Constant current excitation for SSO compensated stainless steel pressure sensors

INTRODUCTION

First Sensors SSO series offers rugged OEM pressure sensors in a fully welded, media isolated stainless steel construction. These devices are temperature compensated from 0...50 °C when using constant current excitation. This application note describes the design of an appropriate constant current source.

CIRCUIT DESIGN

To achieve a constant current source a circuit with a single operational amplifier is used as shown in Fig. 1. The current source is controlled by a ±1 % band-gap reference diode Z_R.

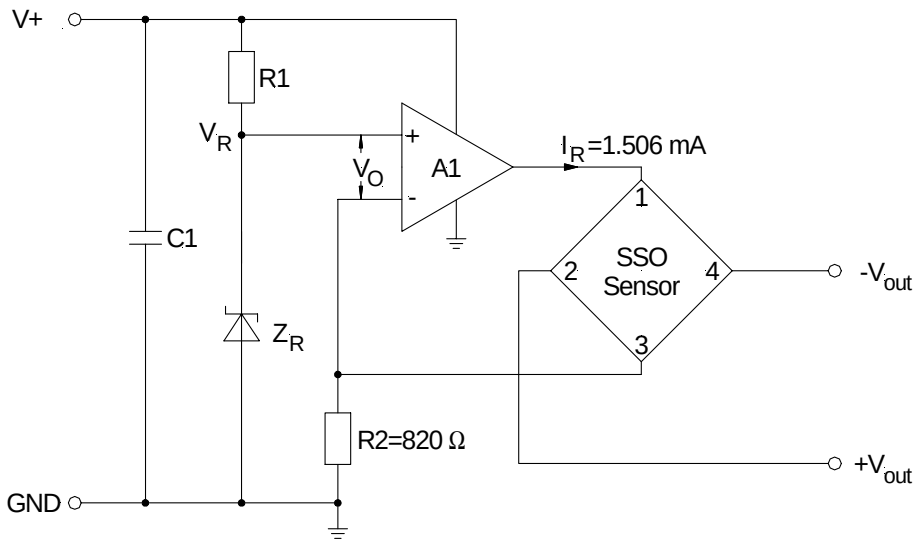
The reference current I_R is defined by

$$I_R = \frac{(V_R - V_O)}{R_2}$$

where

V_R = Diode reference voltage (1.235 V ±1 %)
V_O = Amplifier offset voltage (~0 V)
R_2 = Current set resistor (820 Ω)

Selecting amplifier A_1 with an offset voltage <1 mV and a ±0.1 % tolerance resistor R_2 with a standard value of 820 Ω delivers a current of I_R = 1.506 mA with a typical accuracy of ±1.2 %.



A_1	LT1490A or LTC1051
Z_R	LT1034-1.2 or LT1004-1.2
R_1	Select according to LT1034-1.2 or LT1004-1.2 data sheet
C_1	0.1 µF
V_+	>10 V

Figure 1: Constant current source for First Sensors SSO temperature compensated pressure sensors