KDS-111
Snow Height Sensor

KDS-111-DS-Rev 4.3 - November 25, 2013

General Description

The KDS-111 is a smart sensor for the measurement of snow level. It employs a new proprietary statistical ensemble-sensing technology to measure snow level with class leading accuracy and stability. Raw data is internally converted into engineering units.

Hardware Features

- Ultrasonic based sensing element
- Self-calibrating electronics
- High resolution quantizer
- Robust ESD protection

Measurement Process

The sensor uses a ultrasonic based transducer of very good long-term stability. The transducer fully enclosed with high end SS material to protect against corrosion and dust. Ultrasonic frequency pulses reflect with snow within 30 degree beam angle and measuring time interval with high resolution quantizer. Microprocessor computes and applies corrections / compensations on measured raw values. A Large number of instantaneous readings are averaged to produce one sample value with excellent stability. This value is then converted to an engineering value.

Averaging

The KDS series sensors have a user settable sliding window averager included in the post processing procedure. Long averaging improves the variance of the sensor output but will delay the availability of stabilized data after a power on. The instantaneous samples are also accessible and the analog outputs can be programmed to follow either the averaged output or the instantaneous output.

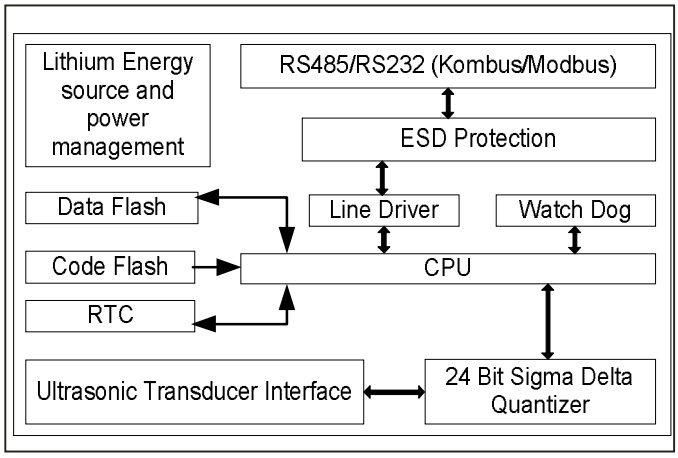
Calibration

Individual sensor calibration data stored inside the sensor as coefficients, at multiple points. Typically a KDS-111 is calibrated at range from 0.5 to 10 meter. Like all KDS series sensors, it is recalibratable with ease. Calibration traceability offered is IMD/NPL (India) or NIST (USA).

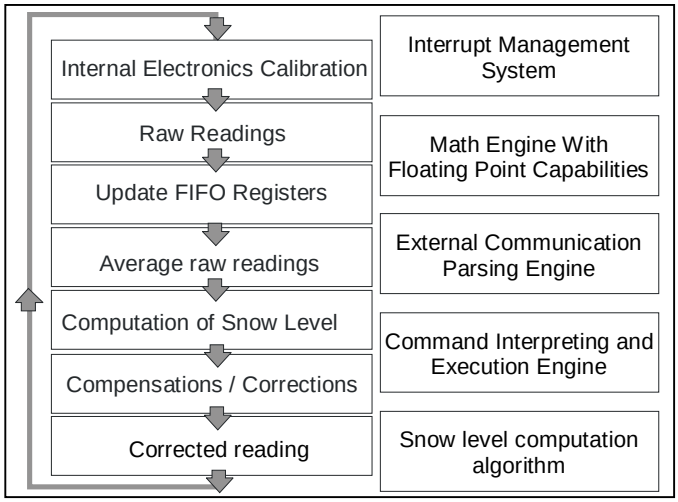
Deployment

The KDS-111 is designed for continuous outdoor use with weather station. It can also be useful in indoor measurement applications.

Block Diagram



Processing Flow



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Parameter / Specification	Conditions	Min	Typ	Max	Units
Type of Sensing Element	Ultrasonic Transducer				
Snow Height					
Type of Sensor	Ultrasonic Sensor				
Accuracy			±1		cm
Resolution		0.2			mm
Output Units		meter			
Beam Acceptance		30			degree
Range of measurement		0.5		10	m
Temperature drift	Non-Frosting, -20 to +65ºC		<1%		
Environmental					
Storage temperature		-40		+85	ºC
Operating temperature		-20		+65	ºC
Electrical					
Supply Voltage		10	12	16	V
Supply Current	Active	80	100	120	mA
	Quiescent	8	10	12	mA
	Shut down	1	2	3	mA
Power-On Latency				<1	s
Power-On Settling Time				<1	s
Mechanical					
Dimension	80 Diameter x 100 Height				mm
Weight	0.8				kg
Deployment					
Location		Outdoor Mast borne			
Cable Length-Normal Version (KDS Series)				250	m
Outputs					
Type		Serial Digital Asynchronous (UART)			
Electrical Interface		RS485 Multi-Drop Addressable			
Output Mode		KOMBUS			
Measurements		Free Running			
Baud Rate	Default (9600)	9600 to 38400			bps
Parity		Even			
Start, Stop Bits		1,1			
Responses		Externally Commanded			
Calibration					
Standard		In-House			