इलेक्ट्रॉनिकी एवं सूचना प्रौद्योगिकी मंत्रालय
MINISTRY OF ELECTRONICS AND INFORMATION TECHNOLOGY

SAMEER

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Score Sugar Content Measurement

Microwave Based Brix/Concentration Measurement System For Sugar Industries

INTRODUCTION

Automation of the sugar industry enables high production yields and good quality sugar. Brix/Concentration measurement of the sugar syrup in the entire sugar production process plays an important role in process automation of the sugar industry.

SAMEER has successfully developed the microwave based non-destructive instant Brix/Concentration measurement system for the sugar industry. The system has been installed, calibrated and conducted trials in the sugar factory. The technology has been demonstrated to sugar industry people and it is now ready for technology transfer.

Key Features

- Non-destructive and Instant Measurement
- Precise and reliable maintenance free system
- Microwave transmission based measurement
- Sustainable rugged for harsh industrial environment
- Configurable/Programmable hardware
- In-situ auto cleaning by hot water flushing
- User friendly GUI and easy menu driven calibration process

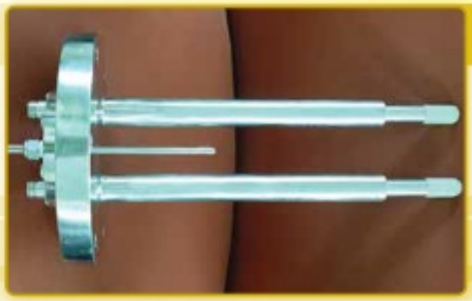
Brix Hardware



Brix Microwave Transceiver



Brix Insertion Probe



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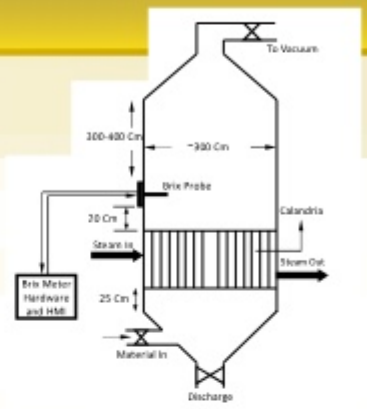
Working Principle

The system works on the principle of microwave signal transmission through the materials and accounting the change in phase and amplitude of the signal. Prerequisite is that the material being measured shows some dielectric properties which vary with its compositions (i.e. percentage of water and solid contents). Thus the dielectric property of the sugar syrup changes with its Brix (sugar concentration) value. As a result, microwave signal undergoes certain changes mainly in amplitude and phase when it passes through the syrup. The amount of changes in amplitude and phase depend on the Brix value of the material. The Brix parameter can therefore be determined by measuring the amplitude and phase of the signal and correlating with the calibrated/reference data.



Schematic diagram of insertion probe installation in the boiler

SYSTEM SPECIFICATIONS

Operating frequency	:	5.8 GHz
Transmission power (Variable)	:	-6 dBm to +17dBm
Bandwidth	:	500MHz
Phase Noise	:	-87dBc/Hz at 100 Hz
Harmonics	:	Better than -30dBc
Gain of the Antenna	:	3-4 dB
Receiver sensitivity	:	better than -75dBm
Programmable receiver gain	:	40dB to 70dB
Dynamic range	:	> 70dB
Measured parameter	:	Attenuation and Phase shift
Range of Brix measurement	:	0 to 100°Brix
Accuracy	:	+/-0.2° *
Output	:	4-20m A isolated for Brix & Temp para

*Subject to multi point calibration and accurate determination of Brix value by lab method or any other method

SUGAR INDUSTRY





Typical applications in the sugar cane and food industry for the followings:

- Brix value during sugar crystallization process
- Dry substance of thin and thick juice
- Concentration of milk of lime
- Total solids (TS) measurement in liquid food industry
- In-situ instant density and concentration measurement for quality control and process productivity and efficiency improvement

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