

Siemens Milltronics Sitrans LR 400

Technical Description, 5 September 2001

1. Introduction

Siemens Milltronics Sitrans LR 400 is intended for use in process industries for the determination of material level in tanks and other process vessels. The principle used is Frequency Modulated Continuous Wave (FMCW). A microwave frequency is generated whose frequency varies with time. This signal is directed towards the target. The signal is reflected by the target and received by the antenna. The time of flight of the pulse, τ is calculated by comparing the transmitted and received frequencies for a given sweep rate.

2. Technical Description

Refer to the block diagram shown on Siemens-Milltronics drawing 20150176 sheet 3.

The sweep frequency is obtained by mixing the output of the 2.4 GHz Voltage Controlled Oscillator (VCO) with the 22.4 GHz Local Oscillator (LO). VCO is also applied directly to a saw-wave reference (OFW) to obtain the reference signal REF which can be used to maintain the accuracy of the device over temperature. The sweep (frequency sum of LO and VCO) is applied to the antenna via a splitter. The received signal is then mixed with the transmitted signal to obtain the measured signal MESS (difference frequency). Since in a real measuring system multiple targets exist, the measurement signal will not be a single frequency but will be a combination of many frequencies representing the different targets. Digital Signal Processing techniques are used to extract the frequencies present in the measured signal and to reject false targets to select the correct target and calculate the target distance.