10.000, +9.995]$ V. Again, specified voltages outside that range saturate the conversion as shown in [Figure 06.6](#).

The DAC has a resolution of 4.883 mV, with absolute accuracy ± 200 mV. Each channel has a maximum drive current of 3 mA, a maximum slew rate of $2 \text{ V}/\mu\text{s}$, and an overload protection of ± 16 V.

Our library contains a function that accepts a specified channel for the DAC, and returns the converted value. Its prototype is:

```
void Aio_Write(MyRio_Aio* channel, double value);
```

where `channel` is the pointer to the channel structure defined above: `&CO0` and `value` is the specified value of the analog output voltage.

