



detect and identify

Process Control

# Measuring concentration using microwaves

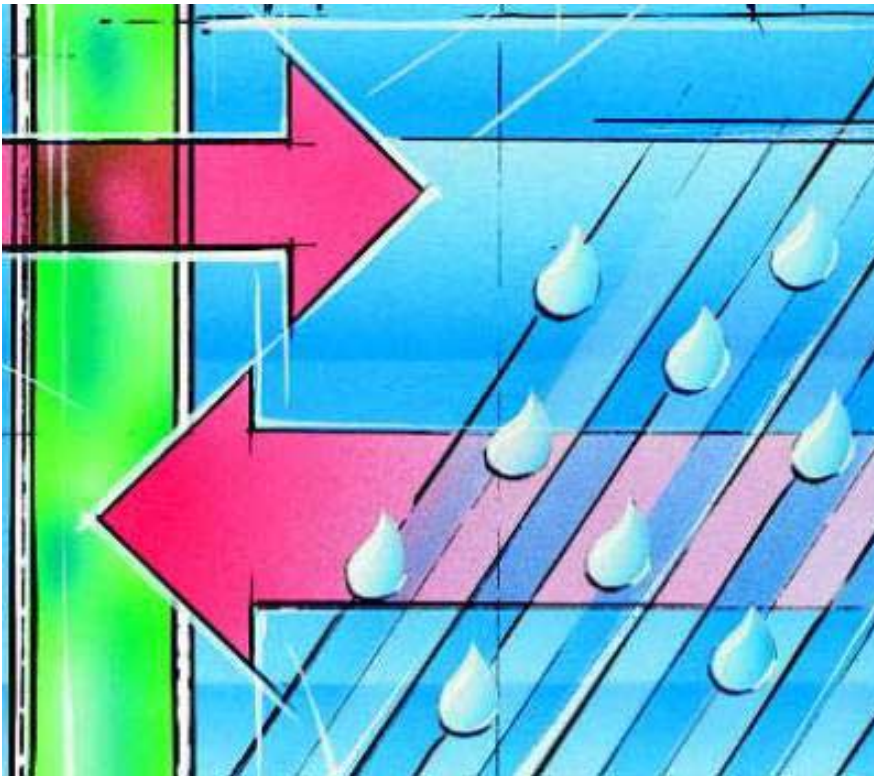
## Micro-Fluid LB 455

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Micro-Fluid LB 455

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## Exact and reliable measurement of concentration



Berthold Technologies  
your experienced  
partner

More than 15 years  
experience in the  
microwave measuring  
technology



Brown coal  
measurement



Sugar  
Measurement



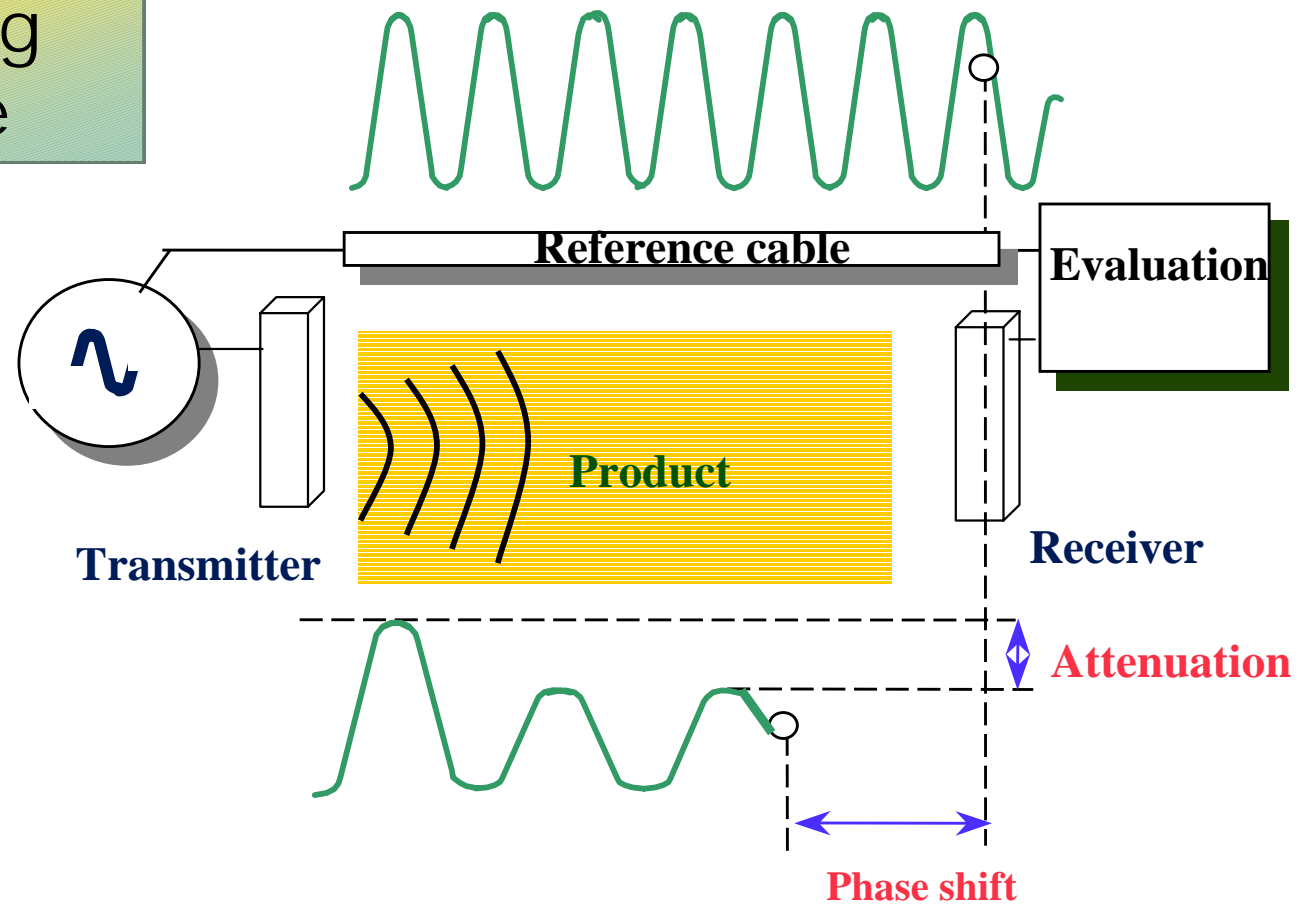
Cream cheese  
measurement

Wood chip  
measurement



# Microwave measuring system

Measuring principle



## Microwave measuring system

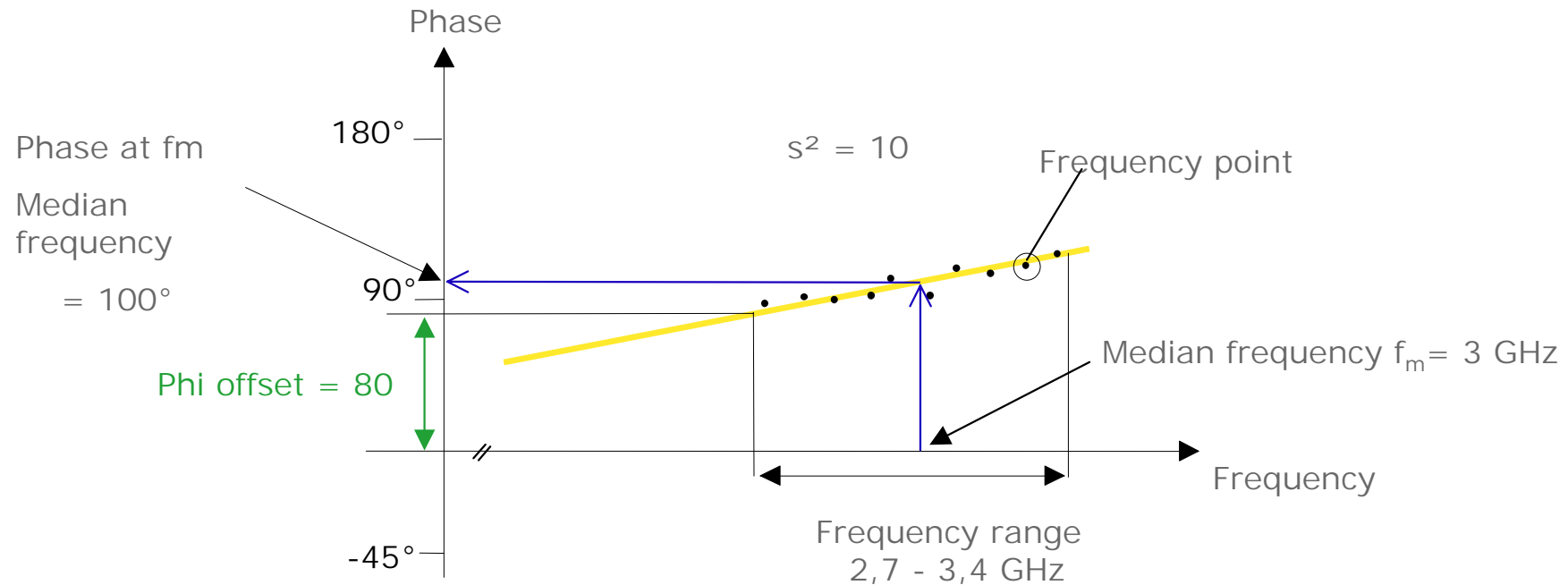
- ▶ Transmission measurement
- ▶ Measurement of 22 single frequencies in a range of 2,7 - 3,4 GHz
- ▶ Evaluation of attenuation and phase shift
- ▶ Regression over 22 frequency points
- ▶ Plausibility control, then clearance for measuring value calculation
- ▶ Concentration value from phase (and/or attenuation) calculated by means of linear regression line



# Microwave measuring system

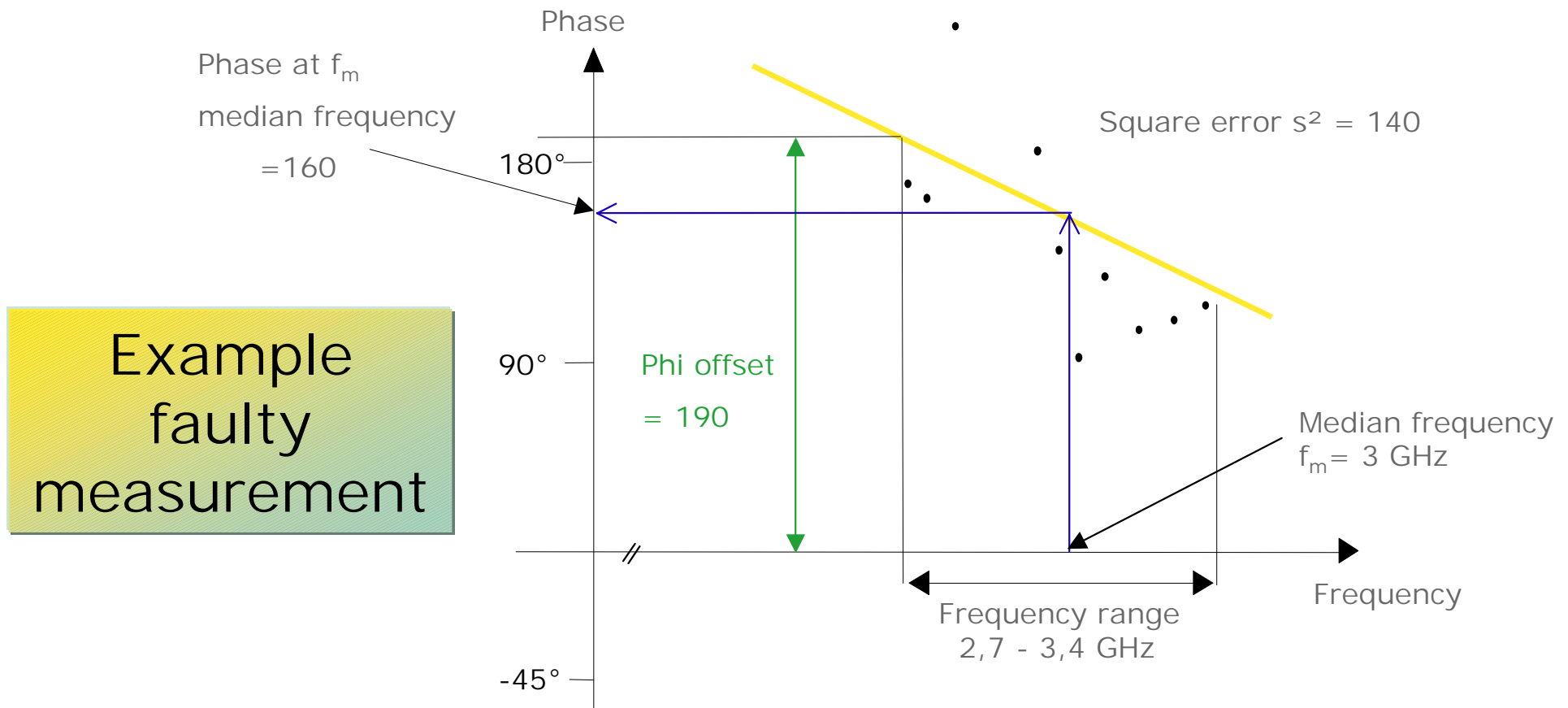
## Evaluation

$s^2$  = square error =  
Scattering of each frequency  
point around the trend line





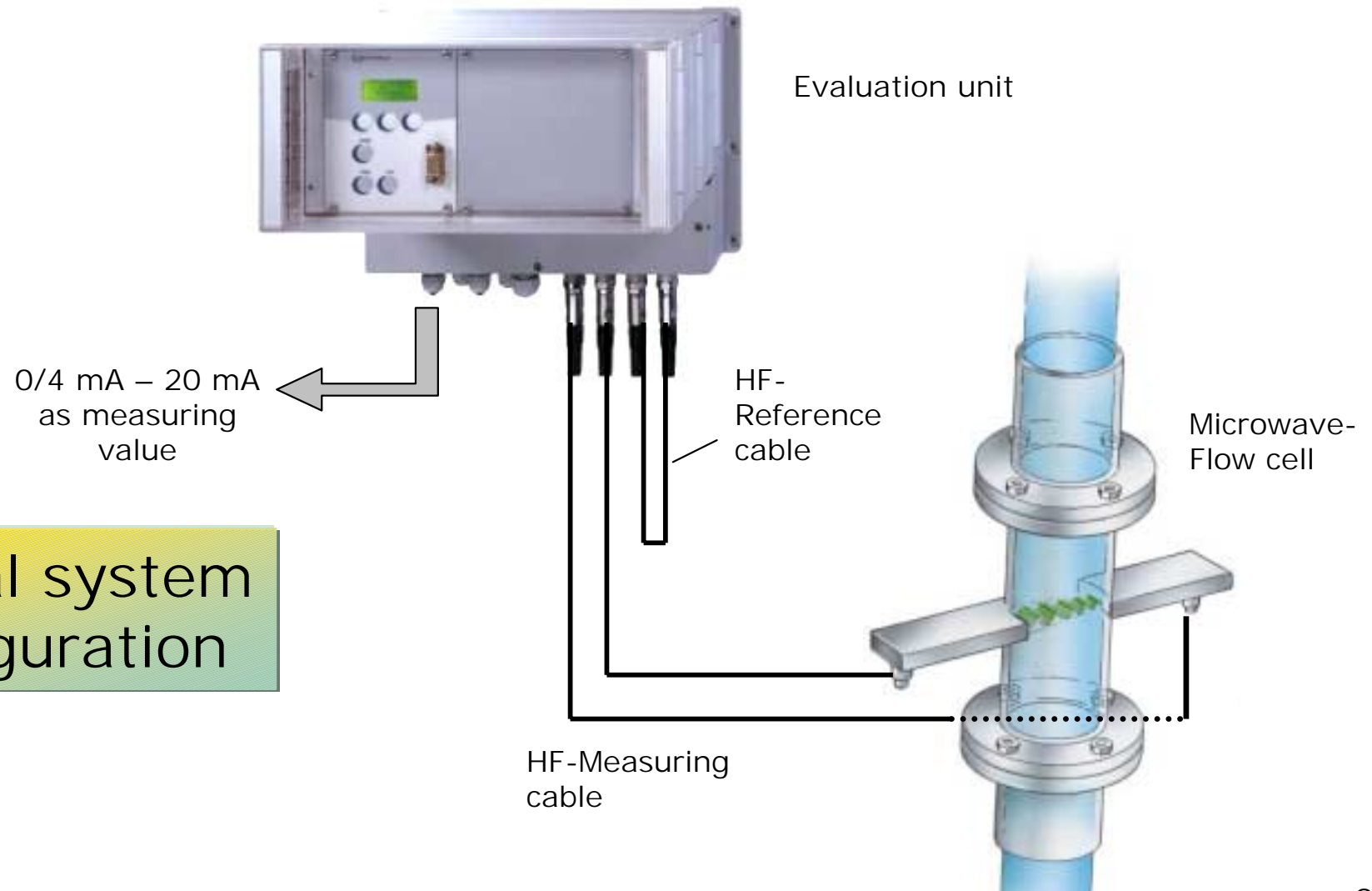
# Microwave measuring system



Example  
faulty  
measurement



# Microwave measuring system



Typical system configuration

## Special microwave sensors

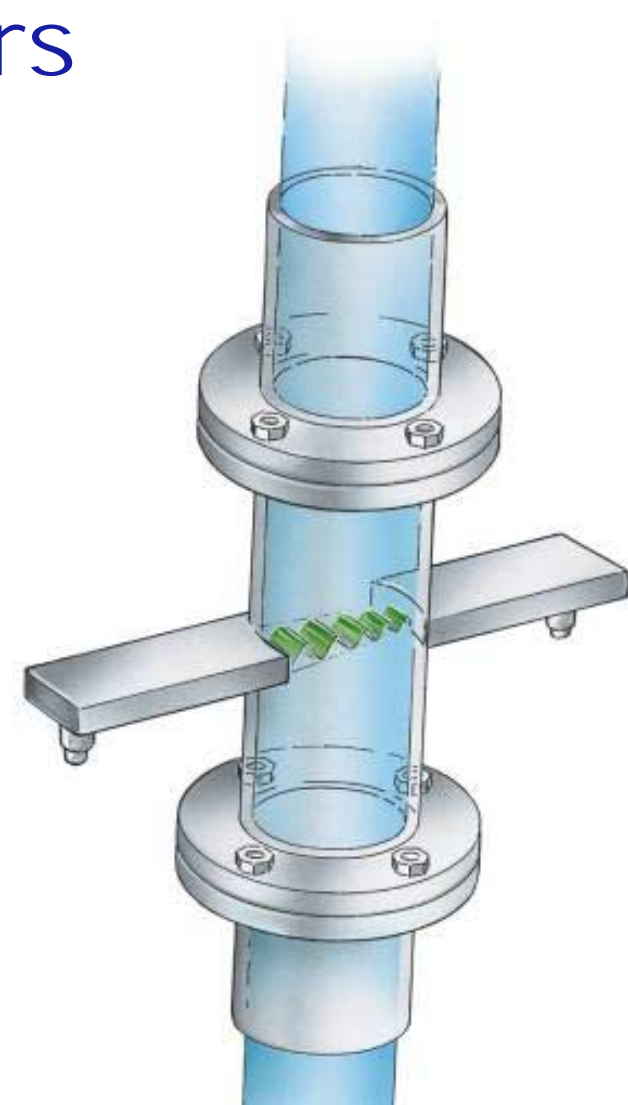
For the efficient measurement in

- ▶ Product pipes
- ▶ Containers
- ▶ Crystallisators
- ▶ Or at any other concentration measuring points

## Microwave sensors

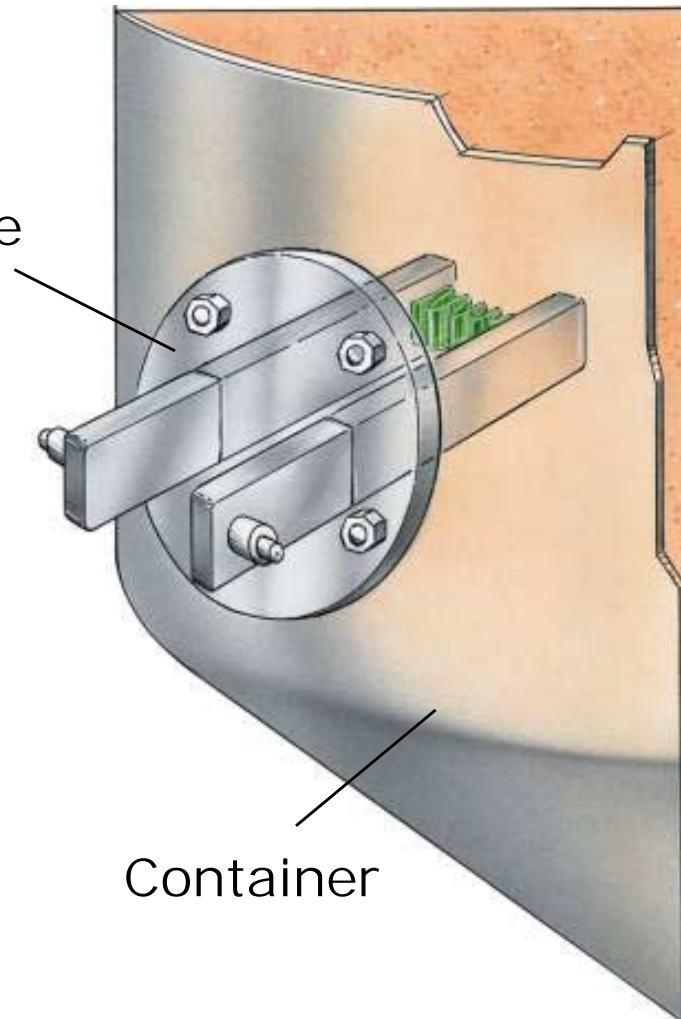
### Measurement in pipelines

- ▶ Flow cell
  - various nominal diameters
    - ▶ PTFE lining
    - ▶ Flat inner lining
    - ▶ no parts contacting the product
    - ▶ High abrasion resistance
  
- ▶ Applications on e. g.
  - ▶ Sugar beet, thick and thin juices
  - ▶ Gypsum suspension, Lime milk



# Microwave sensors

Container probe



Measurement in  
containers

Container

## Microwave sensors

- ▶ Container probes with or without flushing device
  - ▶ Material: Stainless steel and PTFE
  - ▶ High abrasion resistance
  - ▶ Standard flange
- ▶ Applications in e.g.
  - ▶ Sugar industry: vacuum pan
  - ▶ Instant coffee



## Examples of successful concentration measurements

- ▶ Cream cheese
- ▶ Sugar beet, thick and thin juice
- ▶ Butter
- ▶ Caramel
- ▶ Sewage sludge
- ▶ Gypsum suspension, Lime-milk
- ▶ Silicic acid
- ▶ Instant coffee

## Aims and Advantages

1. Exact and reliable concentration measurement
2. Abrasion proof microwave sensors
3. Quick and easy installation
4. Easy start up procedure
5. Berthold Technologies as experienced partner



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