

# CENTERWAVE 6000

Wall thickness, inner profile, diameter, ovality  
Measurement of pipes with innovative millimeter wave technology



# CENTERWAVE 6000

Quality assurance at the extrusion of pipes

Perfection by innovation achieves impressive progress in product quality as well as in the optimization of material costs during the manufacture of plastic pipes with diameters from 32 to 3,200 mm and large wall thicknesses. Norms and standards precisely define the minimum and maximum permissible diameters and wall thicknesses of a specific pipe dimension and require repeatable processes. In order to meet these standards and growing demands in the pipe extrusion, the use of innovative measuring and control systems in the production process is required.

## Millimeter wave technology: precise, efficient, perfect

SIKORA's innovative CENTERWAVE 6000 precisely measures the wall thickness, the inner profile, the inner and outer diameter and ovality of plastic pipes. Furthermore, it calculates the weight per meter from the measured cross-sectional area of the wall. The measuring principle does not require any coupling media, is not influenced by temperature or the plastic material and does not need any calibration. The application area of the CENTERWAVE 6000 includes both the measurement of single and multi-layer pipes. Easy operation and precision lead to the highest quality of the final product as well as cost savings and optimal efficiency.

## Function

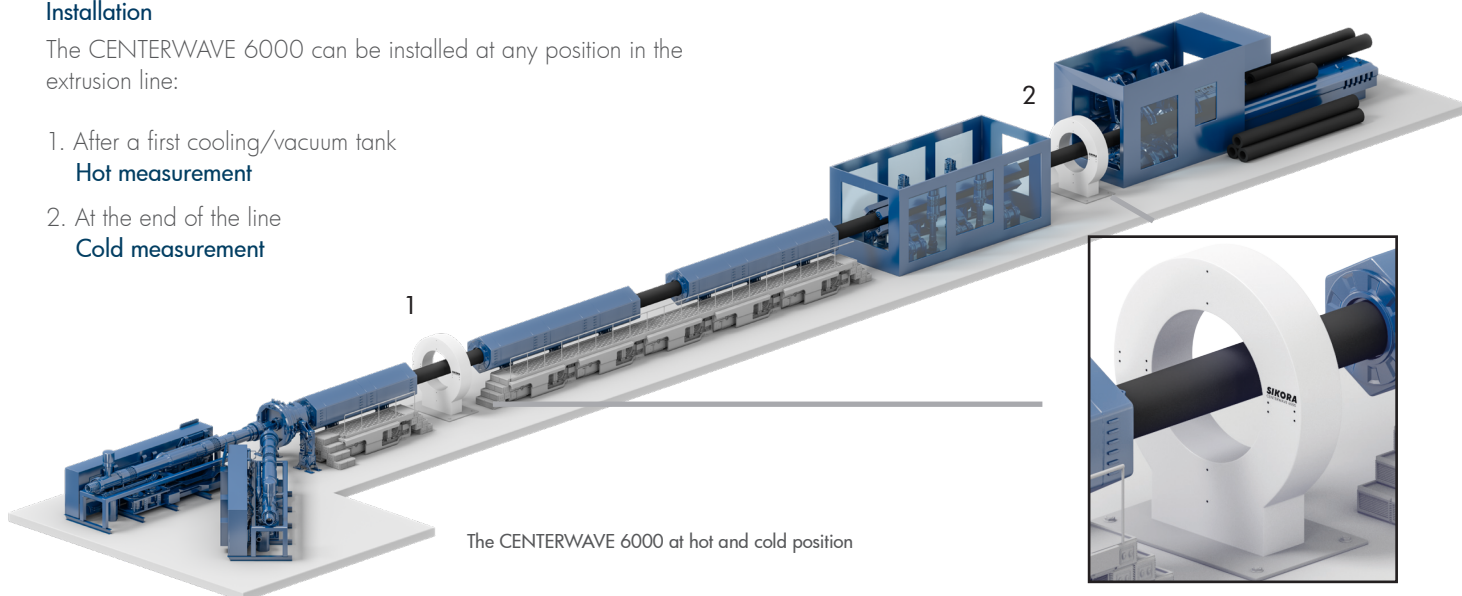
The measurement with millimeter wave technology is based on the FMCW\* runtime method. One or several constantly rotating transceivers continuously send and receive frequency modulated millimeter waves. From the runtime difference, the wall thickness, inner profile, inner and outer diameter and ovality are defined.

\* Frequency Modulated Continuous Wave

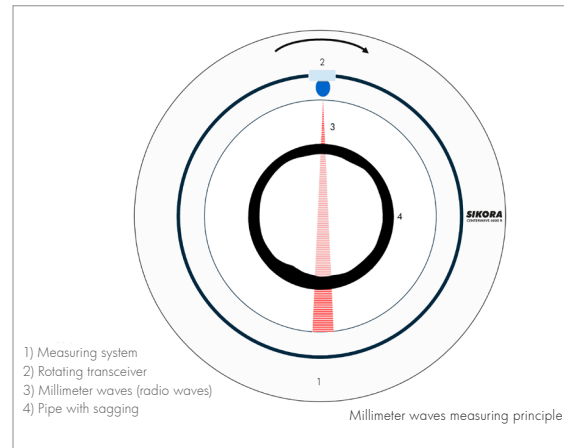
## Installation

The CENTERWAVE 6000 can be installed at any position in the extrusion line:

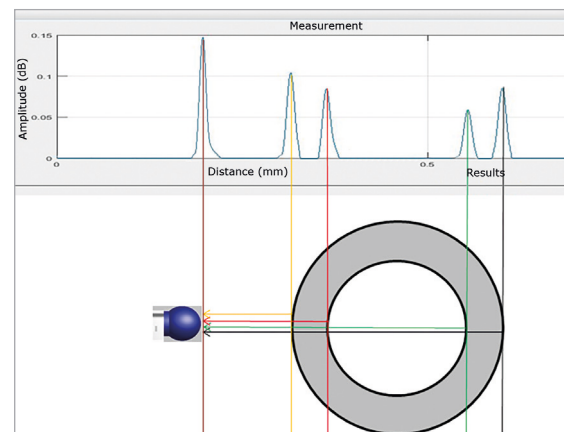
1. After a first cooling/vacuum tank  
**Hot measurement**
2. At the end of the line  
**Cold measurement**



The CENTERWAVE 6000 at hot and cold position



Measuring system with rotating sensor



Video image: Evaluation of the received signals and determination of the pipe dimensions

A rotating gauge offers the complete recording of the wall thickness over 360 degrees of the entire circumference of the pipe. This design also allows for precise measurement and visualization of the inner profile of the pipe.

### Evaluation and display

After an algorithmic processing of the received transceiver signals, the measuring values are displayed in real time. The connected processor system ECOCONTROL 6000 offers a numerical visualization of the measuring values and their graphical visualization as well as extensive trend and statistical functions and data logging opportunities.

### Applications

As product temperatures have no influence on the measuring results when using millimeter wave technology and coupling media is not required, the system can be installed for a hot measurement or for a final quality control at the cold end of the line. The CENTERWAVE 6000 is suitable for the measurement of single and multi-layer plastic pipes with a diameter from 32 to 3,200 mm that are, for example, used for conducting water, gas, chemicals and oil. The system is applicable for pipes made of all common plastics, such as PE, HDPE, PP, PA6, PVC etc. For all applications, the system provides precise measuring values, also for thick-walled pipes.

### Sagging

When producing pipes with heavy walls, depending on the plastic used, there is the risk for so-called "sagging", as the melt flows down as a result of gravity, and thus, negatively influences the pipe wall thickness distribution. This sagging is identified by the rotating measuring method because of the high measuring rate. The ECOCONTROL 6000 provides the machine operator with constant information on the production process that allows quick action to be taken.



The measuring values of the CENTERWAVE 6000 are clearly displayed at the ECOCONTROL 6000

### Automatic control: Optimization of the centering and minimization of the wall thickness

In combination with the ECOCONTROL 6000, the CENTERWAVE 6000 provides information for manual respectively thermal centering of the extrusion tools. Furthermore, the system's specific algorithms permit the control to the minimum wall thickness.

# CENTERWAVE 6000



Certified according to  
DIN EN ISO 9001

## Technical Data CENTERWAVE 6000

<b>Measuring Principle</b>
Non-contact on the basis of FMCW (Frequency Modulated Continuous Wave) millimeter wave technology
<b>Application</b>
Extrusion lines for pipes
<b>Areas of Application</b>
- Smooth pipes - Foamcore pipes - Corrugated pipes - Multi-layer pipes
<b>Material</b>
Any kinds of polyolefins (e.g. PE, PP), PVC, fluoropolymers (e.g. PVDF, PTFE), ceramic, glass
<b>Measuring Range</b>
CENTERWAVE 6000/250: 32 to 250 mm CENTERWAVE 6000/400: 90 (optional 60) to 400 mm CENTERWAVE 6000/630: 90 to 630 mm CENTERWAVE 6000/800: 160 to 800 mm CENTERWAVE 6000/1200: 250 to 1,200 mm CENTERWAVE 6000/1600: 250 to 1,600 mm CENTERWAVE 6000/3200: 1,200 to 3,200 mm (larger measuring ranges on request)
<b>Wall Thickness</b>
≥ 1.6 mm (smaller wall thicknesses on request)

<b>Repeatability</b>
Better than 5 µm
<b>Calibration</b>
The CENTERWAVE 6000 does not require any calibration
<b>Measuring Frequency</b>
80 to 300 GHz, max. 10 mW
<b>Measuring Rate</b>
370 Hz
<b>Power Supply</b>
200 - 240 V AC ± 10 %, 50/60 Hz (100 - 460 V transformer on request)
<b>Ambient Temperature</b>
+ 5 to + 45 °C
<b>Interfaces</b>
USB Optional: industrial fieldbus (e.g. Profinet IO, EtherNet/IP, Profibus-DP, CANopen, DeviceNet), LAN, OPC DA/UA, analog output

Technical data is subject to change

### Typical features

- Non-contact measurement of wall thickness, inner profile, diameter and ovality
- Measurements independent from material and temperature
- Automatic control of the wall thickness to the smallest permissible value
- Automatic control of the centering
- No need for coupling media
- Hot and cold measurement
- Measuring results in real time

### Your benefits

- Precise measuring values immediately after starting up the line for an optimum centering
- Easy operation without presetting the product parameters
- No calibration necessary

### The highly modern measuring device ensures:

- Assurance of pipe quality and repeatable processes
- Reduction of material consumption and start-up scrap
- Increase of productivity (time and cost savings)
- A short-term Return On Investment (ROI)

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