# Industrial Converter Technical Note - ICV001
# Selecting a Low Bandwidth Σ–Δ ADC

**Introduction**
Analog Devices has a wide range of low bandwidth, high resolution, Σ–Δ ADCs. Along with the ADC, these devices contain current sources, a multiplexer, a PGA and analog input buffers on board. This Technical Note identifies some of the applications in which the ADCs are used as well as identifying the most suitable ADCs for each application.

**1) Number of Bits**
16-Bit: AD7705/6, AD7707, AD7708, AD7709, AD7715
24-Bit: AD7710, AD7711, AD7712, AD7713, AD7714, AD7718, AD7719, AD7730, AD7731, AD7732, AD7734, AD7738

**2) Multi-Channel Applications**

High Throughput: AD7731, AD7734, AD7738
Low Throughput: AD7708, AD7718, AD7714

**3) Temperature Measurements**
For thermal diode and RTD applications, current sources are required.
Thermocouple: AD7714, AD7719
Thermal Diode: AD7709
RTD: AD7711, AD7719, AD7783

**4) Pressure**
Requirements: Low level differential analog inputs with a high level differential reference input for ratiometric operation. Optional features include an auxiliary ADC which can be used for temperature compensation.
AD7719, AD7714, AD7730, AD7710

**5) Weighscale**
Requirements: Low level differential analog inputs with a high level differential reference input for ratiometric operation. Optional features include an auxiliary ADC which can be used for temperature compensation, fast-step, AC excitation, a reference detect circuit and increased filter rejection in the out-of-band region.
AD7730, AD7730L, AD7719, AD7714

**6) Low Power**
AD7705/6, AD7714, AD7715, AD7719

**7) High Analog Input Voltages (±10 V)**
AD7732, AD7734, AD7712, AD7707

**8) Rail-to-Rail On-Chip Buffers**
AD7719, AD7708/18, AD7782, AD7783, AD7709

**9) Bipolar Inputs (±2.5 V)**
AD7710, AD7711, AD7712

**10) Pin Configurable**
AD7782, AD7783

**Summary of Low Bandwidth Sigma Delta ADCs.**

| MODEL | No. of Bits | Min. Input Range (V) | Max. Input Range (V) | p-p res. @ Max. Range (Bits) | @ Data Rate (Hz) | AIN Chan. | Onchip AIN Buffer | Onchip Curr. Source | Power Supply Current (mA) | Price $/1K | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AD7701 | 16 | 2.5 | 2.5 | 16 | 4000* | 1 | | | 5 | 15.70 | |
| AD7703 | 20 | 2.5 | 2.5 | 17 | 4000* | 1 | | | 5 | 13.26 | |
| AD7705 | 16 | 0.02 | 2.5 | 16 | 60 | 2 | Y | | 0.3 | 4.12 | |
| AD7706 | 16 | 0.02 | 2.5 | 16 | 60 | 3 | Y | | 0.3 | 4.12 | |
| AD7707 | 16 | 0.02 | 10 | 16 | 60 | 3 | Y | | 0.28 | 4.46 | |
| AD7708 | 16 | 0.02 | 2.56 | 16 | 20 | 10 | Y | | 1.28 | 3.98 | |
| AD7709 | 16 | 0.02 | 2.56 | 16 | 20 | 4 | Y | Y | 1.25 | 3.89 | |
| AD7710 | 24 | 0.02 | 2.5 | 17.5 | 60 | 2 | | | 5 | 14.45 | |
| AD7711 | 24 | 0.02 | 2.5 | 17.5 | 60 | 2 | | Y | 5 | 15.30 | Two Curr. Sources |
| AD7711A | 24 | 0.02 | 2.5 | 17.5 | 60 | 2 | | Y | 5 | 15.30 | One Curr. Source |
| AD7712 | 24 | 0.02 | 2.5 | 17.5 | 60 | 2 | | | 5 | 13.20 | |
| AD7713 | 24 | 0.02 | 2.5 | 16 | 20 | 3 | | Y | 0.7 | 16.15 | |
| AD7714 | 24 | 0.02 | 2.5 | 17.5 | 60 | 5 | Y | | 0.35 | 8.28 | |
| AD7715 | 16 | 0.02 | 2.5 | 16 | 60 | 1 | Y | | 0.35 | 5.65 | |
| AD7718 | 24 | 0.02 | 2.56 | 18.5 | 20 | 10 | Y | | 1.28 | 5.24 | |
| AD7719 | 24 | 0.02 | 2.56 | 18.5 | 20 | 5 | Y | Y | 1.5 | 8.76 | Dual ADC |
| AD7730 | 24 | 0.01 | 0.08 | 17 | 200 | 2 | Y | | 13 | 11.60 | Weighscale |
| AD7730L | 24 | 0.01 | 0.08 | 17 | 200 | 2 | Y | | 13 | 9.55 | Weighscale |
| AD7731 | 24 | 0.02 | 1.28 | 17 | 800 | 5 | Y | | 13.5 | 9.86 | |
| AD7732 | 24 | 5 | 10 | 16 | 2000 | 2 | Y | | 18 | 7.77 | Fast Ch. switching |
| AD7734 | 24 | 5 | 10 | 16 | 2000 | 4 | Y | | 18 | 7.77 | Fast Ch. switching |
| AD7738 | 24 | 0.625 | 2.5 | 16 | 6800 | 8 | Y | | 18 | 6.89 | Fast Ch. switching |
| AD7782 | 24 | 0.16 | 2.56 | 18.5 | 20 | 2 | Y | | 1.3 | 5.10 | Read-Only |
| AD7783 | 24 | 0.16 | 2.56 | 18.5 | 20 | 1 | Y | Y | 1.3 | 5.10 | Read-Only |

*While the update rate equals 4 kHz, the bandwidth is 10 Hz.