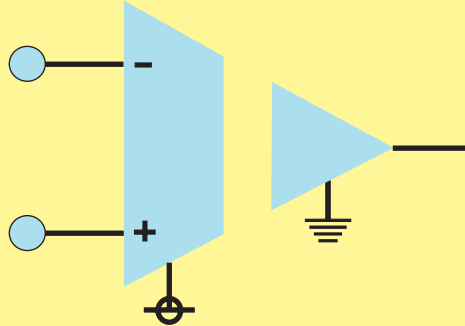




SUITABLE APPLICATIONS FOR ISOLATION



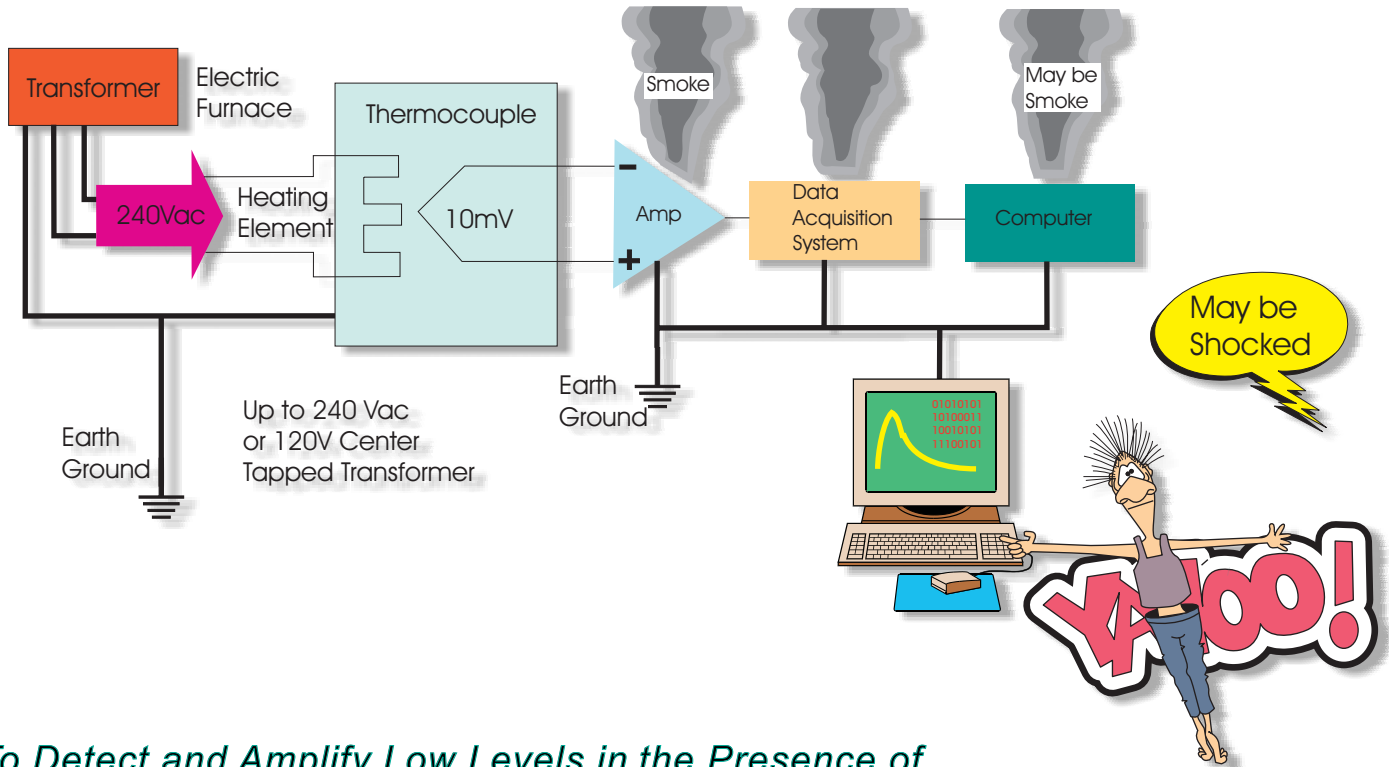
- ✓ **Low level signals with high common-mode voltages**
- ✓ **Breaking ground loops**
- ✓ **Medical patient monitoring equipment**
- ✓ **Protection of electronic instruments/equipment**
- ✓ **Analog and Digital acquisition**
- ✓ **Industrial environment**

In general, most applications can be broadly categorized in the following four types :

- Amplifying and measuring low level signals in the presence of high common-mode voltages.
- Breaking ground loops or eliminating source ground connections. The isolation device provides full floating input, eliminating the need for connections to source ground, and allowing two-wire hook-up to the signal sources.
- Providing an interface between medical patient monitoring equipment and the transducer or device that may be in physical contact with the patients. Such applications require high isolation voltage levels and very low leakage currents.
- Providing isolation protection to electronic instruments or equipment. Large common-mode voltages occasionally cause hazardous electronic faults. The low leakage currents and high isolation voltage capability of isolation devices help protect instruments against damage caused by such faults.



HIGH VOLTAGE PROTECTION ELECTRICAL



To Detect and Amplify Low Levels in the Presence of High Voltages Without Causing Shock to Personnel - or Damage to Equipment

Isolation amplifiers and couplers act as an interface between remote sensors, motors, and data acquisition systems, where low signal levels are detected and amplified.

In the presence of high voltages, isolation devices provide galvanic isolation between the input and output potentials so to prevent personnel or equipment damage. Here galvanic isolation means that there is a break in the ohmic continuity of the electrical signal.

The galvanic isolation between the input and output potentials of the isolation device allow accurate transmission of signal across a high voltage barrier, avoiding possible crosscoupling or interaction between two or more circuits.



WHAT IS AN ISOLATION AMPLIFIER ?

Isolation amplifiers resemble operational amplifiers but are designed to have a galvanic discontinuity between their input and output pins. This discontinuity, called an isolation barrier, must have high breakdown voltage, low DC leakage (high barrier resistance), and low AC leakage (low barrier capacitance).

The isolation barrier sets the isolation amplifier apart from operational and instrumentation amplifiers in cost and complexity, as well as in application. So called three-port isolation amplifiers have an additional isolation barrier between the power supply connexion and the signal connections.

This feature increases versatility because it allows the user to connect power in common with either the amplifier's input or its output. In some cases, it may be advantageous to isolate the power supply from the input or the output and thereby eliminate additional error sources that may be present in a system.

Below is a comparison of the three basic amplifier types. The isolation amplifier, as well as offering

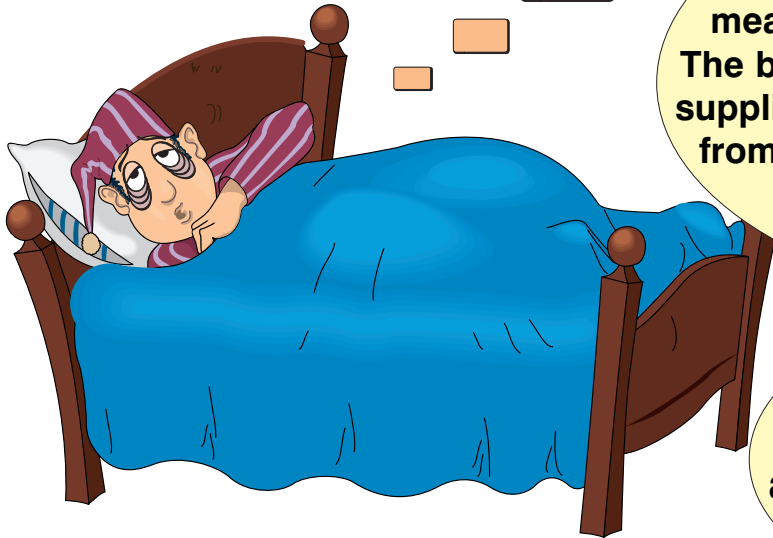
| | | | |
|-------------------------------|--|--|--|
| SYMBOL | | $V_{out} = G_d (V_{in})$ | |
| FEEDBACK CONFIGURATION | User defined feedback such as voltage, current dV/dt ; $\int Vdt$, log V, etc. | Committed feedback. Gain adjustable Within fixed limits | |
| BASIC APPLICATION | <ol style="list-style-type: none"> 1. General purpose gain element 2. Buffer 3. Analog computer | High accuracy analog sense amplifier when common-mode potentials are smaller than the supply voltage | <ol style="list-style-type: none"> 1. High accuracy analog sense amplifier for common-mode potentials in excess of supply voltage 2. Analog safety isolator 3. Break ground loops |
| MAJOR ERRORS | Offset, noise and common-mode errors independent of gain | Input and output offset and noise. Total error depends on gain. One set of common-mode specifications. | Input and output offset and noise. Separate common-mode and isolation mode errors except for single-ended input devices |



FIRE

CONCLUSION

Without isolation



Galvanic isolation ensures measurement integrity and equipment protection.

Signal adaptation and isolation are important criteria in a measurement chain. The best is to purchase these products from a supplier who is able to provide the whole chain, from the conditioner up to the system (see **STB** and **BCI** products).

Protects user equipment from lightning and heavy equipment powerline voltage.

Isolation is good



With galvanic isolation, high level common modes and ground loops can be avoided.

The overrun cost incurred by galvanic isolation is greatly balanced by increased long-term reliability (ownership cost).



It is strongly recommended to use boards with galvanic isolation between the systems and the process under measurement.

ADAS boards meet this criterion.