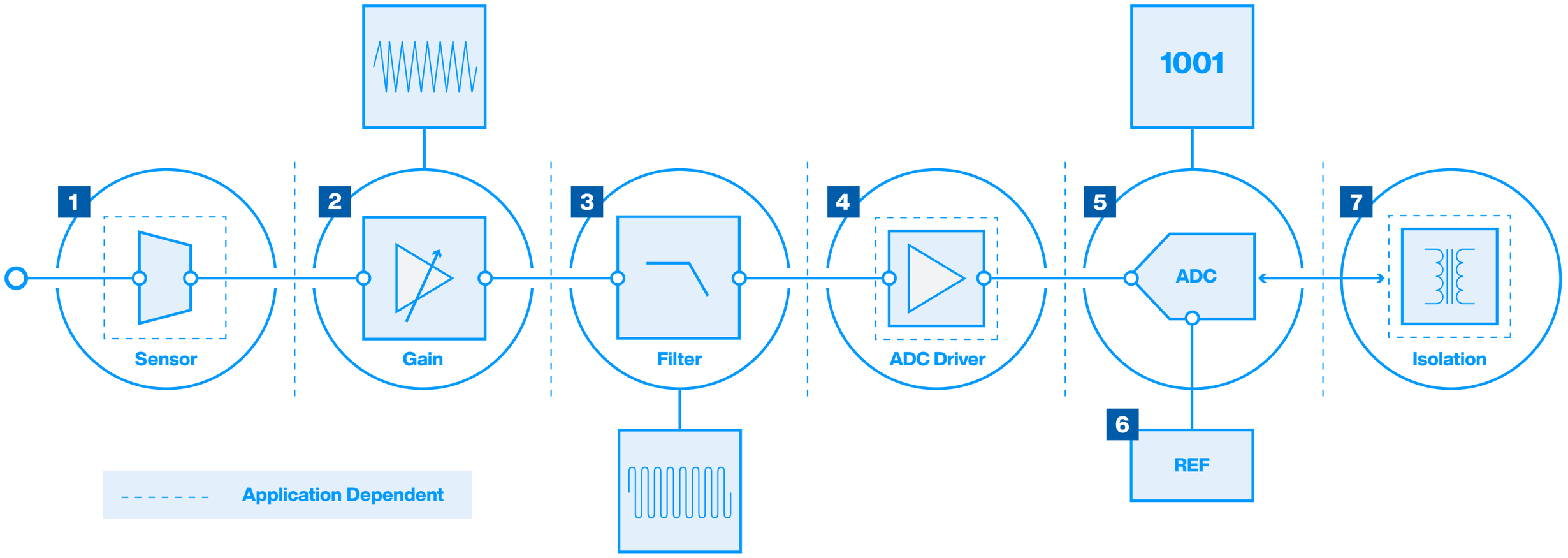
Analogue Signal Chain

A basic analogue signal chain consists of amplifiers, filters, voltage references, data converters, and isolation for high voltage applications. Typically, signal chains are built using individual components, although some semiconductor companies offer complete signal chain modules for specific application areas.

Those solutions can be tailored to exact specifications, ranging from stability and latency to signal chain density and power consumption. Precision narrow bandwidth signal chains can be used for applications such as test and measurement equipment, chromatography, weigh scales, seismic survey equipment, battery test and inspection, energy metering, semiconductor manufacturing, and more.



Signal source > Amplification > Filtering > Signal conversion > Isolation

1 Sensor

Produces a small electrical output in response to an external stimulus, such as change in temperature pressure or light. They can be passive or active with either voltage or current output. Examples: a thermocouple, a piezoelectric pressure sensor, and a photodiode.

2 Gain/Amplifier

Increases the sensor's small output to a usable level. Usually an Operational Amplifier, or Op-Amp. Amplifies only the difference in voltage between the two input terminals (differential input voltage). To learn more about op-amps, download the Mouser Op-Amp reference guide.

3 Filter

Removes noise and unwanted frequency components from the applied signal, enhance wanted ones, or both. In analogue signal chains, common types are: high-pass, low-pass, band-pass, band-stop (band-rejection; notch), or all-pass.

4 ADC Driver

Amplifier specifically designed to drive ADC's, Performs important functions such as buffering, amplifying, input/output type conversion, and filtering. Enables the ADC to achieve best possible performance. Optional block depending on the type of ADC and application requirements Important: low noise, no drift.

5 ADC

Translates the continuous, analog sensor output into a series of discrete-time and discrete-amplitude digital samples, suitable for digital processing. The sampling frequency and resolution of the ADC is selected to suit the signal being converted. Converting an analog signal to discrete binary values in this way introduces quantization error (or noise). To learn more about ADC's and how they work, watch 'What is an ADC'.

6 REF (Voltage reference)

Produces a fixed voltage against which the ADC compares the input signal. The reference voltage remains constant irrespective of external factors such as loading on the device, power supply variations, temperature changes, or elapsed time. Important: High precision and stability.

7 Isolation

Digital isolators protect people, assets, and data from from hazardous voltages. They provide complete galvanic isolation between two power domains by capacitive or magnetic means. Also useful for level shifting and ground noise elimination.