PGA900, PGA300 and PGA305 Use Case for the Pressure Transmitter Applications

Introduction

The resistive bridge sensors are used in a variety of end-equipment like Pressure Transmitters or Transducers, Flow Meters, HVAC, and Weight Scales. The pressure transmitter or transducer is one of the major applications for the resistive bridge.

Pressure Transmitter

Figure 1 shows the pressure transmitter mechanism. The pressure transmitter measures and monitors the pressure from outside, and sends this information to the controller. The sensor element to measure the pressure value is normally the resistive bridge.

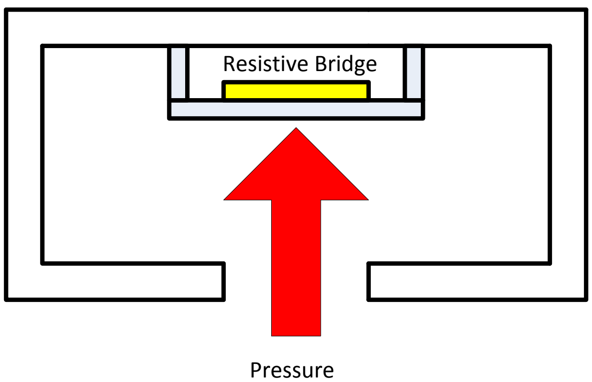

Figure 1. Pressure Transmitter System

Resistive Bridge

Figure 2 shows the resistive bridge. Ideally, the signal from the resistive bridge would be linear with the change of pressure, but that is not always the case. Furthermore, each individual resistance is not equal to the others, so a voltage offset is observed. This particularly comes to effect when no pressure is applied to the resistive bridge. Finally, the output is temperature-dependent, meaning the signal from the resistive bridge must be temperature-compensated in the system. This requires that the typical system connected to a load cell sensor is capable of linearization and temperature dependency cancellation for accurate measurements across pressure and temperature.

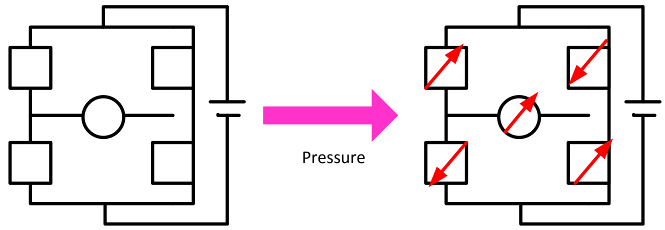

Figure 2. Resistive Bridge

Important System Factors

The pressure transmitter needs to measure precisely, so consider the following spec in signal conditioning device:

- High resolution
- High accuracy
- Temperature compensation and linearization
- Output interface : voltage of 4 to 20 mA or I2C

PGA900

Figure 3 shows the PGA900 Functional Diagram. The device has two high-resolution ADCs (24-bit) with an integrated ARM M0 MCU that allows the development of application-specific compensation linearization algorithms. The PGA900 supports multiple output choices, including the analog voltage (0 – 5, 0 – 10 V), the current output (4 – 20 mA), and the digital I2C, UART, PWM, and One Wire interface.

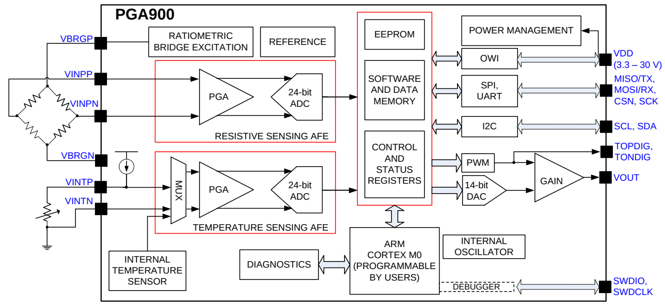

Figure 3. PGA900 Block Diagram

PGA300

Figure 4 shows the PGA300 Block Diagram. The PGA300 integrates two 16-bit ADCs while a 3rd-order compensation algorithm is employed for sensor linearization. The system accuracy achieved can be <0.1%FS over temperature. PGA300 supports the analog voltage, the current output (4 – 20 mA), and the One Wire interface.

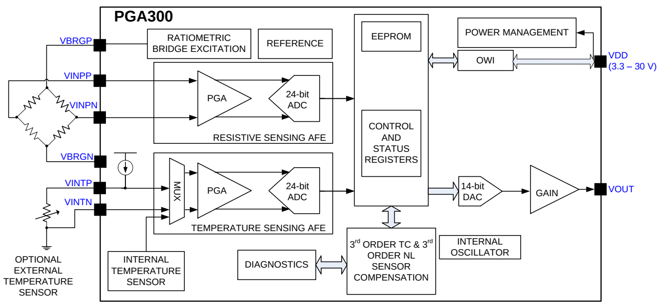

Figure 4. PGA300 Block Diagram

PGA305

Figure 5 shows the PGA305 Block Diagram. This device integrates a dual-channel, 24-bit ADC, followed by a 3rd-order digital linearity compensation algorithm. The system accuracy achieved can be <0.1%FS over temperature. The PGA305 supports the analog voltage and the current output (4 – 20 mA), along with the I2C output and the One Wire Interface.

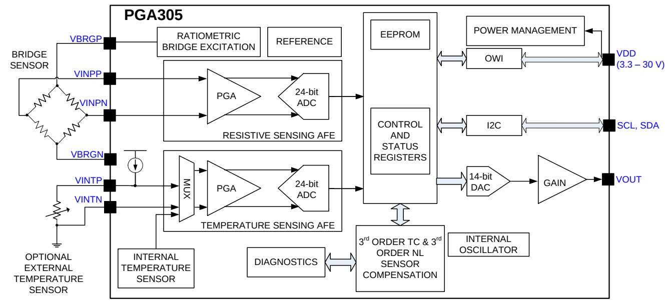

Figure 5. PGA305 Block Diagram

Table 1. Alternative Device Recommendations

Device	Optimized Parameters	Performance Trade-Off
PGA308	High Gain Setting, Automotive AECQ100 available	High current consumption
PGA309	High Gain Setting	High current consumption

Table 2. Adjacent Tech Notes

SLYA025	PGA900/300/305 Use Case for the HVAC Application
SLYA026	PGA900/300/305 Use Case for the Pressure Transmitter Application

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