

SENSOR UNIT

User Manual



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1. PURPOSE OF THE SENSOR UNIT

CURRENT USER MANUAL DESCRIBES THE SENSOR UNIT FOR THE ONLINE MOISTURE METER IDC202

1.1. The Sensor Unit (SU) can only be used together with the moisture meter and can not be used as a standalone device. The SU is expected to be mounted on a conveyor that is used for transporting the material under test.

1.2. THE SENSOR UNIT IS DESIGNED TO CARRY OUT FOLLOWING TASKS:

- Creating the necessary measurement space and maintaining its stability during device exploitation.
- Generating microwaves (MWs) and emitting them onto the measured material; receiving and detecting of MWs after they passed through the material;
- Measuring the temperature of the material under test; detecting and signalling the presence of the material; transmitting data-signals to the Control Unit (CB).

2. PRINCIPLE COMPONENTS OF THE SENSOR UNIT

Table 1 Principle components of the sensor unit

DENOMINATION	DENOTATION	NUMBER OF PIECES
Generator Unit	GU	1
Detector Unit	DtU	1
Temperature Sensor	TS	1*
Material presence sensor	MPS	1*
User manual	UM-SU	1

* - supplied after agreement with the customer

3. TECHNICAL DATA

Table 2 Main parameters and specifications of the sensor unit

PARAMETER	SPECIFICATION
Overall dimensions of the GU, mm	175 x 234 x 274
Overall weight of the GU, kg	<6,0
Overall dimensions of the DU, mm	180x190x130
Overall weight of the DU, kg	<1,0
Overall dimensions of the TS (with mounting parts), mm	120 x 420 x 60
Overall weight of the TS, kg	< 1,0
Overall dimensions of MPS, mm	115 x 50 x 45
Overall weight of MPS, kg	Не более 0,15
Manufacturing standard	IP54
Length of the cable connecting SU to CU, m	3,5
Maximum possible distance between SU and CU, m	25

4. STRUCTURE AND OPERATIONAL PRINCIPLE

4.1. ORGANISATION OF THE SENSOR UNIT IS ILLUSTRATED IN Figure 1.

SENSOR UNIT COMPRISES:

- Generator Unit (GU)
- Detector Unit (DtU)
- Temperature Sensor (TS)
- Material presence sensor (MPS)

SU is comprised of waveguide feed. At the waveguide flange there is a protective cover with hermetic lid and cable input.

Under protective cover there is microwave generator and a terminal block, which is used to provide communication with Control Block. Waveguide feed is mounted (corbelled) above the conveyor belt. During operation the bottom part of the waveguide feed is immersed into the transported on the conveyor belt material under test. The vertical position of the waveguide feed above the conveyor belt can be changed by adjusting the corbelling. The space between lowest point of the waveguide feed and the surface of the conveyor belt is called a **measuring space**.

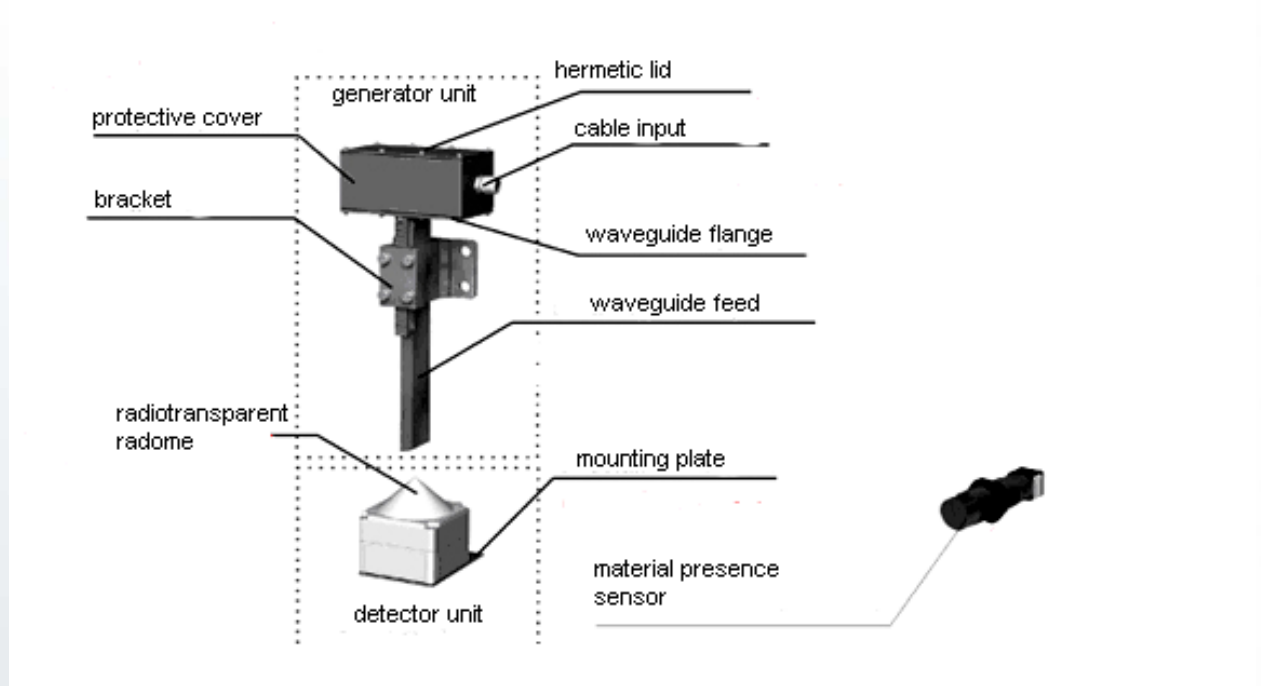


Figure 1: Sensor unit for the moisture meter IDC202

The Detector Unit comprises another antenna and microwave detector for receiving the energy that has passed through the material under test. The lid of the plastic case accommodates radiotransparent radome. The Detector Unit is to be rigidly mounted on a mounting bracket in alignment with the waveguide feed of the GU. All the units of the SU are designed in accordance with IP54 manufacturing standard.

An example of mounting the GU and the DU for measuring moisture in the material on a conveyor belt is illustrated in Figure 2.

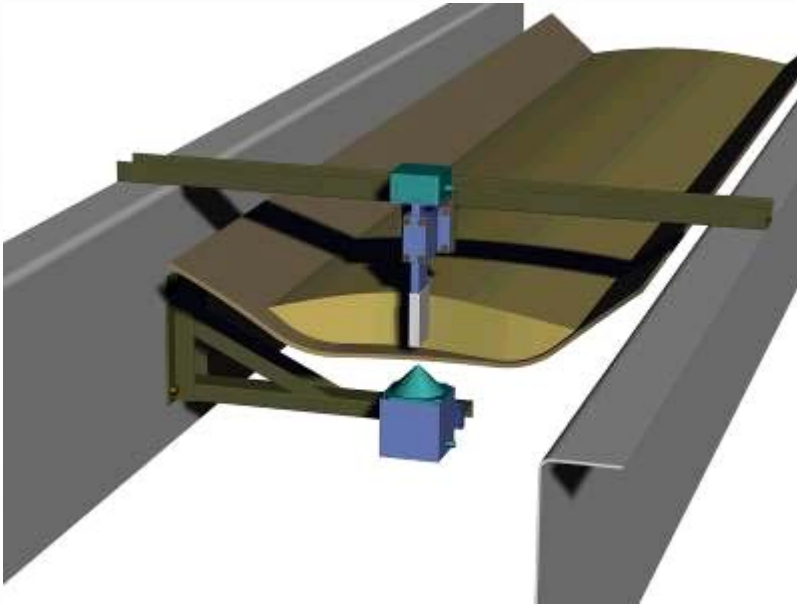


Figure 2: Generator and detector units in a workflow.

4.2. OPERATIONAL PRINCIPLE OF THE SENSOR UNIT

The block-diagram of the SU and logical interaction between different blocks of the meter are presented in Figure 3.

The Generator Unit is powered by the Control Unit. The Control Unit constantly forms the negative voltage 13 – 15V.

The microwave generator generates continuous microwave signal which then emitted by a stripline antenna. The emitted signal passes through the material under test and then detected by a stripline antenna of the DtU.

In the DtU microwaves are transformed into a voltage. Therefore this voltage is a function of the moisture in the material under test. This transformed into voltage signal is outputted to the CU for further processing. The CU also comprises input from the Temperature (TS) and Material Presence sensors (MPS). In case when MPS indicates that there is no material in the measuring space all the processing of the imputed signal is stopped.

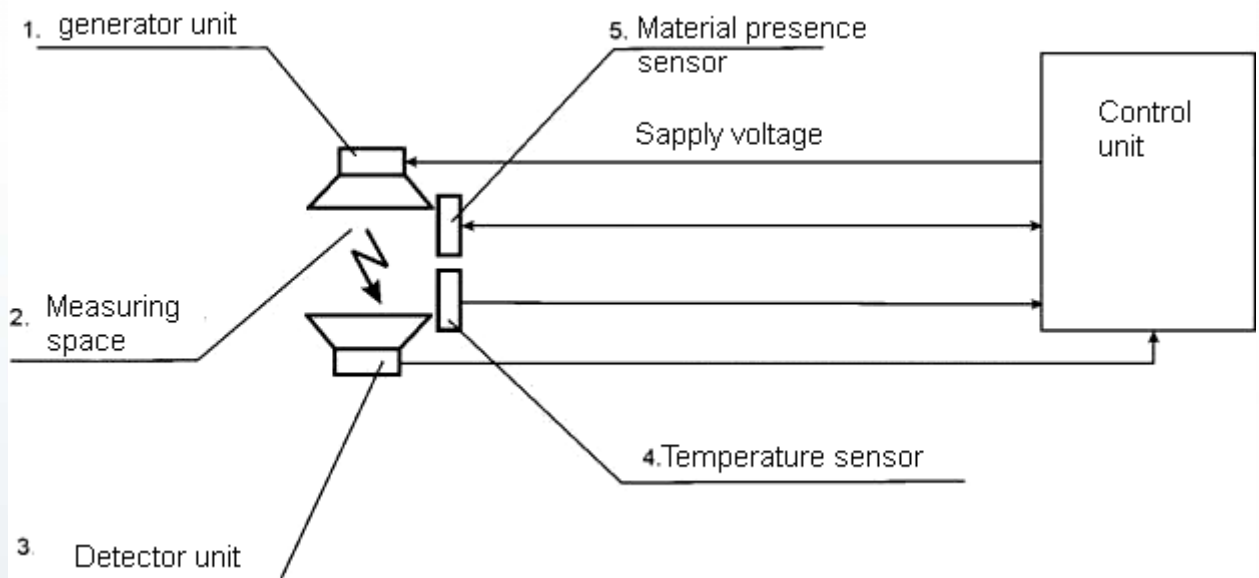


Figure 3: Block-diagram of the SU and interaction between different units.

5. INSTRUCTIONS

5.1. The Sensor Unit is an essential part of the meter and can be exploited only as a part of the meter after all the preparation works (mounting and putting into operation) are finished.

5.2. Mounting of the SU is to be carried out in accordance with the “On-line microwave moisture meter IDC 202. Installation directions”.

5.3. Mounting of the SU, setting up and maintenance are to be carried out in accordance with general safety precautions described in “On-line microwave moisture meter IDC 202. User Manual”.

5.4. Putting the SU into operation is to be carried in accordance with “User Manual for moisture meter IDC202”.

5.5. For normal operation of the SU the thickness of the material on a conveyor belt is expected to be at least 100 mm. The cross-section of the material is expected to be at least 500 cm².

5.6 All the assistance, warranty and service works are carried out in accordance with warranty rules applied to the moisture meter and described in “On-line microwave moisture meter IDC 202. User Manual”.

6. STORAGE

Each unit of the SU should be packaged sealed polythene bags and stored at a temperature not lower than - 5 °C and not greater than +40 °C, at a relative humidity not greater than 80 % (at 35 °C). Store the product no closer than 0.5 m from room heaters, radiators, hot pipes and other such heat sources. The air should be without any mixture that can cause corrosion.