Technical Info

# Key Consideration When Selecting a Preamplifier

The most important role of a preamplifier is to faithfully amplify the input signal. The ideal preamplifier should be providing a sufficient wide range, generating no noise by itself, no waveform distortion, hardly being affected by temp. change and over time change.
It' s important to select the optimal preamplifier for the application under specific conditions.

## 1 Input Signal Level

In some applications, gain may be set using several stages of amplifiers due to a very low input signal level. In such setups, it' s particularly important to use a low-noise amplifier in the initial stage since any noise generated there will be amplified by the following stage.

## 2 Gain

There are fixed gain amplifiers and switchable gain amplifiers. If the input signal level is unknown or greatly changed, selects a switchable gain amplifier.

## 3 Input Mode

There are a single wire ground input and a differential input. If the gain and the frequency characteristics are same, the amplifier with single wire ground input achieves lower noise. If the external noise is large, you can reduce the influence of external noise by using a differential input amplifier. "

## 4 Signal Frequency Range

We should consider whether we need the amplifier to accommodate DC at the lower end of the frequency range and what the upper limit of that range will be. Amplifiers with a wide range exhibit fast response and produce waveforms with a faithful leading edge. However, a wide range also results in more noise, so we should choose an amplifier that matches the frequency of the signal.

# Key Consideration When Selecting a Preamplifier

## 5 Input and Output Impedance

The ideal low-frequency amplifier has sufficiently high input impedance and low output impedance.
As for high-frequency amplifier (over 10 MHz), its input and output impedance should match with a coaxial line" (50 Ω in general)

## 6 For Current Output Sensor Uses

If you use the current-output sensor, select a transimpedance amplifier (Current to voltage converter) . In this case, the amplifier should have low input impedance. Since the capacitance of the sensor affects the amplifier's frequency characteristics, the input cable length between the sensor and the amplifier should be minimized.

It' s also necessary to consider factors such as the amplifier' s maximum output voltage, input noise, input offset, offset drift, distortion, size, power supply, and power consumption.

## Products

### Low Noise Preamplifier SA-230F5
(voltage amplifier)

- Frequency range: 1 kHz to 100 MHz
- Input type: Single-ended
- Input impedance: 50 Ω
- Equivalent input noise voltage density: 0.25 nV/√ Hz
- Noise figure: 0.6 dB
- Gain: 46 dB

### Wideband Current Amplifier SA-604F2
(current to voltage converter)

- Frequency range: DC to 500 kHz
- Input type: Single-ended
- Input impedance: 1 kΩ
- Equivalent input noise current density: 45 fA/√ Hz
- Gain (V/A): $1\times10^7$ (10 M)

### Low Noise DC Power Supply LP5393

- Output Noise: 10 μVrms or lower (typ.) (10 Hz to 20 MHz bandwidth)
- Output Voltage Stability: ±20 ppm/°C (typ.)
- Output Voltage: ±12 V to ±15 V
- Output Current: ±0.1 A max.