



Processmeasurement Microwave and NIR-Spectrometer

Catalogue

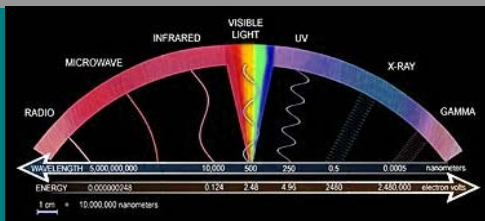
January 2010

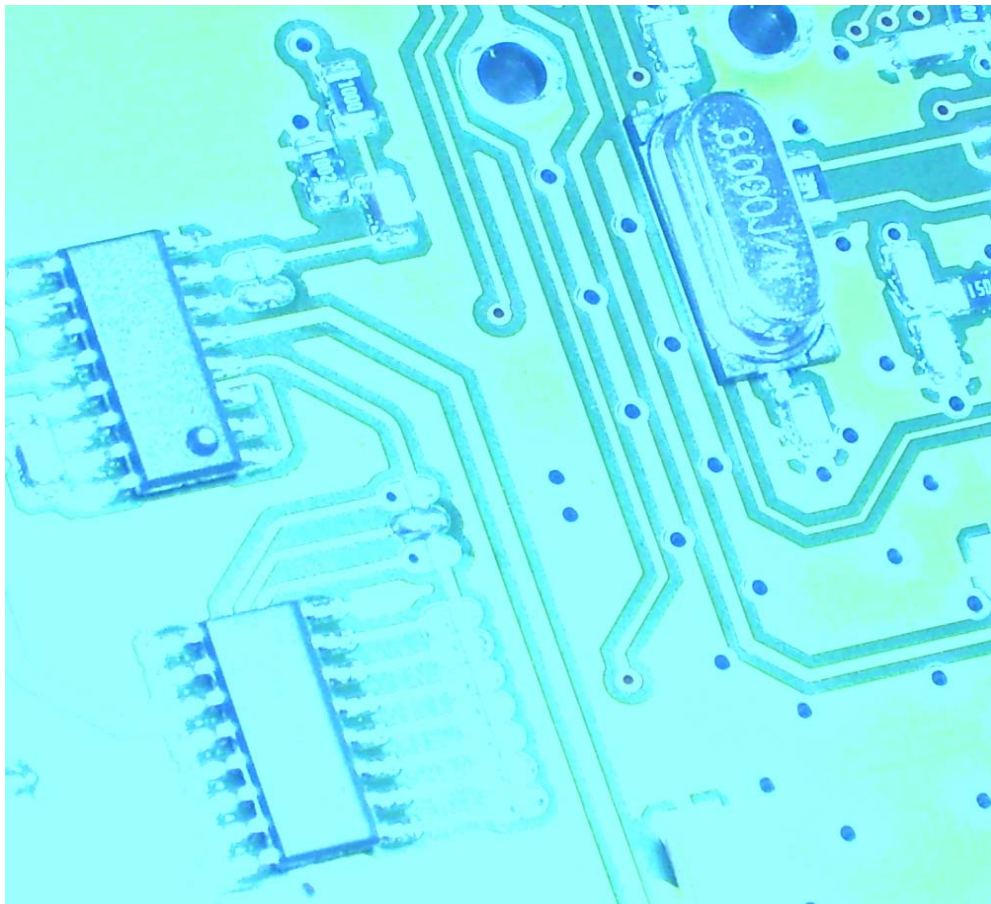
4th Edition



www.harrerkassen.com
info@harrerkassen.com

T: +49-(0)7084-928410 Am Heschen 6
F: +49-(0)7084-928429 D-75328 Langenbrand
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Der Weg ist das Ziel

Lao Tse

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1 Application / Business field

The Harrer & Kassen GmbH was established 1996 and is located in the northern Black Forest in Langenbrand. We are experts in the process measurement field.



We are developing and producing progressive and advanced instruments at the latest state of art. High performance, high measurement accuracy and high availability of the instruments made us to a leader in the supply of process measurement technology.

1.1 Processmeasurements



Matched to the engineering processes in the different industries, various procedures of measurement are in use in dependence of the technical material transport and the product to be analysed. The material to be analysed can be transported in pipes, vessels, silos, tanks or conveyer belts and the product can be solid or liquid.

For the increasement of efficiency in the production and for quality insurance our systems measure continuously various constituents and contents as total/dry solids, BRIX, moisture, concentration, fat, protein etc.

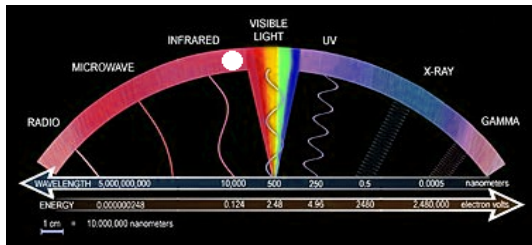




1.2 Procedures of Measurement

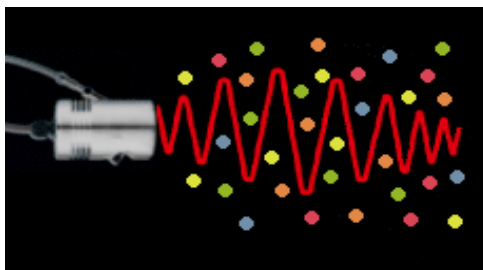


NIR



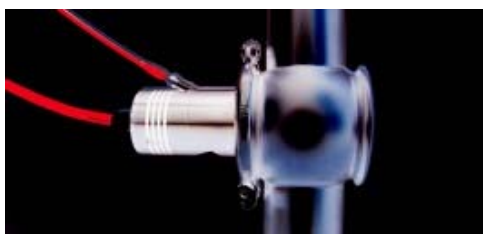
In the NIR-measurement technology the surface of the product is illuminated by white halogen light. An optical fiber sensor transfers the data, measured after the transmissive or reflective principle, to the diode array. A significant higher resolution can define all molecules with an absorption line in the spectrum of measurement. The

evaluation with diode arrays realize the measurement of every organic constituent in the detected spectrum. Mainly this are CH-, NH- and OH-molecules. The simultaneous measurement of up to 5 organic constituents is realized with an accuracy of 2 nanometers through a high resolution diode array. The spectral detection in the spectrometer is defined in the wavelength range between 600 and 2500 nanometers.



NIR-sensor with halogenlamp

Modular structure of evaluation-unit and NIR-sensor. Both are connected by an optical fiber with a max. length of up to 100 meters. The optical fiber is protected through a coating of stainless steel and contains no organic components, which could have an influence to the result of the measurement.



NIR-reflection principle

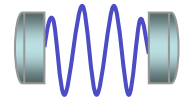
NIR-detections are alternatively performed with transmission or reflection. At the reflection principle, the product is illuminated with white halogen light. The reflected NIR-part is detected by the NIR-sensor and transferred to the diodearray via an optical fiber.



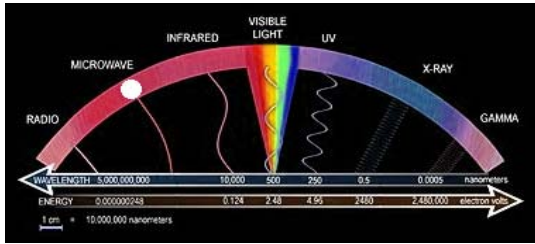
NIR-transmission principle

At the transmission principle the white halogenlight streams through the product. This only works, if the product is made of transparent material. The halogenlight is received by the NIR-sensor (at the opposite side of the lamp) and is transferred to the diodearray via an optical fiber.

The measurements are performed normally at tanks, silos, mixers and pipes. Different flowcells and flanges with special glasswindows are available also for the requirements in the food industry. The measurement cannot be influenced by environmental light or colour. The NIR-reflection measurement at conveyer belts only should be realized, if the product provides a homogenous and plain structure of the surface.

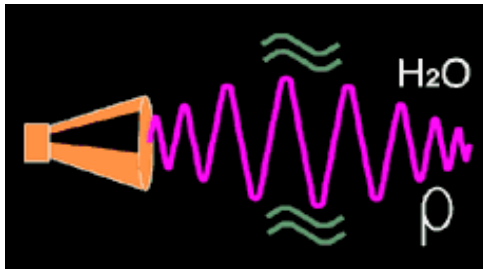


Microwave Measurement



In the microwave measurement an electromagnetic wave with low energy is generated and via an antenna integrated into the product. This wave spreads out in the product in dependence of the electrical characteristics. A second antenna receives this wave. Energy and phase of the received wave are indicators for the watercontent, the material concentration and density in the product. MW-measurements are qualified because of high stability and a very short feedback time. Measurements at conveyer belts or nonconductive tanks are operating without direct contact and can be mounted outside of the process equipment. In case of metallic tanks the sensors are inserted together with a flange in the wall.

and density in the product. MW-measurements are qualified because of high stability and a very short feedback time. Measurements at conveyer belts or nonconductive tanks are operating without direct contact and can be mounted outside of the process equipment. In case of metallic tanks the sensors are inserted together with a flange in the wall.



Provision of the latest digital microwave technology at 2,45GHz or 10/24GHz. In dependence of the measurement, different sensorsystems can be used alternatively. Anwendung.

pinantennas:



short pinantennas:



spiralantennas:



mini-spiralantennas:



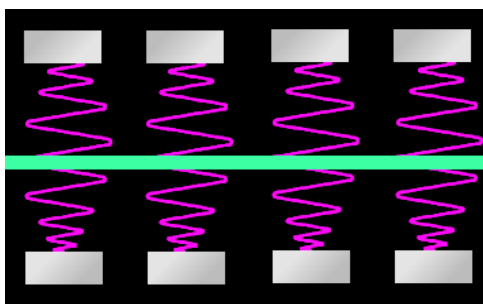
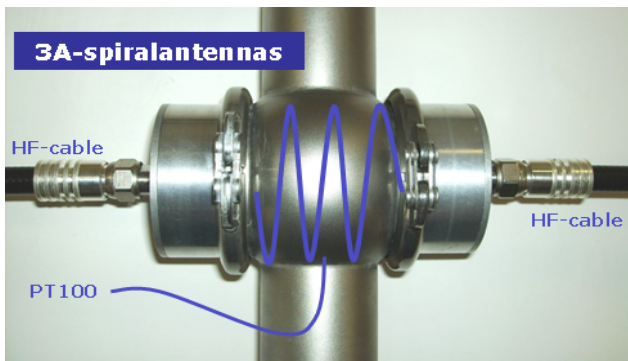
hornantennas:



3A-spiralantennas:



10/24GHz-sensors:





1.3 Applications



We do measure online in the process, not offline in the laboratory!

With our microwave instruments and our NIR-spectrometer we are present in many branches in a large number of industries.

FOOD INDUSTRY		
Food	spices liquid spices sauces mayonnaise marmelades	total solids/dry solids fat protein water
Candies	chocolate caramel	total solids/dry solids
Pet food	meat fodder	fat water
Meat products	 cooked ham film ham raw sausage brew sausage boiled sausage ground meat	Wasser fat creatin collagen calculated water
Poultry	turkey sausage pies	fat water
Fish	fish meal pies	fat water
Dairies/Creameries	 fermented cheese processed cheese cream cheese butter mozzarella liquid products milk powder	total solids/dry solids fat protein water lactose 
Sugar	sugar beets sugarcane	BRIX 



BEVERAGE & TOBACCO INDUSTRY		
Breweries	beer	water moisture ethanol
Soft drinks	lemonade	
Spirits	brandy	
Tobacco	tobacco leaves	


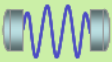







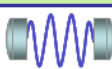
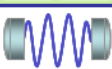
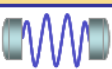






CHEMICALS INDUSTRY		
Base material	biodiesel	ethanol moisture concentration
Paper mills	paper/cellulose	
Paints	lacquers	
Packaging	cardboard/starch	



CONSTRUCTION INDUSTRY		
Timber industry	chipboards/veneer	moisture
Building material	plaster/roof tiles	
Cement industry	cement	

Applications

Dairy products

<p><u>fermented cheese</u> soft cheese semihard cheese hard cheese</p>  	<p><u>creamcheese</u> curd creamcheese cottage cheese</p>  <p>mascarpone ricotta</p> 	<p><u>pasta filata cheese</u> mozzarella</p>  <p>butter</p> 	<p><u>liquid products</u> buttermilk fresh milk evaporated milk cream jogurt desserts whey drinks milk drinks</p> 	<p><u>milk powders</u> full cream skimmed milk buttermilk jogurt cream curd whey hydrolyzate</p> 
<p><u>processed cheese</u> fondue cheese</p> 				
				

Semihard cheese





Cream cheese / Curd



Boiled sausage



Optimisation, Quality Assurance, Efficiency

The customer value is obvious. The online-measurements make a good case for reliable trend indications for the total production characteristics.

With the cheese measurement this applies not only to the dry solid values, but also, as an assurance of the product quality, to the height values of each cheese block.

Microwave-meters as well as NIR-spectrometers are non-contacting online measurements. No product will be destroyed by sampling or even influenced.

The online analysis are effected continuously and in real-time, d.h., the results are useable immediately and not after hours or days. The obtained actual values are explicit and enable the control of the production through manual operations or in the best case through automation.

The continuous recording of the measured values allow the spreading of archives and statistics formatted for audits; specific for sorts, charges, products and clients.

The number of laboratory samples for production control can be reduced.

Savings are always realistic. A spillover in the products can be avoided. Only with the continuous recording of the production data, weak spots and malfunctions can be detected in the plant. With this results measures for improvement and optimisation can be afforded.



2 Evaluation units

2.1 HK1

Latest digital microwave technology at 2,45 GHz

The microwave instrument HK1 is available in 4 product versions:

- HK1-M modular
- HK1-Mp modular paper
- HK1-Mc modular cheese
- HK1-C compact

2.1.1 HK1-M

HK1-M



evaluation unit HK1-M

range of application

measurement of concentration and water content in the food-, primary- and chemical industry

Example: Measurement of dry/total solids in creamcheese products

design

aluminium pressure casting housing
h x w x d: 200 x 230 x 110mm

HF-cable 2 x 2m

functionality / sensor systems

2 pinantennas

pinantennas (with PT100 and flange DN65)

pinantennas (with PT100 and flange DN80)

elongated pinantennas (PT100/flange DN65)

elongated pinantennas (PT100/flange DN80)



HK1-M1- PAN-6506

HK1-M1- PAN-8006

HK1-M1- PAL-6506

HK1-M1- PAL-8006

2 3A-spiralantennas

3A-spiralantennas (for 3A-flowcell)



HK1-M1- 3SA-3AFC

2 short 3A-pinantennas

short 3A-pinantennas (for 3A-flowcell)



HK1-M1- 3SP-FLC1

2 mini-spiralantennas

mini-spiralantennas with sockets (for flowcell)



HK1-M1- MSA-FLC2

2 spiralantennas

spiralantennas



HK1-M2- SPA-0000

2 hornantennas

hornantennas



HK1-M2- HOA-0000



2.1.2 HK1-Mp

HK1-MP

evaluation unit HK1-Mp

range of application

measurement of density in the paper industry

Example: Starch concentration

design

aluminium pressure casting housing
h x w x d: 177 x 177 x 100mm

HF-cable 2 x 2m

functionality / sensor systems**PAN-8006****2 pinantennas**

pinantennas (with PT100 and flange DN80)

**3SA-WFL1****2 3A-spiralantennas**

3A-spiralantennas (for welding flanges)

**MSA-FLC2****2 mini-spiralantennas**

mini-spiralantennas with sockets (for flowcell)



2.1.3 HK1-Mc

HK1-MC

evaluation unit HK1-Mc

**SPA-CH01****range of application**

Dry/total solids measurement of cheese blocks (semihard cheese) pre-brine stage in dairy and cheese factories

design

aluminium pressure casting housing
h x w x d: 200 x 230 x 110mm

stainless steel box 300 x 500 x 170mm
stainless steel distance-lasersensor
HF-cable 2 x 2m

functionality / sensor systems**2 spiralantennas**

spiralantennas

1 stainless steel box



2.1.4

HK1-Mc-LAB

HK1-MC



evaluation unit HK1-Mc-LAB

range of application

Dry/total solids measurement of cheese blocks (semihard cheese) pre-brine stage in dairy and cheese factories
Manual product sampling

design

aluminium housing
h x w x d: 130 x 390 x 210mm

distance-lasersensor
HF-cable 2 x 2m

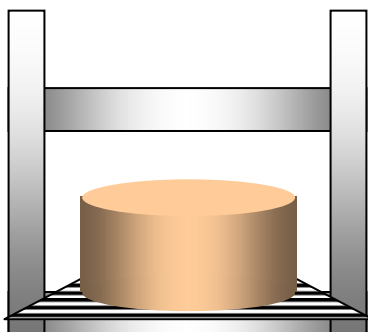
functionality / sensor systems

2 spiralantennas

spiralantennas



LAB-CH02



1 laboratory-measure-device

(stainless steel / teflon)
HKD-CH-TEF-0001





2.1.5 HK1-C

HK1-C1



evaluation unit HK1-C



PAN-8006

range of application

measurement of concentration and water content in the food-, primary- and chemical industry
density measurement paper industry

design

aluminium pressure casting housing
h x w x d: 177 x 177 x 100mm

functionality / sensor systems

2 integrated pinantennas

pinantennas (with PT100 and flange DN80)

2.2 HK2

Latest digital microwave technology at 2,45 GHz

The microwave instrument HK2 is available in 3 product versions:

- HK2-M modular
- HK2-C compact
- HK2-F field

2.2.1 HK2-M

HK2-M1



evaluation unit HK2-M



PAN-6506

range of application

concentration measurement BRIX in the sugarindustry

design

aluminium pressure casting housing
h x w x d: 177 x 177 x 100mm

HF-cable 2 x 2m

functionality / sensor systems

2 pinantennas

pinantennas (flange DN65)



PAC-6506

2 pinantennas

pinantennas (with cleaning and flange DN65)



2.2.2 HK2-C

HK2-C1



evaluation unit HK2-C



PAN-6506

range of application

concentration measurement BRIX in the sugarindustry

design

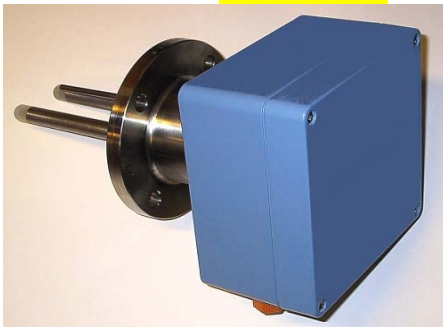
aluminium pressure casting housing
h x w x d: 177 x 177 x 100mm

functionality / sensor systems**2 integrated pinantennas**

pinantennas (with NTC and flange DN65)

2.2.3 HK2-F

HK2-F1



evaluation unit HK2-F



OPE-6506

range of application

concentration measurement BRIX in the sugarindustry

design

aluminium pressure casting housing
h x w x d: 177 x 177 x 100mm
keine Folientastatur

functionality / sensor systems**2 integrated pinantennas**

pinantennas (with NTC and flange DN65)

1 remote control

remote control with 10m connection cable





2.3 HK4 (NIR-spectrometer)

Latest NIR-technology with diode array.

The spectrometer is available in 3 product versions

- HK4-1 600nm - 1100nm
- HK4-2 1200nm - 1700nm
- HK4-3 1700nm - 2500nm

2.3.1 HK4-1

HK4-10



evaluation unit HK4

range of application

Measurement in % of **3** organic constituents, through spectral absorption of all molecules of the CH-, NH- and OH-compounds.

spectral range 600nm - 1100nm

design

stainless steel box

h x w x d: 180 x 600 x 300mm

*Preferable transmission-measurement.
Example: Ethanol in brandy*

functionality / sensor systems



NIR-4BFT

1 NIR-sensor

halogen lamp 4B black enodized
3A-flowcell DN50 / transmission



NIR-4SFT

1 NIR-sensor

halogen lamp 4S stainless steel
3A-flowcell DN50 / transmission





2.3.2 HK4-2

HK4-2x



evaluation unit HK4

Examples: *Measurement in blenders / boiled sausage*
Measurement in pipes / curd and jogurt

range of application

Measurement in % of **4** organic constituents, through spectral absorption of all molecules of the CH-, NH- and OH-compounds.

spectral range 1200nm - 1700nm

design

stainless steel box
 h x w x d: 180 x 600 x 300mm

HK4-21	1 organic constituent 1 analogue output 0/4 - 20mA
HK4-22	2 organic constituents 2 analogue outputs 0/4 - 20mA
HK4-23	3 organic constituents 3 analogue outputs 0/4 - 20mA
HK4-24	4 organic constituents 4 analogue outputs 0/4 - 20mA

functionality / sensor systems



NIR-4BFR



1 NIR-sensor

halogen lamp 4B black enodized
 3A-flowcell DN50 / reflection



NIR-4SFR



1 NIR-sensor

halogen lamp 4S stainless steel
 3A-flowcell DN50 / reflection



NIR-4BFT



1 NIR-sensor

halogen lamp 4B black enodized
 3A-flowcell DN50 / transmission



NIR-4SFT



1 NIR-sensor

halogen lamp 4S stainless steel
 3A-flowcell DN50 / transmission



NIR-4BTR



1 NIR-Sensor

halogen lamp 4B black enodized
 3A-tankcell DN50 / reflection

NIR-4STR



1 NIR-Sensor

halogen lamp 4S stainless steel
 3A-tankcell DN50 / reflection



NIR-4BPR



1 NIR-Sensor

halogen lamp 4B black enodized
 3A-tubecell DN50 / reflection

NIR-4SPR



1 NIR-Sensor

halogen lamp 4S stainless steel
 3A-tubecell DN50 / reflection



2.3.3 HK4-3

HK4-30



evaluation unit HK4

range of application

Measurement in % of **5** organic constituents, through spectral absorption of all molecules of the CH-, NH- and OH-compounds.

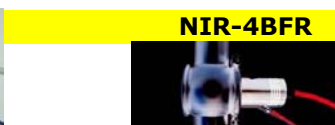
spectral range 1700nm - 2500nm

design

stainless steel box
h x w x d: 180 x 600 x 300mm

*Examples: Measurement in blenders / boiled sausage
Measurement in pipes / curd and jogurt
Measurement in pipes / milkpowder*

functionality / sensor systems



NIR-4BFR

1 NIR-sensor

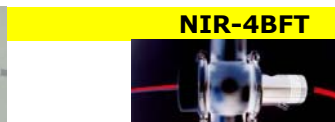
halogen lamp 4B black enodized
3A-flowcell DN50 / reflection



NIR-4SFR

1 NIR-sensor

halogen lamp 4S stainless steel
3A-flowcell DN50 / reflection



NIR-4BFT

1 NIR-sensor

halogen lamp 4B black enodized
3A-flowcell DN50 / transmission



NIR-4SFT

1 NIR-sensor

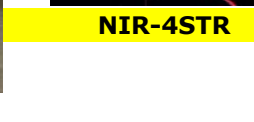
halogen lamp 4S stainless steel
3A-flowcell DN50 / transmission



NIR-4BTR

1 NIR-Sensor

halogen lamp 4B black enodized
3A-tankcell DN50 / reflection



NIR-4STR

1 NIR-Sensor

halogen lamp 4S stainless steel
3A-tankcell DN50 / reflection



NIR-4BPR

1 NIR-Sensor

halogen lamp 4B black enodized
3A-tubecell DN50 / reflection



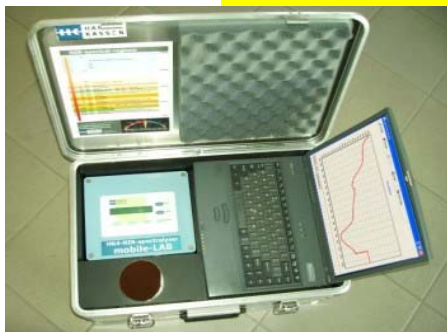
NIR-4SPR

1 NIR-Sensor

halogen lamp 4S stainless steel
3A-tubecell DN50 / reflection



2.3.4 HK4-mobile-LAB **HK4-ML** **NIR-0001**



HK4-mobile-LAB



evaluation unit HK4-3



range of application

Measurement in % of **5** organic constituents, through spectral absorption of all molecules of the CH-, NH- and OH-compounds.

spectral range 1700nm - 2500nm

design

aluminium-case
h x w x d: 380 x 580 x 240mm

integrated:

- HK4-3 evaluation unit
- NIR-sensor / reflection
- optical fiber
- arrangement for petri dishes
- notebook
- chemometric software SPECTER
- precalibrated product characteristics
- measure kit (for product preparation)
- petri dishes (glassware)
- operating manual

2.4 **HK5** **HK5**



evaluation unit HK5



HK5-12 **GHZ-0010**
HK5-12 **GHZ-0024**

range of application

Measurement of moisture in thin layers at the production of
- paper, card board paper industry
- chip boards, veneers (primary industry)

design

aluminium pressure casting housing
h x w x d: 200 x 230 x 110mm

standard cable (option max. 100m)

functionality / sensor systems

2 sensors

- 10 GHz-sensors
- 24 GHz-sensors



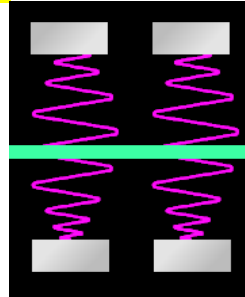


HK5-14 GHZ-0010
HK5-14 GHZ-0024

4 sensors

10 GHz-sensors

24 GHz-sensors

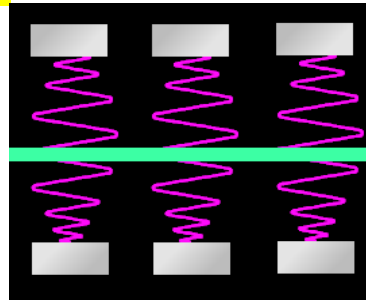


HK5-16 GHZ-0010
HK5-16 GHZ-0024

6 sensors

10 GHz-sensors

24 GHz-sensors

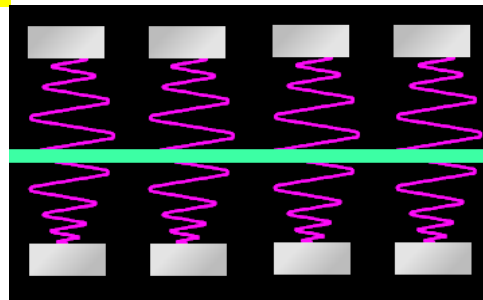


HK5-18 GHZ-0010
HK5-18 GHZ-0024

8 sensors

10 GHz-sensors

24 GHz-sensors





2.5

HK6

Latest digital microwave technology at 2,45 GHz.

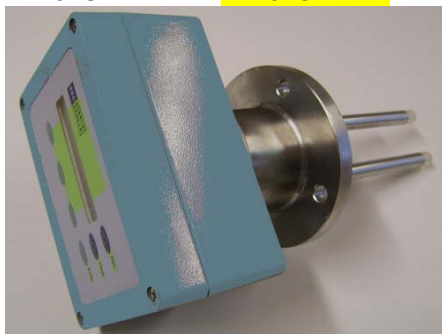
The microwave instrument HK2 is available in 2 product versions:

- HK6-C compact
- HK2-F field

2.5.1

HK6-C

HK6-C1



evaluation unit HK6-C



PAN-6506

range of application

concentration measurement BRIX in the sugarindustry

design

aluminium pressure casting housing
h x w x d: 130 x 200 x 90mm

functionality / sensor systems

2 integrated pinantennas

pinantennas (with NTC and flange DN65)

2.5.2

HK6-F

HK6-F1



evaluation unit HK6-F



OPE-6506

range of application

concentration measurement BRIX in the sugarindustry

design

aluminium pressure casting housing
h x w x d: 130 x 200 x 90mm
no softkeys

functionality / sensor systems

2 integrated pinantennas

pinantennas (with NTC and flange DN65)

1 remote control

remote control with 10m connection cable





3 Components

3.1 Evaluation Units

3.1.1 HK1-M **HK1-M1- XXX-0000**



Evaluation Unit HK1-M without sensors, cables etc.

3.1.2 HK1-Mp **HK1-Mp- XXX-0000**



Evaluation Unit HK1-Mp without sensors, cables etc.

3.1.3 HK2-M **HK2-M1- XXX-0000**



Evaluation Unit HK2-M without sensors, cables etc.

3.1.4 HK5 **HK5-00- XXX-1224**



Evaluation Unit HK5 without sensors, cables etc.

3.2 sensors / antennas

3.2.1 PT100 **HKA-TE**



PT100-Kabel

range of application

Temperature acquisition of the product to compensate the measure result

in use with:

- HK1-M
- HK1-Mp
- HK1-C
- HK4

design

length: ca.200mm

thread: M8

standard cable 2,5m

PT1-0100

PT2-E100 with connection electronic



3.2.2 pinantennas

HKA-MW

Stabsensoren mit Flansch

range of application

Microwave measurement TS (total solids)
in pipes and tanks

design

immersion depth 195mm

PAN-6506 flange DN65

in use with:

- HK1-M
- HK2-M
- HK2-C
- HK2-F
- HK6-C
- HK6-F

immersion depth 195mm

PAN-8006 flange DN80

in use with:

- HK1-M
- HK1-Mp
- HK1-C

3.2.3 pinantennas with cleaning

HKA-MW

pinantennas with cleaning

range of application

Microwave measurement TS (total solids)
in pipes and tanks
concentration measurement BRUX in the
sugarindustry.

design

immersion depth 195mm

PAC-6506 flange DN65

in use with:

- HK2-M



3.2.4 elongated pinantennas

HKA-MW



elongated pinantennas
with flange

range of application

Microwave measurement TS (total solids)
in pipes and tanks

design

PAL-6506

immersion depth max. 370mm
flange DN65

in use with:

- HK1-M
- HK2-M
- HK2-C
- HK2-F
- HK6-C
- HK6-F

PAL-8006

immersion depth max. 370mm
flange DN80

in use with:

- HK1-M
- HK1-Mp
- HK1-C

3.2.5 3A-spiralantennas

HKA-MW



3A-spiralantennas

range of application

Microwave measurement TS (total solids)
in pipes

design

3SA-3AFC

distance max. 200mm

in use with:

- HK1-M
- HK1-Mp



3.2.6 short 3A-pinantennas

HKA-MW

short 3A-pinantenna

range of application

Microwave measurement TS (total solids)
in pipes

design

3SP-FLC1 distance max. 80mm
in use with:
- HK1-M

3.2.7 mini-spiralantennas

HKA-MW

mini-spiralantenna

range of application

Microwave measurement TS (total solids)
in pipes

design

MSA-FLC2 distance max. 200mm
in use with:
- HK1-M
- HK1-Mp

3.2.8 spiralantennas

HKA-MW

spiralantenna

range of application

Microwave measurement TS (total solids)
at conveyer belts or arrangements with
hand operated product supply

design

SPA-0000 distance max. 500mm
in use with:
- HK1-M
- HK1-Mc



3.2.9 hornantennas

HKA-MW

hornantenna

range of application

Microwave measurement TS (total solids)
at conveyer belts

design

HOA-0000 distance max. 1000mm
in use with:
- HK1-M

3.2.10 10/24GHz-sensors

HKA-MW

10/24GHz-sensors

range of application

Microwavemeasurement TS (moisture)
in thin layers (paper, card board,
chip boards) on conveyer belts

design

GHZ-0010 10 GHz-version
in use with:
- HK5

GHZ-0024 24 GHz-version
in use with:
- HK5



3.2.11 NIR-sensor / halogenlamp

HKA-IR

NIR-Sensor

range of application

NIR-reflection- or -transmission measurement to detect organic molecules in CH-, NH- and OH-compounds.

design

NIR-4BT1 4 halogen bulbs / housing black enodized
transmission measurement

NIR-4ST1 4 halogen bulbs / housing stainless steel
transmission measurement

NIR-4BR1 4 halogen bulbs / housing black enodized
reflection measurement

NIR-4SR1 4 halogen bulbs / housing stainless steel
reflection measurement

in use with:

- HK4



3.3 Measure cells

3.3.1 3A-flowcell (for 3A-spiralantennas)

HKC-PR



3A-flowcell

3SA-3AFC

range of application

Microwavemeasurement TS (total solids)
in pipes

design

pipe diameter DN50
in use with:
- 3A-spiralantennas

2 welding flanges (for 3A-spiralantennas)

HKC-PR



3SA-WFL1

pipe diameter DN100 or larger
in use with:
- 3A-spiralantennas

3.3.2 3A-flowcell (for short 3A-pinantennas)

HKC-PR



3A-flowcell

3SP-FLC1

range of application

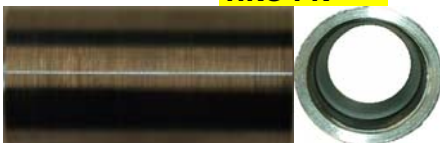
Microwavemeasurement TS (total solids)
in pipes

design

pipe diameter DN50
in use with:
- short 3A-pinantennas

2 welding sockets stainless steel (for short 3A-pinantennas)

HKC-PR



3SP-WSO3

welding in pipes DN50 or larger
in use with:
- short 3A-pinantennas



3.3.3 flowcell (for mini-spiralantennas)

HKC-NO



flowcell

range of application

Microwavemeasurement TS (total solids)
in pipes

design

MSA-FLC2 pipe diameter DN65
in use with:
- mini-spiralantennas

2 welding sockets stainless steel (for mini-spiralantennas)

HKC-NO



MSA-WSO1 welding in pipes DN65 or larger
in use with:
- mini-spiralantennas

3.3.4 3A-flowcell (for NIR-reflection)

HKC-PR



3A-flowcell

range of application

NIR-reflections measurement to detect
organic molecules in CH-, NH- and OH-
compounds

design

NIR-3AFR pipe diameter DN50
in use with:
- NIR-sensor/reflection

HKA-IR- NIR-4BR1
HKA-IR- NIR-4SR1



3.3.5 3A-flowcell (for NIR-transmission)

HKC-PR



3A-flowcell

range of application

NIR-transmission measurement to detect organic molecules in CH-, NH- and OH-compounds

design

NIR-3AFT pipe diameter DN50

in use with:

- NIR-sensor/transmis.

HKA-IR- NIR-4BT1

HKA-IR- NIR-4ST1

3.3.6 3A-tankcell (for NIR-reflection)

HKC-PR



3A-tankcell

range of application

NIR-reflections measurement to detect organic molecules in CH-, NH- and OH-compounds

design

NIR-3ATR flange

in use with:

- NIR-sensor/reflection

HKA-IR- NIR-4BR1

HKA-IR- NIR-4SR1

3.3.7 3A-tubecell (for NIR-reflection)

HKC-PR



3A-tubecell

range of application

NIR-reflections measurement to detect organic molecules in CH-, NH- and OH-compounds

design

NIR-3APR flange

in use with:

- NIR-sensor/reflection

HKA-IR- NIR-4BR1

HKA-IR- NIR-4SR1



4 Devices / Spareparts

4.1 devices

4.1.1 remote control **HKD-OD**



OPE-0010

range of application

remote operation of HK-evaluation-units via 10m connection cable

in use with:

- HK1-M
- HK1-Mp
- HK1-C
- HK2-M
- HK2-C
- HK2-F
- HK5
- HK6-C
- HK6-F

design

plastic housing
keypad/softkeys
connection cable 10m

4.1.2 cable

4.1.2.1 HF-cable **HKD-CA**



HFC-0001

HFC-0002

range of application

connection of modular microwave evaluation-units with sensors

in use with:

- HK1-M
- HK1-Mp
- HK1-Mc
- HK2-M

design

1m coax cable/indoor, outdoor
2m max.

4.1.2.2 standard cable **HKD-CA**



STA-0001

STA-0100

range of application

cable for power supply

connection with sensors

- HK5

design

1m NYM-cable/indoor, outdoor
100m max.



4.1.2.3 optical fiber

HKD-OF**range of application**

connection of HK4-spectrometers with NIR-sensors

in use with:

- HK4

design

NIR-0001 1m optical fiber/indoor, outdoor with stainless steel coating

NIR-0100 100m max.

4.1.3 swiffle-flange

HKD-FL**range of application**

adjustable device for pinantennas.
optional spin of pinantennas

in use with:

- pinantennas

design

PAN-0065 DN65

PAN-0080 DN80

4.1.4 stainless steel box

HKD-CH**range of application**

housing for the protected installation of evaluation-unit and PS for distance-lasersensor.

in use with:

- HK1-Mc

design

BOX-0001 h x w x d: 300 x 500 x 167mm
stainless steel

4.1.5 distance-lasersensor

HKD-CH**range of application**

rating of the thickness of the product
(fermented cheese blocks)

in use with:

- HK1-Mc

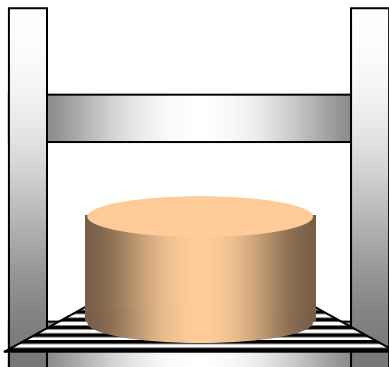
design

LAS-0001 h x w x d: 25 x 35 x 55mm



4.1.6 laboratory.measure-device

HKD-CH



TEF-0001

range of application

installation of the sensors for TS-measurement (cheese/curd). Hand operated product supply.

in use with:

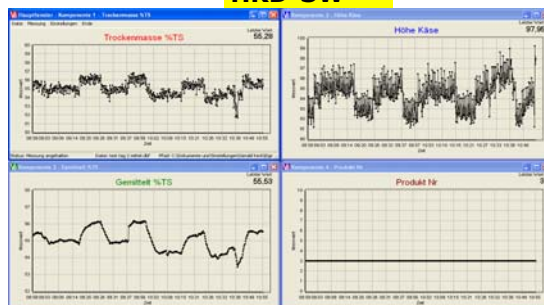
- HK1-Mc

design

h x w x d: 600 x 800 x 800mm
stainless steel frame with teflon-board

4.1.7 Visual-Specter

HKD-SW



VIA-A001

range of application

displaying- and archiving software

in use with:

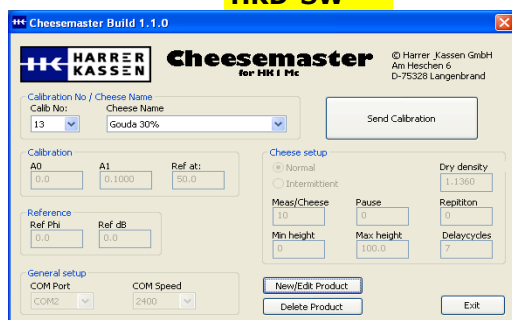
all HK-instruments

design

software is installed on a Windows-based PC or Laptop

4.1.8 CheeseMaster

HKD-SW



CMA-9901

range of application

cheese-type administration software. management for up to 99 cheese types

in use with:

-HK1-Mc

design

software is installed on a Windows-based PC or Laptop



4.1.9 RS485-bus-module

HKD-SW**range of application**

bus network with RS485-bus-module (incl. Busv administration software) for up to 16 instruments

in use with:
-HK6

design**BUS-0485**

software is installed on a Windows-based PC or Laptop

4.1.10 remote-service

HKD-RM

**application of a modem for
remote data transmission**

range of application

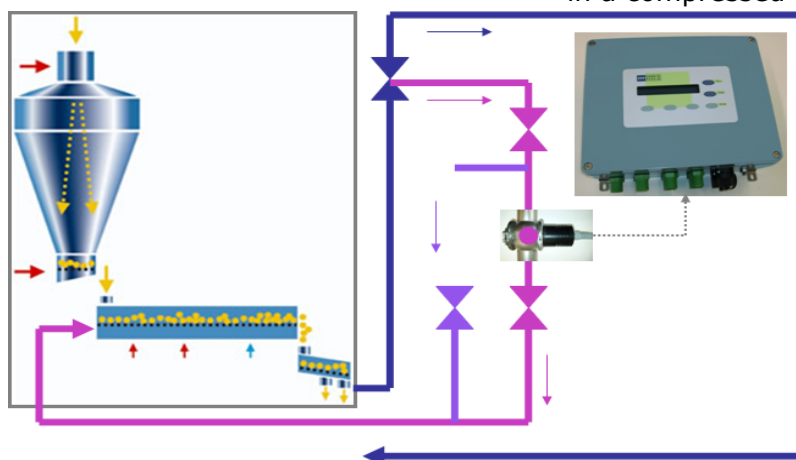
data-acquisition and calibration via modem

in use with:
-HK4

design**NIR-00V1**

separate modem-box inserted in the stainless steel housing

4.1.11 powder-sampling-system

HKD-PS**range of application**

measurement of types of milkpowders in a compressed-air bypass-system

in use with:
-HK4

design**NIR-4V01**

systemdesign with the application of 4 valves incl. Flowcell



4.1.12 product-selection-switch

HKD-PS**SWI-0016****range of application**

switching of max. 16 products

in use with:

- HK1-M
- HK1-Mc
- HK4

design

h x w x d: 58 x 85 x 80mm

4.1.13 add-on HK4-2x

HK4-2X

1 x upgrade set from
HK4-21 to HK4-22
HK4-22 to HK4-23
HK4-23 to HK4-24

2 x upgrade sets from
HK4-21 to HK4-23
HK4-22 to HK4-24

3 x upgrade sets from
HK4-21 to HK4-24

range of application

upgrade of the measurement for an
 additional organic constituent incl.
 analogue output 0/4 - 20mA

in use with:

- HK4-2

design**NIR-ADD1** upgrade-HW and SW

4.1.14 add-on HK1-Mc

HKD-AS

1 x upgrade set from
HK1-MC-SPA-CH01
to
HK1-MC-SPA-CHAL

range of application

upgrade of the cheese-measurement
 HK1-Mc for a potential-free analogue
 output 0/4 - 20mA (cheese-height)

in use with:

- HK1-Mc

design**ALT-0420** upgrade-HW and SW

4.2 spareparts4.2.1 halogen bulbs **HKS-LA****range of application**

exchange/rebuild of halogen bulbs in the NIR-sensor

in use with:

- HK4

design**NIR-0004** set von 4 halogen bulbs each 5V / 6,5W

4.2.2 housing frontcover

HKS-HC**range of application**

frontcover of the HK-housings with and without keypad

with keypad
with keypad
without keypad
with keypad
without keypad**HK1-0001** für HK1
HK2-0001 für HK2
HK2-0002 für HK2
HK6-0001 für HK6
HK6-0002 für HK6**design**

original spare-parts

4.2.3 CPU-boards

HKS-CP**range of application**

replacement of CPU-boards

standard
option RS485
standard
option RS485
standard
option RS485
option potentialfree output cheese-height
option potentialfree output cheese-height+RS4
standard
option relais cleaning
option PT100
standard incl. HF-board
option RS485 / bus**1Mx-0000** for HK1-M
1Mx-0001 for HK1-M
1Mp-0000 for HK1-Mp
1Mp-0001 for HK1-Mp
1Mc-0000 for HK1-Mc
1Mc-0001 for HK1-Mc
1Mc-0002 for HK1-Mc
1Mc-0003 for HK1-Mc
2Mx-0000 for HK2
2Mx-0001 for HK2
2Mx-0002 for HK2
6CF-0000 for HK6
6CF-0001 for HK6**design**

original spare-parts

4.2.4 HF-board

HKS-HF**range of application**

replacement of HF-boards

12x-0000 for HK1-M/HK1-Mp/HK1-C/HK2
1Mc-0000 for HK1-Mc**design**

original spare-parts



5 Technical Data

5.1

HK1-M

measuring method	microwavetechnique 2,45 GHz		
housing	aluminium pressure casting housing		
dimensions h x w x d	200 x 250 x 110mm		
protection class	IP65		
weight			
colour	RAL 5024		
circuit points			
power supply	variable 100-240V / AC		quick-connection
2 analogue outputs	0/4 - 20mA		quick-connection
1 analogue outputs	0/4 - 20mA		quick-connection
1 temperature/PT100	x		quick-connection
1 relay contact	x		quick-connection
1 HF-IN 1 HF-OUT	2 x N-plug sockets		
2 computer-interface	RS232 or RS485 bidirectional		circular plug-in connector
4 digital inputs	ext. select: 16 products/on/off		circular plug-in connector
user interface			
operating	6 softkeys in integrated keypad		
monitoring	2 x 24 characters in illuminated display		
measuring accuracy / scanning	analogue/digital conversion		cyclic 250ms
in pipes	x TS/liquids		0,2%
in tanks	x TS/liquids		0,2%
at conveyer belts	x TS/bulk material		1%
sensorsystems			
pinantennas 195mm / DN65	x		
pinantennas 195mm / DN80	x		
3A-spiralantennas	x		
short 3A-pinantennas	x		
mini-spiralantennas	x		
spiralantennas	x		
hornantennas	x		
ambient conditions			
environment temperature	-20°C - +85°C		
product temperature	>0°C - +130°C		



5.2

HK1-Mp

measuring method	microwavetechnique 2,45 GHz		
housing	aluminium pressure casting housing		
dimensions h x w x d	177 x 177 x 100mm		
protection class	IP65		
weight			
colour	RAL 5024		
circuit points			
power supply	variable 100-240V / AC		quick-connection
2 analogue outputs	0/4 - 20mA		quick-connection
1 analogue outputs	0/4 - 20mA		quick-connection
1 temperature/PT100	x		quick-connection
1 relay contact	x		quick-connection
1 HF-IN 1 HF-OUT	2 x N-plug sockets		
2 computer-interface	RS232 or RS485 bidirectional		circular plug-in connector
digital inputs	ext. select:16 products/on/off		circular plug-in connector
user interface			
operating	6 softkeys in integrated keypad		
monitoring	2 x 24 characters in illuminated display		
measuring accuracy / scanning	analogue/digital conversion		cyclic 250ms
in pipes	x TS/liquids		0,2%
in tanks	x TS/liquids		0,2%
at conveyer belts	x TS/bulk material		1%
sensorsystems			
pinantennas 195mm / DN65			
pinantennas 195mm / DN80	x		
3A-spiralantennas	x		
short 3A-pinantennas			
mini-spiralantennas	x		
spiralantennas			
hornantennas			
ambient conditions			
environment temperature	-20°C - +85°C		
product temperature	>0°C - +130°C		



5.3

HK1-Mc

measuring method	microwavetechnique 2,45 GHz	
housing	aluminium pressure casting housing	
dimensions h x w x d	200 x 250 x 110mm	
protection class	IP65	
weight		
colour	RAL 5024	
circuit points		
power supply	variable 100-240V / AC	quick-connection
2 analogue outputs	0/4 - 20mA	quick-connection
1 analogue outputs	0/4 - 20mA	quick-connection
1 temperature/PT100	x	quick-connection
1 relay contact	x	quick-connection
1 HF-IN 1 HF-OUT	2 x N-plug sockets	
2 computer-interface	RS232 or RS485 bidirectional	circular plug-in connector
4 digital inputs	ext. select:16 products/on/off	circular plug-in connector
user interface		
operating	6 softkeys in integrated keypad	
monitoring	2 x 24 characters in illuminated display	
measuring accuracy / scanning	analogue/digital conversion	cyclic 250ms
in pipes	TS/liquids	0,2%
in tanks	TS/liquids	0,2%
at conveyer belts	x TS/cheese blocks standard	<0,5%
at conveyer belts	x TS/cheese blocks granular	≤0,8%
sensorsystems		
pinantennas 195mm / DN65		
pinantennas 195mm / DN80		
3A-spiralantennas		
short 3A-pinantennas		
mini-spiralantennas		
spiralantennas	x	
hornantennas		
ambient conditions		
environment temperature	-20°C - +85°C	
product temperature	>0°C - +130°C	



5.4

HK1-C

measuring method	microwavetechnique 2,45 GHz		
housing	aluminium pressure casting housing		
dimensions h x w x d	177 x 177 x 100mm		
protection class	IP65		
weight			
colour	RAL 5024		
circuit points			
power supply	variable 100-240V / AC		quick-connection
2 analogue outputs	0/4 - 20mA		quick-connection
1 analogue outputs	0/4 - 20mA		quick-connection
1 temperature/PT100	x		quick-connection
1 relay contact			quick-connection
1 HF-IN 1 HF-OUT	2 x N-plug sockets		
2 computer-interface	RS232 or RS485 bidirectional		circular plug-in connector
digital inputs	ext. select:16 products/on/off		circular plug-in connector
user interface			
operating	6 softkeys in integrated keypad		
monitoring	2 x 24 characters in illuminated display		
measuring accuracy / scanning	analogue/digital conversion		cyclic 250ms
in pipes	x TS/liquids		0,2%
in tanks	x TS/liquids		0,2%
at conveyer belts	x TS/bulk material		1%
sensorsystems			
pinantennas 195mm / DN65			
pinantennas 195mm / DN80	x		
3A-spiralantennas			
short 3A-pinantennas			
mini-spiralantennas			
spiralantennas			
hornantennas			
ambient conditions			
environment temperature	-20°C - +85°C		
product temperature	>0°C - +130°C		



5.5

HK2-M

measuring method	microwavetechnique 2,45 GHz		
housing	aluminium pressure casting housing		
dimensions h x w x d	177 x 177 x 100mm		
protection class	IP65		
weight			
colour	RAL 5024		
circuit points			
power supply	variable 100-240V / AC		quick-connection
2 analogue outputs	0/4 - 20mA		quick-connection
1 analogue outputs	0/4 - 20mA		quick-connection
1 temperature/PT100	NTC		quick-connection
1 relay contact	x		quick-connection
1 HF-IN 1 HF-OUT	2 x N-plug sockets		
2 computer-interface	RS232 or RS485 bidirectional		circular plug-in connector
digital inputs	ext. select:16 products/on/off		circular plug-in connector
user interface			
operating	6 softkeys in integrated keypad		
monitoring	2 x 24 characters in illuminated display		
measuring accuracy / scanning	analogue/digital conversion		cyclic 250ms
in pipes	x	TS/liquids	0,2%
in tanks	x	TS/liquids	0,2%
at conveyer belts	x	TS/bulk material	1%
sensorsystems			
pinantennas 195mm / DN65	x		
pinantennas 195mm / DN80			
3A-spiralantennas			
short 3A-pinantennas			
mini-spiralantennas			
spiralantennas			
hornantennas			
ambient conditions			
environment temperature	-20°C - +85°C		
product temperature	>0°C - +130°C		



5.6

HK2-C

measuring method	microwavetechnique 2,45 GHz		
housing	aluminium pressure casting housing		
dimensions h x w x d	177 x 177 x 100mm		
protection class	IP65		
weight			
colour	RAL 5024		
circuit points			
power supply	variable 100-240V / AC		quick-connection
2 analogue outputs	0/4 - 20mA		quick-connection
1 analogue outputs	0/4 - 20mA		quick-connection
1 temperature/PT100	NTC		quick-connection
1 relay contact	x		quick-connection
1 HF-IN 1 HF-OUT	2 x N-plug sockets		
2 computer-interface	RS232 or RS485 bidirectional		circular plug-in connector
digital inputs	ext. select:16 products/on/off		circular plug-in connector
user interface			
operating	6 softkeys in integrated keypad		
monitoring	2 x 24 characters in illuminated display		
measuring accuracy / scanning	analogue/digital conversion		cyclic 250ms
in pipes	x TS/liquids		0,2%
in tanks	x TS/liquids		0,2%
at conveyer belts	x TS/bulk material		1%
sensorsystems			
pinantennas 195mm / DN65	x		
pinantennas 195mm / DN80			
3A-spiralantennas			
short 3A-pinantennas			
mini-spiralantennas			
spiralantennas			
hornantennas			
ambient conditions			
environment temperature	-20°C - +85°C		
product temperature	>0°C - +130°C		



5.7

HK2-F

measuring method	microwavetechnique 2,45 GHz		
housing	aluminium pressure casting housing		
dimensions h x w x d	177 x 177 x 100mm		
protection class	IP65		
weight			
colour	RAL 5024		
circuit points			
power supply	variable 100-240V / AC		quick-connection
2 analogue outputs	0/4 - 20mA		quick-connection
1 analogue outputs	0/4 - 20mA		quick-connection
1 temperature/PT100	NTC		quick-connection
1 relay contact	x		quick-connection
1 HF-IN 1 HF-OUT	2 x N-plug sockets		
2 computer-interface	RS232 or RS485 bidirectional		circular plug-in connector
digital inputs	ext. select:16 products/on/off		circular plug-in connector
user interface			
operating	6 softkeys in integrated keypad		
monitoring	2 x 24 characters in illuminated display		
measuring accuracy / scanning	analogue/digital conversion		cyclic 250ms
in pipes	x TS/liquids		0,2%
in tanks	x TS/liquids		0,2%
at conveyer belts	x TS/bulk material		1%
sensorsystems			
pinantennas 195mm / DN65	x		
pinantennas 195mm / DN80			
3A-spiralantennas			
short 3A-pinantennas			
mini-spiralantennas			
spiralantennas			
hornantennas			
ambient conditions			
environment temperature	-20°C - +85°C		
product temperature	>0°C - +130°C		



5.8

HK4-1

measuring method	NIR-spectrometer with diodearray		
housing	stainless steel box		
dimensions h x w x d	300 x 600 x 180mm		
protection class	IP65		
weight			
colour	RAL 5024		
circuit points			
power supply	variable 100-240V / AC	quick-connection	
3 analogue outputs	0/4 - 20mA	quick-connection	
1 PS-halogenlamp	x	quick-connection	
1 temperature/PT100	x	quick-connection	
1 relay contact	x	quick-connection	
1 optical fiber	1 connection		
2 computer-interface	RS232 or RS485 bidirectional	circular plug-in connector	
user interface			
operating	6 softkeys in integrated keypad		
monitoring	2 x 24 characters in illuminated display		
measuring accuracy / scanning	spectral range 600nm - 1100nm		
in pipes	CH-/NH-/OH-compounds	brandy	0,5%
in tanks	CH-/NH-/OH-compounds	meat/sausage	0,5%
in sampling system	CH-/NH-/OH-compounds	milkpowder	0,5%
sensorsystems			
NIR-sensor reflection			
NIR-sensor transmission	x		
calibration and commissioning	chemometric software SPECTER		
ambient conditions			
environment temperature	-20°C - +35°C		
product temperature	>0°C - +130°C		



5.9

HK4-2

measuring method	NIR-spectrometer with diodearray		
housing	stainless steel box		
dimensions h x w x d	300 x 600 x 180mm		
protection class	IP65		
weight			
colour	RAL 5024		
circuit points			
power supply	variable 100-240V / AC		quick-connection
4 analogue outputs	0/4 - 20mA		quick-connection
1 PS-halogenlamp	x		quick-connection
1 temperature/PT100	x		quick-connection
1 relay contact	x		quick-connection
1 optical fiber	1 connection		
2 computer-interface	RS232 or RS485 bidirectional		circular plug-in connector
user interface			
operating	6 softkeys in integrated keypad		
monitoring	2 x 24 characters in illuminated display		
measuring accuracy / scanning	spectral range 1200nm - 1700nm		
in pipes	CH-/NH-/OH-compounds	curd/jogurt	0,5%
in tanks	CH-/NH-/OH-compounds	meat/sausage	0,5%
in sampling system	CH-/NH-/OH-compounds	milkpowder	0,5%
sensorsystems			
NIR-sensor reflection	x		
NIR-sensor transmission			
calibration and commissioning	chemometric software SPECTER		
ambient conditions			
environment temperature	-20°C - +35°C		
product temperature	>0°C - +130°C		



5.10

HK4-3

measuring method	NIR-spectrometer with diodearray		
housing	stainless steel box		
dimensions h x w x d	300 x 600 x 180mm		
protection class	IP65		
weight			
colour	RAL 5024		
circuit points			
power supply	variable 100-240V / AC	quick-connection	
5 analogue outputs	0/4 - 20mA	quick-connection	
1 PS-halogenlamp	x	quick-connection	
1 temperature/PT100	x	quick-connection	
1 relay contact	x	quick-connection	
1 optical fiber	1 connection		
2 computer-interface	RS232 or RS485 bidirectional	circular plug-in connector	
user interface			
operating	6 softkeys in integrated keypad		
monitoring	2 x 24 characters in illuminated display		
measuring accuracy / scanning	spectral range 1700nm - 2500nm		
in pipes	CH-/NH-/OH-compounds	curd/jogurt	0,5%
in tanks	CH-/NH-/OH-compounds	meat/sausage	0,5%
in sampling system	CH-/NH-/OH-compounds	milkpowder	0,5%
sensorsystems			
NIR-sensor reflection	x		
NIR-sensor transmission			
calibration and commissioning	chemometric software SPECTER		
ambient conditions			
environment temperature	-20°C - +35°C		
product temperature	>0°C - +130°C		



5.11

HK4-mobile-LAB

measuring method	NIR-spectrometer with diodearray		
housing	aluminium pressure casting housing		
dimensions h x w x d	230 x 280 x 110mm		
protection class	IP65		
weight			
colour	RAL 5024		
aluminium-case h x w x d	380 x 580 x 240mm		
circuit points			
power supply	variable 100-240V / AC	quick-connection	
5 analogue outputs			
1 PS-halogenlamp			
1 notebook	x		
1 measure kit	x		
1 chemometric software	x	SPECTER	
Benutzeroberfläche			
Bedienen	6 Softkeys in integrierter Folientastatur		
Beobachten	2 x 24 Zeichen mit beleuchteter Anzeige		
measuring accuracy / scanning	spectral range 1700nm - 2500nm		
in petri dishes	CH-/NH-/OH-compounds	sausage/curd/powder	0,3%



5.12

HK5

measuring method	microwavetechnique 2,45 GHz	
housing	aluminium pressure casting housing	
dimensions h x w x d	200 x 230 x 110mm	
protection class	IP65	
weight		
colour	RAL 5024	
circuit points		
power supply	variable 100-240V / AC	quick-connection
2 analogue outputs	0/4 - 20mA	quick-connection
1 analogue outputs	0/4 - 20mA	quick-connection
1 temperature/PT100		quick-connection
1 relay contact		quick-connection
2 sensor-plugs	standardcable	quick-connection
2 computer-interface	RS232 or RS485 bidirectional	circular plug-in connector
digital inputs	ext. select:16 products/on/off	circular plug-in connector
user interface		
operating	6 softkeys in integrated keypad	
monitoring	2 x 24 characters in illuminated display	
measuring accuracy / scanning	analogue/digital conversion	cyclic 250ms
in pipes	TS/liquids	0,2%
in tanks	TS/liquids	0,2%
at conveyer belts	x TS/thin layers	0,2%
sensorsystems		
pinantennas 195mm / DN65		
pinantennas 195mm / DN80		
3A-spiralantennas		
short 3A-pinantennas		
mini-spiralantennas		
spiralantennas		
hornantennas		
10/24GHz-sensors	x	
ambient conditions		
environment temperature	-20°C - +85°C	
product temperature	>0°C - +130°C	



5.13

HK6-C

measuring method	microwavetechnique 2,45 GHz		
housing	aluminium pressure casting housing		
dimensions h x w x d	177 x 177 x 100mm		
protection class	IP65		
weight			
colour	RAL 5024		
circuit points			
power supply	variable 100-240V / AC		quick-connection
2 analogue outputs	0/4 - 20mA		quick-connection
1 analogue outputs	0/4 - 20mA		quick-connection
1 temperature/PT100	NTC		quick-connection
1 relay contact	x		quick-connection
1 HF-IN 1 HF-OUT	2 x N-plug sockets		
2 computer-interface	RS232 or RS485 bidirectional		circular plug-in connector
digital inputs	ext. select:16 products/on/off		circular plug-in connector
user interface			
operating	6 softkeys in integrated keypad		
monitoring	2 x 24 characters in illuminated display		
measuring accuracy / scanning	analogue/digital conversion		cyclic 250ms
in pipes	x TS/liquids		0,2%
in tanks	x TS/liquids		0,2%
at conveyer belts	x TS/bulk material		1%
sensorsystems			
pinantennas 195mm / DN65	x		
pinantennas 195mm / DN80			
3A-spiralantennas			
short 3A-pinantennas			
mini-spiralantennas			
spiralantennas			
hornantennas			
ambient conditions			
environment temperature	-20°C - +85°C		
product temperature	>0°C - +130°C		



5.14

HK6-F

measuring method	microwavetechnique 2,45 GHz		
housing	aluminium pressure casting housing		
dimensions h x w x d	177 x 177 x 100mm		
protection class	IP65		
weight			
colour	RAL 5024		
circuit points			
power supply	variable 100-240V / AC		quick-connection
2 analogue outputs	0/4 - 20mA		quick-connection
1 analogue outputs	0/4 - 20mA		quick-connection
1 temperature/PT100	NTC		quick-connection
1 relay contact	x		quick-connection
1 HF-IN 1 HF-OUT	2 x N-plug sockets		
2 computer-interface	RS232 or RS485 bidirectional		circular plug-in connector
digital inputs	ext. select:16 products/on/off		circular plug-in connector
user interface			
operating	6 softkeys in integrated keypad		
monitoring	2 x 24 characters in illuminated display		
measuring accuracy / scanning	analogue/digital conversion		cyclic 250ms
in pipes	x TS/liquids		0,2%
in tanks	x TS/liquids		0,2%
at conveyer belts	x TS/bulk material		1%
sensorsystems			
pinantennas 195mm / DN65	x		
pinantennas 195mm / DN80			
3A-spiralantennas			
short 3A-pinantennas			
mini-spiralantennas			
spiralantennas			
hornantennas			
ambient conditions			
environment temperature	-20°C - +85°C		
product temperature	>0°C - +130°C		



6 Services



project planning:

The know-how for the technical engineering of our measurement instruments is the intellectual property from Harrer & Kassen GmbH. With microwave measurements is i.e. the optimal antenna distance in dependance from temperature and pipe diameter only one example for many engineering steps, which have to be worked out technically. With NIR-measurements is, in addition to the accuracy of the spectrometer and the calibration, nothing so important as the place of the NIR-sensor. In cooperation with our clients we develop the only solutions which are reasonable and efficient.

installation:

For all sensor systems installation guidelines are constituted. The necessary built-in parts as welding sockets and flanges are part of the order and will be delivered by us. The assembly normally is done by the customer.

commissioning:

For every measurement instrument a manual is available. A description shows in detail the step-by-step procedure for commissioning. Normally the commissioning is a service, which is offered and arranged by us. We also offer training courses, to set our clients in the position to perform commissioning, parametrisation, calibration and processoperation by themselves.



6.1 commissioning**HKF-CO****range of application**

commissioning of all delivered measurement instruments

microwave-instruments **MW1-0001** for article-numbers HK1-M1-
HK1-MP-
HK1-C1-
HK2-M1-
HK2-C1-
HK2-F1-
HK6-C1-
HK6-F1-

microwave-instruments **MW1-0002** for article-numbers HK1-M2-
HK1-MC-
HK1-MC/LAB
HK5-12-
HK5-14-
HK5-16-
HK5-18-

NIR-spectrometer **NIR-0001** for article-numbers HK4-10-
HK4-20-
HK4-30-

6.2 preparation for calibration**HKF-CA****range of application**

sample-spectra scanning for 1 organic constituent (in-house)

NIR-spectrometer **NIR-0001**

6.3 training**HKT-TE****range of application**

training-cours for personal/staff at site

microwave-instruments **MWT-0001**
NIR-spectrometer **NIR-0001**

6.4 service contract**HKF-MA****range of application**

maintenance and service of the installed systems

NIR-standard **NIR-0002** validity 1 year, 2 inspections, repairs, system check-up,
SW-update, light performance test

NIR-basic **NIR-0003** validity 1 year, 1 inspection, repairs, system check-up



7 Article Numbers / Pricelist 2009-11-A13.2

		article number		EUR
7.1	HK1			
7.1.1	<u>HK1-M</u>			
	evaluation-unit with 2x2m HF-cable	HK1-M1-		
	2 pinantennas (with PT100 and flange DN65)	PAN-	6506	-
	2 pinantennas (with PT100 and flange DN80)	PAN-	8006	
	2 3A-spiralantennas (for 3A-flowcell**)	3SA-	3AFC	
	2 short 3A-pinantennas (for 3A-flowcell**)	3SP-	FLC1	
	2 mini-spiralantennas with sockets (for flowcell**)	MSA-	FLC2	
	**not included in the delivery range			
	2 elongated pinantenneas max.370mm (PT100/DN65)	PAL-	6506	-
	2 elongated pinantenneas max.370mm (PT100/DN80)	PAL-	8006	
	evaluation-unit with 2x2m HF-cable	HK1-M2-		
	2 spiralantennas	SPA-	0000	-
	2 hornantennas	HOA-	0000	
7.1.2	<u>HK1-Mp</u>			
	evaluation-unit with 2x2m HF-cable	HK1-MP-		
	2 pinantennas (with PT100 and flange DN80)	PAN-	8006	-
	2 3A-spiralantennas (for welding-flanges**)	3SA-	WFL1	
	2 mini-spiralantennas with sockets (for flowcell**)	MSA-	FLC2	
	**not included in the delivery range			
7.1.3	<u>HK1-Mc</u>			
	evaluation-unit with 2x2m HF-cable	HK1-MC-		
	2 spiralantennas	SPA-	CH01	-
	incl. 1 stainless steel housing incl. 1 distance-lasersensor (stainless steel) with PS and cables			
	1 potential-free output 0/4-20mA "cheese-altitude"	SPA-	CHAL	-
7.1.4	<u>HK1-Mc-LAB</u>			
	evaluation-unit with 2x2m HF-cable	HK1-MC-		
	2 spiralantennas	LAB-	CH02	-
	incl. 1 laboratory-device (stainless steel/teflon) incl. 1 "distance-lasersensor" with PS and cables			
7.1.5	<u>HK1-C</u>			
	evaluation-unit	HK1-C1-		
	2 pinantennas 195mm (with PT100 and flange DN80)	PAN-	8006	-
7.2	HK2			
7.2.1	<u>HK2-M</u>			
	evaluation-unit with 2x2m HF-cable	HK2-M1-		
	2 pinantennas (flange DN65)	PAN-	6506	-
	2 pinantennas (with cleaning and flange DN65)	PAN-	6516	
7.2.2	<u>HK2-C</u>			
	evaluation-unit	HK2-C1-		
	2 pinantennas 195mm (with NTC and flange DN65)	PAN-	6506	-
7.2.3	<u>HK2-F</u>			
	evaluation-unit without softkeys	HK2-F1-		
	2 pinantennas (with NTC and flange DN65)	OPE-	6506	-
	1 operating-device (with 10m connection-cable)			



7.3 HK4

7.3.1 HK4-1

evaluation-unit 600nm-1100nm / 3C / 0,5%
 1 NIR-sensor 4B (with 3A-flowcell DN50 / transmission)
 1 NIR-sensor 4S (with 3A-flowcell DN50 / transmission)
 (1-4 halogen-bulbs / B black enodized / S stainless steel)

article number

EUR

HK4-10-
 NIR- 4BFT
 NIR- 4SFT

-

7.3.2 HK4-2

evaluation-unit 1200nm-1700nm / 1 constituent
 evaluation-unit 1200nm-1700nm / 2 constituents
 evaluation-unit 1200nm-1700nm / 3 constituents
 evaluation-unit 1200nm-1700nm / 4 constituents
 1 NIR-sensor 4B (with 3A-flowcell DN50 / reflection)
 1 NIR-sensor 4S (with 3A-flowcell DN50 / reflection)
 1 NIR-sensor 4B (with 3A-flowcell DN50 / transmission)
 1 NIR-sensor 4S (with 3A-flowcell DN50 / transmission)
 1 NIR-sensor 4B (with 3A-tank-cell DN50 / reflection)
 1 NIR-sensor 4S (with 3A-tank-cell DN50 / reflection)
 1 NIR-sensor 4B (with 3A-tube-cell DN50 / reflection)
 1 NIR-sensor 4S (with 3A-tube-cell DN50 / reflection)
 (1-4 halogen-bulbs / B black enodized / S stainless steel)

HK4-21-
 HK4-22-
 HK4-23-
 HK4-24-
 NIR- 4BFR
 NIR- 4SFR
 NIR- 4BFT
 NIR- 4SFT
 NIR- 4BTR
 NIR- 4STR
 NIR- 4BPR
 NIR- 4SPR

-
 -
 -
 -

7.3.3 HK4-3

evaluation-unit 1700nm-2500nm / 5C / 0,1%
 1 NIR-sensor 4B (with 3A-flowcell DN50 / reflection)
 1 NIR-sensor 4S (with 3A-flowcell DN50 / reflection)
 1 NIR-sensor 4B (with 3A-flowcell DN50 / transmission)
 1 NIR-sensor 4S (with 3A-flowcell DN50 / transmission)
 1 NIR-sensor 4B (with 3A-tank-cell DN50 / reflection)
 1 NIR-sensor 4S (with 3A-tank-cell DN50 / reflection)
 1 NIR-sensor 4B (with 3A-tube-cell DN50 / reflection)
 1 NIR-sensor 4S (with 3A-tube-cell DN50 / reflection)
 (1-4 halogen-bulbs / B black enodized / S stainless steel)

HK4-30-
 NIR- 4BFR
 NIR- 4SFR
 NIR- 4BFT
 NIR- 4SFT
 NIR- 4BTR
 NIR- 4STR
 NIR- 4BPR
 NIR- 4SPR

on request

7.3.4 HK4-mobile-LAB

evaluation-unit 1700nm-2500nm / 5C / 0,1%
 1 NIR-sensor 4B (reflection)
 1 notebook (with SPECTER-software)
 1 measure-kit

HK4-ML- NIR 0001

-

7.4 HK5

7.4.1 HK5-1

evaluation-unit 10/24GHz
 2 10GHz-sensors
 2 24GHz-sensors

HK5-12-
 GHZ- 0010
 GHZ- 0024

-

7.4.2 HK5-2

evaluation-unit 10/24GHz
 4 10GHz-sensors
 4 24GHz-sensors

HK5-14-
 GHZ- 0010
 GHZ- 0024

-



		article number	EUR
7.4.3	<u>HK5-3</u>		
	evaluation-unit 10/24GHz	HK5-16-	
	6 10GHz-sensors	GHZ-	0010
	6 24GHz-sensors	GHZ-	0024
7.4.4	<u>HK5-4</u>		
	evaluation-unit 10/24GHz	HK5-18-	
	8 10GHz-sensors	GHZ-	0010
	8 24GHz-sensors	GHZ-	0024
7.5	HK6		
7.5.1	<u>HK6-C</u>		
	evaluation-unit	HK6-C1-	
	2 pinantennas 195mm (with NTC and flange DN65)	PAN-	6506
7.5.1	<u>HK6-F</u>		
	evaluation-unit without softkeys	HK6-F1-	
	2 pinantennas 195mm (with NTC and flange DN65)	OPE	6506
	1 operating-device (with 10m connection-cable)		
7.6	components		
7.6.1	<u>evaluation-units</u>		
	1 HK1-M	HK1-M1- XXX-	0000
	1 HK1-Mp	HK1-MP- XXX-	0000
	1 HK2-M	HK2-M1- XXX-	0000
	1 HK5	HK5-00- XXX-	1224
7.6.2	<u>sensors / antennas</u>		
	1 PT100	HKA-TE- PT1-	0100
	1 PT100 plus connection-electronic	HKA-TE- PT2-	E100
	2 pinantennas 195mm / DN65	HKA-MW- PAN-	6506
	2 pinantennas 195mm / DN80	HKA-MW- PAN-	8006
	2 pinantennas 195mm / DN65 / cleaning	HKA-MW PAC-	6506
	2 elongated pinantennas max.370mm / DN65	HKA-MW PAL-	6506
	2 elongated pinantennas max.370mm / DN80	HKA-MW PAL-	8006
	2 3A-spiralantennas	HKA-MW- 3SA-	3AFC
	2 short 3A-pinantennas	HKA-MW- 3SP-	FLC1
	2 mini-spiralantennas	HKA-MW- MSA-	FLC2
	2 spiralantennas	HKA-MW- SPA-	0000
	2 hornantennas	HKA-MW- HOA-	0000
	2 12GHz-sensors	HKA-MW- GHZ-	0010
	2 24GHz-sensors	HKA-MW- GHZ-	0024
	1 NIR-sensor 4B (4 halogen-bulbs/body black enodized/transmission)	HKA-IR- NIR-	4BT1
	1 NIR-sensor 4S (4 halogen-bulbs/body stainless steel/transmission)	HKA-IR- NIR-	4ST1
	1 NIR-sensor 4B (4 halogen-bulbs/body black enodized/reflection)	HKA-IR- NIR-	4BR1
	1 NIR-sensor 4S (4 halogen-bulbs/body stainless steel/reflection)	HKA-IR- NIR-	4SR1



7.6.3 cells

		article number	EUR
1	3A-flowcell DN50 (for 3A-spiralantennas)	HKC-PR- 3SA- 3AFC	-
1	3A-flowcell DN50 (for short 3A-pinantennas)	HKC-PR- 3SP- FLC1	-
1	flowcell (for mini-spiralantennas) <u>on request</u>	HKC-NO- MSA- FLC2	-
2	welding flanges stainless steel (for 3A-spiralantennas)	HKC-PR- 3SA- WFL1	-
2	welding sockets stainless steel (for short 3A-pinantennas)	HKC-PR- 3SP- WSO3	-
2	welding sockets stainless steel (for mini-spiralantennas)	HKC-NO- MSA- WSO1	-
1	3A-flowcell DN50 (for NIR-reflection)	HKC-PR- NIR- 3AFR	-
1	3A-flowcell DN50 (for NIR-transmission)	HKC-PR- NIR- 3AFT	-
1	3A-tank-cell DN50 (for NIR-reflection)	HKC-PR- NIR- 3ATR	-
1	3A-tube-cell (for NIR-reflection)	HKC-PR- NIR- 3APR	-
	<u>all other diameters and special manufactures on request</u>		

7.7 **devices / spare parts**

7.7.1 devices

1	operating-device (with 10m connection-cable)	HKD-OD- OPE- 0010	-
1	HF-cable 1m	HKD-CA- HFC- 0001	-
1	HF-cable 2m	HKD-CA- HFC- 0002	-
1	standard-cable 1m *	HKD-CA- STA- L001	-
1	standard-cable 100m *	HKD-CA- STA- L100	-
1	optical fiber 1m *	HKD-OF- NIR- L001	-
1	optical fiber 100m *	HKD-OF- NIR- L100	-
1	swiffle-flange DN65	HKD-FL- PAN- 0065	-
1	swiffle-flange DN80	HKD-FL- PAN- 0080	-
1	stainless steel housing	HKD-CH- BOX- 0001	-
1	distance-lasersensor (stainless steel) incl. PS and cables	HKD-CH- LAS- 0001	-
1	laboratory-device (stainless steel/teflon) for HK1-Mc	HKD-CH- TEF- 0001	-
1	Visual-Specter / display- and archiving-SW	HKD-SW- VIA- A001	-
1	CheesMaster / cheese-types management-SW (99)	HKD-SW- CMA- 9901	-
1	RS485-bus-module for HK6 (incl. bus-management-SW)	HKD-SW- BUS- 0485	-
1	remote-service (adjustment calibration via modem with HK4)	HKD-RM- NIR- 00V1	-
1	powder-sampling-system (incl. tubes, 4 valves, sensor-cell)	HKD-PS- NIR- 4V01	-
1	product-selection switch f. HK1-M, HK1-Mc (16 products)	HKD-PS- SWI- 0016	-
1	add-on HK4-2x/plus 1 organic constituent, plus 1 output 0/4-20mA	HK4-2X- NIR- ADD1	-
1	add-on HK1-Mc/potential-free output 0/4-20mA "cheese-altitude" *lengths in full meters free selectable	HKD-AS- ALT- 0420	-

7.7.2 spare parts

1	set with 4 halogen-bulbs	HKS-LA- NIR- 0004	-
1	housing-cover	HKS-HC-	
	HK1 with keypad	HK1- 0001	-
	HK2 with keypad	HK2- 0001	-
	without keypad	HK2- 0002	-
	HK6 with keypad	HK6- 0001	-
	without keypad	HK6- 0002	-



					article number			EUR
1	CPU-boards				HKS-CP-			
	HK1-M	standard			1Mx-	0000		-
		option RS485			1Mx-	0001		-
	HK1-Mp	standard			1Mp-	0000		-
		option RS485			1Mp-	0001		-
	HK1-Mc	standard			1Mc-	0000		-
		option RS485			1Mc-	0001		-
		option potential-free output "cheese-height"			1Mc-	0002		-
		option potential-free output "cheese-height" + RS485			1Mc-	0003		-
	HK2	standard			2Mx-	0000		-
		option relais cleaning			2Mx-	0001		-
		option PT100			2Mx-	0002		-
	HK6	standard incl. HF-board			6CF-	0000		-
		option RS485 / bus			6CF-	0001		-
1	HF-board				HKS-HF-			
	for HK1-M / HK1-Mp / HK1-C / HK2				12x-	0000		-
	for HK1-Mc				1Mc-	0000		-
7.8 services								
7.8.1 commissioning COM (in Germany)								
1	COM-MW	HK1-M1- HK2-M1 HK6-C1	HK1-MP- HK2-C1 HK6-F1	HK1-C1- HK2-F1	HKF-CO- MW1-	0001		-
1	COM-MW	HK1-M2- HK5-14	HK1-MC-/LAB HK5-16	HK5-12 HK5-18	HKF-CO- MW2-	0001		-
1	COM-NIR	HK4-10	HK4-20	HK4-30	HKF-CO- NIR-	0001		-
7.8.2 preparation for calibration (in-house)								
1	samplespectra-scanning (for 1 organic constituent)				HKF-CA- NIR-	0001		-
7.8.3 training (in-house)								
1	training operating personnel		microwave-systems/3 persons		HKT-TE- MWT-	0001		-
1	training operating personnel		NIR-spectrometer/3persons		HKT-TE- NIR-	0001		-
7.8.4 service-contract								
1	Standard / duration 1 year, 2 inspections, product support HK4, system-check, sw-update, check bulb-power,				HKF-MA- NIR-	0002		-
1	Basic / duration 1 year, 1 inspection, product support HK4 system-check,							-



8 Conditions for Sale and Trade / Imprint

For Harrer & Kassen GmbH the General Business Conditions of the German Electro Industry are valid for Product Development and Sales.



Harrer & Kassen GmbH

Am Heschen 6
D-75328 Langenbrand
Germany

Tel: 0049 (0)7084 9248-0
Fax: 0049 (0)7084 9248-29

eMail: info@harrerkassen.com
web: www.harrerkassen.com

General Management:
Commercial Trade Register:

Dr. Horst Harrer
County Court Stuttgart
HRB330829
DE144606035

VAT-Identification:

Responsible for the editorial and contents:
Ulrich Ottenburger Dipl.Ing.
Marketing and Sales
Harrer & Kassen GmbH

Tel: 0049 (0)7084 9248-15
eMail: ottenburger@harrerkassen.com