Film Thickness Monitor DX7000 Plus Series

Features & Advantages

- ✓ **Non-contact and not-distractive measurements**
- ✓ **High sensitivity and accuracy**
- ✓ **Fast response**
- ✓ **Compact design and light weight**
- ✓ **Low power consumption**
- ✓ **Versatility**
- ✓ **No moving parts**

Applications

- ✓ **Industrial quality control**
- ✓ **Process automation in plastic film production**
- ✓ **Laboratory thickness measurements**

The company RMT introduces new DX7000Plus Series of sensors for film thickness measurements.

Several basic options provide accurate measurements of Polyethylene, Polypropylene and similar films and selective measurements of separate layers in multilayer film structures, for instance barrier layers (EVOH or similar materials).

Measurement concept is based on non-dispersive infrared spectroscopy selective IR absorption by molecules of examined material. The optical absorption principle provides non-contact and non-destructive application advantages of DX7000Plus sensors.

The DX7000Plus Optical Sensor is specially designed for fast response, high sensitivity, low noise and low power consumption.

High accuracy and fast response features make the sensors useful in a wide range of industrial automation, process control and laboratory applications.

Application sectors are: cast films, blown films, coating and laminating, extrusion coating and others.

A number of design features contribute to the device performance.

The differential double frequency optical scheme provides a high accuracy in wide ranges of humidity and temperature due to the internal thermostabilization.

New types of middle infrared light emitters and photodetectors with built-in thermoelectric cooling are used. No moving parts.

The main parts of the Sensor (Light emitter and Photodetector modules) are connected via the RS-485 interface with up to 10 meters long cable.

The high data rate and noise immunity of the interface as well as a very small response time allow using the sensor on a scanning frame or in a fixed point.

Design

The DX7000 Plus Sensor consists of three units:

- DX7010P Detector module
- DX7011P Emitter module
- DX7012P Collector module.

The IR detector is mounted onto the DX7010P module and the IR emitter is mounted onto the DX7011P module. The Collector module DX7012P provides a synchronous operation of all parts of Optical Sensor and remote control from PC through the RS-232 port. Apart from it DC/DC converter is placed in a Collector for power supply of all Sensor modules.

All parts are interconnected via four twisted-pair lines of System Interface.


Detector and Emitter Modules

Collector Modules

Principles of Operation

The NDIR (Non-Dispersive Infra-Red Spectroscopy) measurement method is implemented in the DX7000Plus sensor.

The classical double channel scheme is utilized. Intensities of two light beams, passed through measuring film, are compared.

One of the beams (measuring channel) has wavelength which is adjusted to optical absorption line of molecules of measured material. The another one (reference channel) serves for control and it's wavelength maximum is placed out from the absorption line.
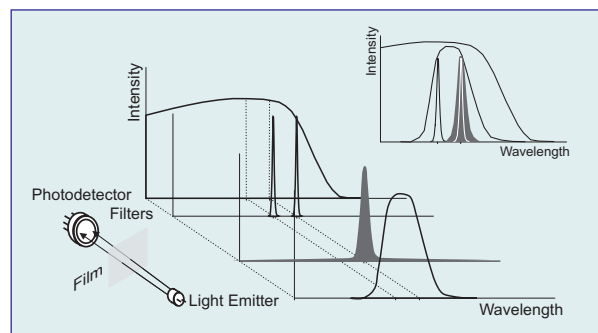
The principle of film thickness measurement

Vision Software

The RMT Ltd has developed the DX7000 Vision program group specially for working with the DX7000 Plus Sensor.

The DX7000 Vision has the simple interface and does not demand the User's special knowledge.

The DX7000 Vision software CD is delivered with the DX7000 Sensor.

To run the DX7000 Vision software, the system must meet or exceed the following hardware and software requirements:

- Intel Pentium class computer with Windows 95/98/2000 operating system
- Free COM port
- 16 MB of RAM (32 MB recommended)
- 6 MB free hard drive space
- CD ROM drive
- Mouse or compatible pointing device

The DX7000 Vision software provides all possible operational modes of the DX7000 Sensor:

- **Measurement**
- **Calibration**
- **Test**

The **Measurement** mode is the basic mode of operation of the Optical Sensor.

The **Calibration** mode provides:

- Its own calibration
- Zero adjustments procedures.

The **Test** mode is required for testing of the proper operation of the main elements of the Optical Sensor: TE coolers, photodetectors, light emitter.

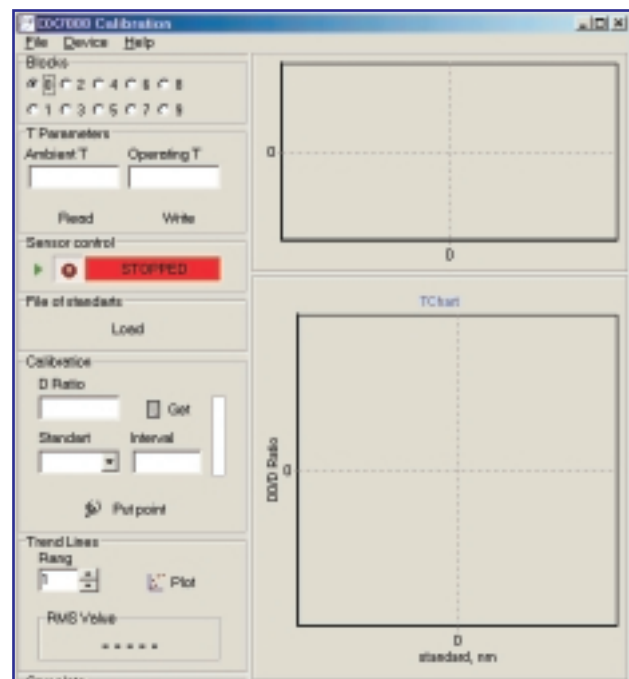Besides the Sensor hardware parameters can be set with the DX7000 Vision:

- Parameters for measuring cycle
- Parameters of digital temperature regulators
- Parameters of measurements synchronization.

Indicator Windows
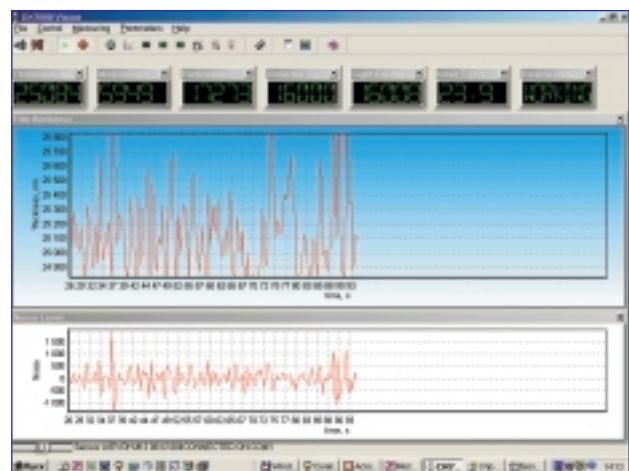
Main Window

Calibration Window

Specifications

Type	NDIR sensor with open path
Detector	Lead selenide with TE cooler
Measured Material	PE and PP film thickness or selective EVOH layer thickness in multilayer films

Detector

Measured material	PE, PP	PE, PP	EVOH
Measured channel	3.60 µm	3.70 µm	2.80 µm
Reference channel	4.00 µm	4.10 µm	2.60 µm

Parameters

Film thickness	0 …50 µm	0 …350 µm	0 …40 µm
Repeatability	0.5 %	1.0 %	0.25 %
Accuracy [1]	0.5 µm	2.0 µm	0.5 %
Sampling distance	10 mm	10 mm	10 mm

Timing

Speed of response [2] 0.01 s

Alarms

Light	Two color LED
Sound	> 85 dB

Supply requirements

Supply voltage	+12 to +35 V DC
Maximum supply power	4.0 W
Nominal supply power	2.5 W

Interfaces

Digital	RS-232C
Analog	0…4.095 V

Operation conditions

Temperature range	0° to 50°C
Relative humidity	0 to 95%

Dimensions

Emitter module	56 71 45 mm
Detector module	56 71 36 mm
Collector module	131 69 25 mm

Weight

Emitter module	220 g
Detector module	210 g
Collector module	250 g

1) *At Averaging Time Constant equal 0.2 s.*

2) *Software Adjustable*

Standard Kit

#	Item	Code	Quan.
1	Detector module	DX7010P	1
2	Emitter module	DX7011P	1
3	Collector module	DX7012P	1
4	System interface cable	DX7010-C-31	2
5	RS-232 cable	DX7010-C-33/9	1
6	Power supply cable	DX7010-C-32	1
7	DX7000 Plus User's Manual		1
8	DX7000 Vision software CD		1

Dimensions
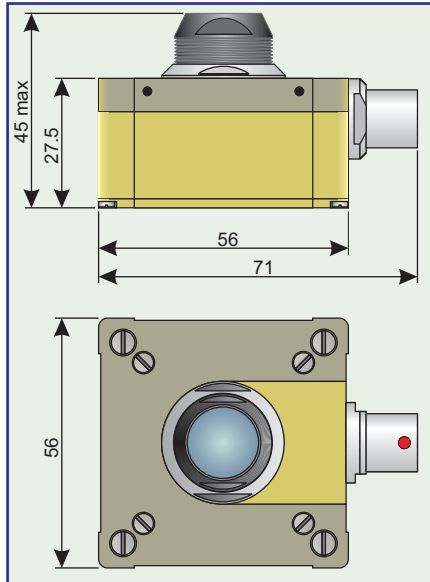
DX7010P Detector module*(in millimeters)*
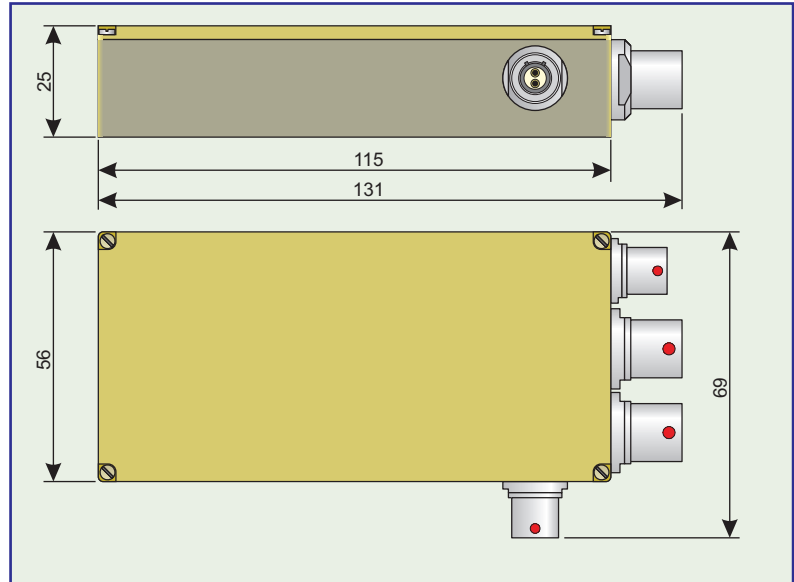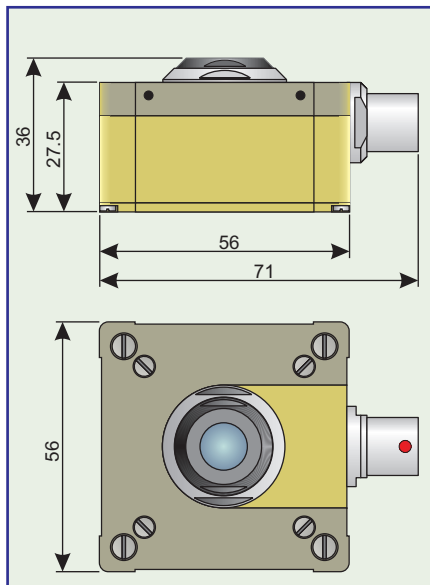

DX7012P Collector module *(in millimeters)*

DX7011P Emitter module (*in millimeters)*