



# Processmeasurement

Measure Instruments

Sensor Systems

Microwave Technique

NIR-Spectrometer

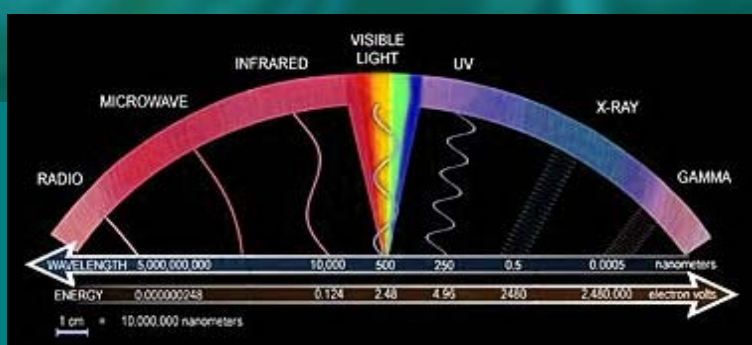
# Catalogue

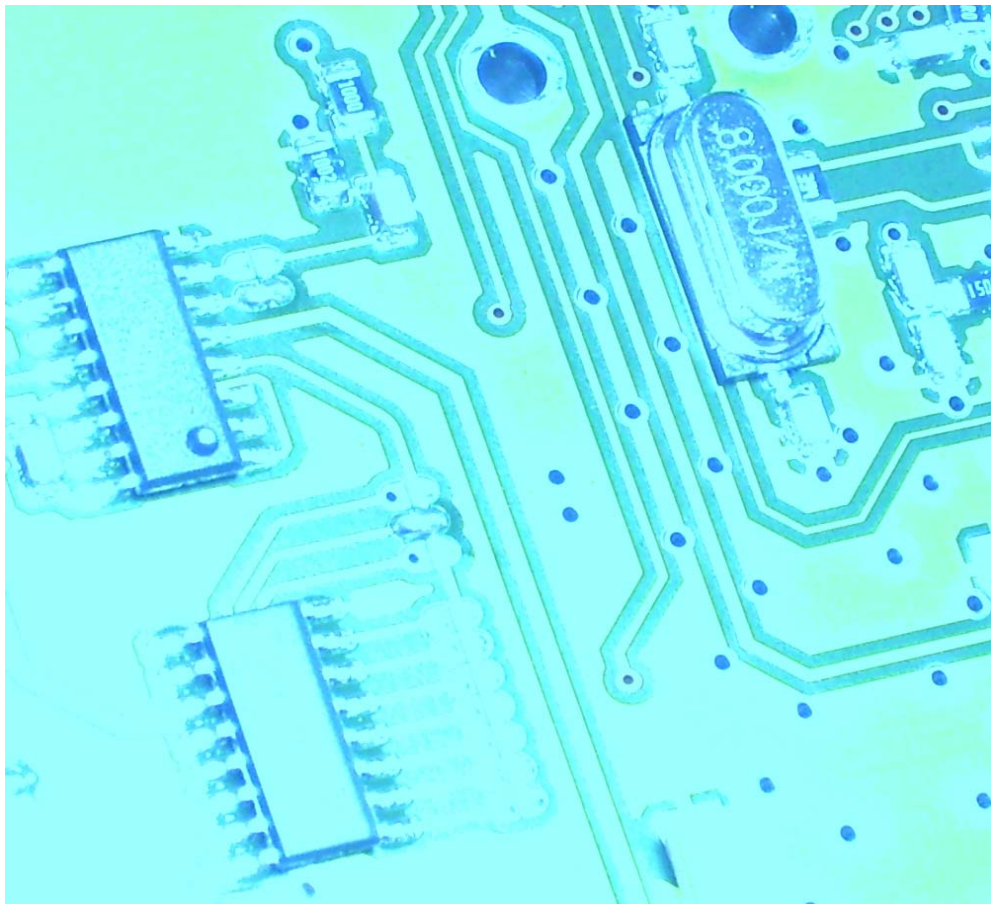
2007-04 / 3rd Edition



[www.harrerkassen.com](http://www.harrerkassen.com)  
[info@harrerkassen.com](mailto:info@harrerkassen.com)

T: +49-(0)7084-928410 Am Heschen 6  
F: +49-(0)7084-928429 D-75328 Langenbrand  
copyright Harrer & Kassen GmbH 2007 / all rights reserved





# The Way is the Target

Lao Tse

**Content:****1 Application / Business field**1.1 Processmeasurements1.2 Procedures of Measurement1.3 Industry Applications**2 Evaluation units**2.1 HK1

2.1.1 HK1-M

2.1.2 HK1-Mp

2.1.3 HK1-Mc

2.1.4 HK1-Mc-LAB

2.1.5 HK1-C

2.2 HK2

2.2.1 HK2-M

2.2.2 HK2-C

2.2.3 HK2-F

2.3 HK4 (NIR-spectralyser)

2.3.1 HK4-1

2.3.2 HK4-2

2.3.3 HK4-3

2.3.4 HK4-mobile LAB

2.4 HK52.5 HK6

2.5.1 HK6-C

2.5.2 HK6-F

**3 Components**3.1 Sensors / Antennas

3.1.1 PT100

3.1.2 Pinantennas

3.1.3 Pinantennas-Cleaning

3.1.4 3A-Spiralantennas

3.1.5 Short 3A-Pinantennas

3.1.6 Mini-Spiralantennas

3.1.7 Spiralantennas

3.1.8 Hornantennas

3.1.9 10/24GHz-Sensors

3.1.10 NIR-Sensor / Halogenlamp

3.2 Measure Cells

3.2.1 3A-Flowcell (for 3A-Spiralantennas) and welding flange

3.2.2 3A-Flowcell (for short 3A-Pinantennas) and welding sockets

3.2.3 Flowcell (for Mini-Spiralantennas) and welding sockets

3.2.4 3A-Flowcell (for NIR-Reflection)

3.2.5 3A-Flowcell (for NIR-Transmission)

3.2.6 3A-Tankcell (für NIR-Reflection)

**4 Devices / Spareparts**4.1 Devices

4.1.1 Remote Control

4.1.2 Cable

4.1.2.1 HF-Cable

4.1.2.2 Standard-Cable

4.1.2.3 Optical Fiber

4.1.3 Swiffle-Flange

4.1.4 Stainless-Steel-Housing

4.1.5 Distance-Lasersensor

4.1.6 Laboratory-Measure-Device

4.2 Spare Parts

4.2.1 Halogen Bulbs



<b>5</b>	<b>Technical Data</b>	<b>33</b>
5.1	HK1-M	33
5.2	HK1-Mp	34
5.3	HK1-Mc	35
5.4	HK1-C	36
5.5	HK2-M	37
5.6	HK2-C	38
5.7	HK2-F	39
5.8	HK4-1	40
5.9	HK4-2	41
5.10	HK4-3	42
5.11	HK4-mobile LAB	42
5.12	HK5	43
5.13	HK6-C	44
5.14	HK6-F	45
<b>6</b>	<b>Operation / Commissioning</b>	<b>46</b>
<b>7</b>	<b>Article Numbers</b>	<b>48</b>
<b>8</b>	<b>Conditions for Sale and Trade / Imprint</b>	<b>52</b>
<b>9</b>	<b>Technical Annex</b>	<b>53</b>



## 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 the 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, liquid or gaseous.

For the quality insurance the products are under measurement to define and monitor concentration, moisture, limit values and organic components.

**density, concentration**  
measurement of solids in water

**moisture**  
measurement of the water content in different solids

**limit values**  
measurement of the min-/max levels of liquid materials

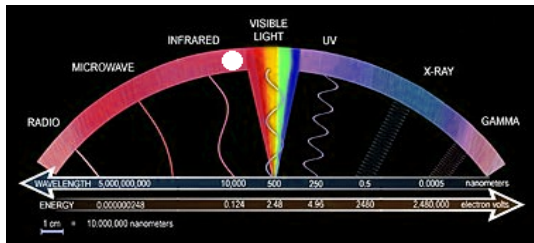
**organic components**  
detection of one or more organic components in an organic mixture





## 1.2 Procedures of Measurement

### NIR

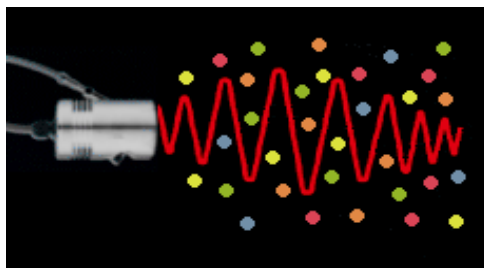


In the NIR-measurement technology the surface of the product is illuminated by white halogen light. An optical fiber sensor transfers the data, measured after the transmissive or reflective principle, to the diode array. A significant higher resolution can define all molecules with an absorption line in the spectrum of measurement. The evaluation with diode arrays realize the measurement of every organic component in the detected spectrum. Mainly this are CH-, NH- and OH-molecules.

The simultaneous measurement of up to 5 organic components 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.

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



**NIR-sensor with halogenlamp**

evaluation with diode arrays realize the measurement of every organic component in the detected spectrum. Mainly this are CH-, NH- and OH-molecules. The simultaneous measurement of up to 5 organic components 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-reflection principle**

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 any influence to the result of the measurement.



**NIR-transmission principle**

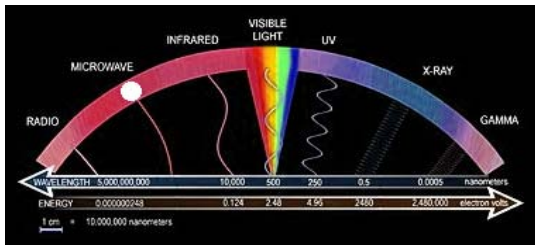
NIR-detections are alternatively performed with transmission or reflection. At the reflection principle, the product is illuminated with white halogen light. The reflected NIR-part is detected by the NIR-sensor and transferred to the diodearray via an optical fiber.

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.

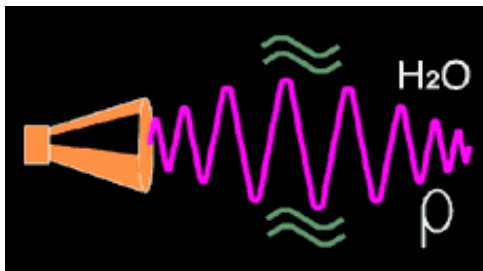


## Microwave Measurement

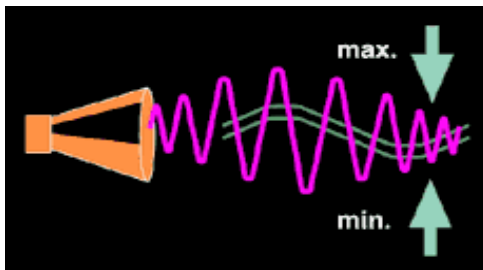


In the microwave measurement an electromagnetic wave with low energy is generated and via an antenna integrated into the product. This wave spreads out in the product in dependence of the electrical characteristics. A second antenna receives this wave. Energy and phase of the received wave are indicators 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.

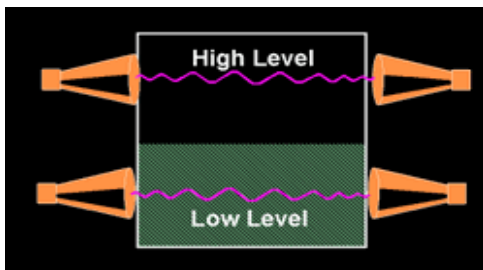
and density in the product. MW-measurements are qualified because of high stability and a very short feedback time. Measurements at conveyer belts or nonconductive tanks are operating without direct contact and can be mounted outside of the process equipment. In case of metallic tanks the sensors are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



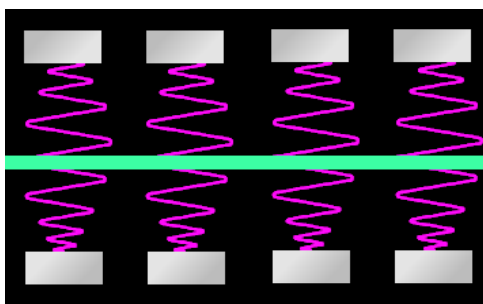
Provision of the latest digital microwave technology at 2,45GHz or 10/24GHz. In dependence of the measurement, different sensorsystems can be used alternatively.



pinantennas:



short pinantennas:



spiralantennas:



mini-spiralantennas:



hornantennas:



3A-spiralantennas:

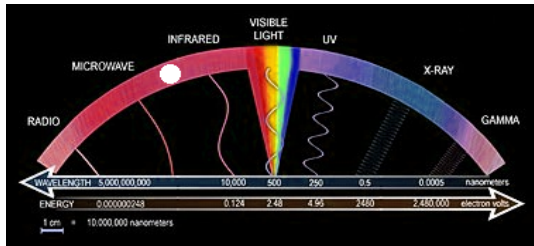


10/24GHz-sensors:

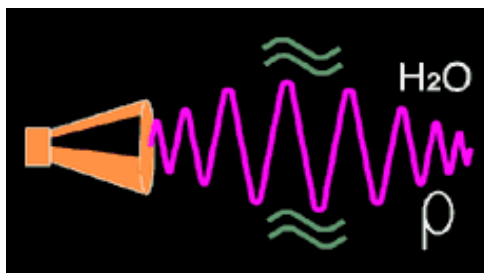




## Highfrequency Measurement

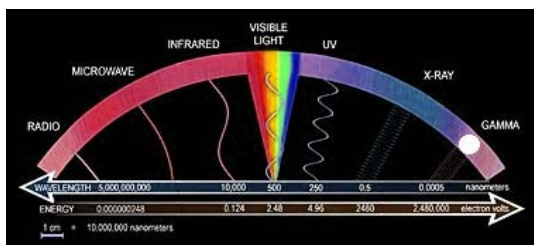


In the highfrequency measurement an electromagnetic wave with low energy is generated and via an antenna integrated into the product. This wave spreads out in the product in dependance of the electrical characteristics. A second antenna receives this wave. Energy and phase of the received wave are indicators for the watercontent in the product.

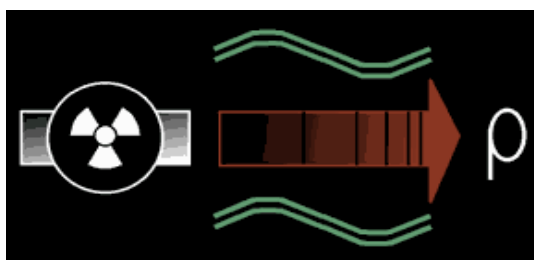


HF-measurements are qualified because of high stability and a very short feedback time. Measurements at conveyer belts or nonconductive tanks are operating without direct contact and can be mounted outside of the process equipment. In case of metallic tanks the sensors are inserted together with a flange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

## Radiometric Measurement



Radiometric systems are used for non contact and continuous measurements with a radioactive spot beamer and a nuclear detector at tanks or pipes. In the radiometric measurement technology a nuclear detector is used to analyse the intensity of gamma-rays, generated from a radioactive spot beamer. The reduction of the intensity of the gamma rays, infected from the product, is the scale for the detection of density or concentration. Radiometric systems are operating without direct contact and can be mounted outside of the process equipment. They are free from wear and tear and the physical or chemical properties of the product have no influence to the measurement.







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 almost every branch in a large number of industries:

**Food Industry**

- food
- mill products
- dairy products
- sweets
- bread production
- frozen food
- tobacco products
- pet food
- sugar production

**Freshfood Industry**

- meat
- poultry
- fish

**Drinks Industry**

- breweries
- soft drinks
- wine
- spirits
- coffee & tea

**Chemical Industry**

- primary industry
- domestic chemicals
- pharmacy
- paper process

**Construction Ind.**

- horticulture
- paints
- building material
- building techniques

**dairy products**



**TS-measurement**

- lab ferment cheese
- curd
  - soft cheese
  - sliceable cheese
  - hard cheese
- cream cheese
  - curd cheese
  - cottage cheese
- milk products
  - yogurt
  - consumpt. milk
  - butter etc.



**measurement of fat, water, protein**

- |                    |                     |
|--------------------|---------------------|
| milk products      | milkpowder products |
| - yogurt           | - milk powder       |
| - consumption milk | - cream powder      |
| - butter etc.      | - yogurt powder     |

**food**

**measurement of fat, water, protein**

agglomerated and non agglomerated powders for instant foods, soups and sauces

**frozen food**

**measurement of fat, fat acid, water, protein**

convenience products as pasta, meat- and fish fastfood, Chinese / Thai food

**sweets**

**measurement of fat, water**

chocolate-, sweets-, praline production

**pet food**

**measurement of fat, water, protein**

meat und fodder



**sugar production**



**BRIX-measurement**

sugar based raw material

- sugar beets
- sugar cane

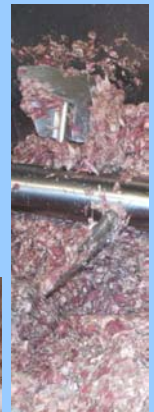
**meat**



**measurement of fat, water, creatin and collagen (BEFFE)**

sausage meat for the production of

- raw sausage
- boiled sausage
- meat paste
- black pudding
- frying sausage
- meatballs
- hash
- pastry



**poultry**

**measurement of fat, water, protein**

sausage meat for the production of pastry etc.

**breweries**

**measurement of water, ethanol, yeast**

top-fermented beers and ales etc.

**spirits**

**measurement of ethanol**

liqueur and brandy

**pharmacy**



**measurement of water, protein, amino acid**

agglomerated and not agglomerated powders for the medicine production

**paper**



**TS-measurement (density)**

cellulose-, paper-, boardproduction  
rag paper processing

**measurement of water, ash, shade of grey**

cellulose, paper

**measurement of water in thin layers**

paper, board, cardboard

**primary industry**

**measurement of water**

chipboard production

**primary industry**

**measurement of water**

concrete- and cement production



## 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.

#### **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)



**HK1-M1- PAN-6506**

**HK1-M1- PAN-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

**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 (with PT100 and flange DN80)

**PAN-8006****2 3A-spiralantennas**

3A-spiralantennas (for welding flanges)

**3SA-WFL1****2 mini-spiralantennas**

mini-spiralantennas with sockets (for flowcells)

**MSA-FLC2**



## 2.1.3 HK1-Mc

**HK1-MC**

evaluation unit HK1-Mc

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

total solids- and watercontent-  
measurement for the cheese production  
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  
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**

Auswerteeinheit HK1-Mc-LAB

**range of application**

total solids- and watercontent-  
measurement for the cheese production  
dairy and cheese factories.

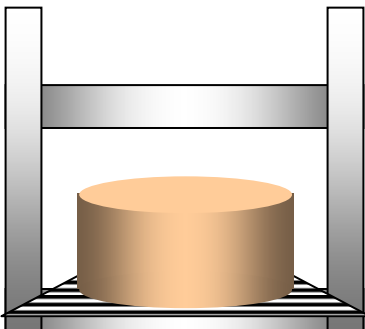
**design**

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 / 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)

**PAN-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**

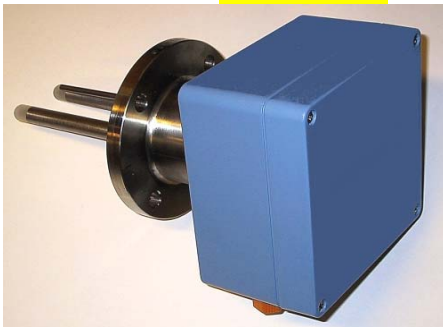
aluminium pressure casting housing  
h x w x d: 177 x 177 x 100mm

**functionality / sensor systems****2 integrated pinantennas**

pinantennas (with NTC and flange DN65)

## 2.2.3 HK2-F

## HK2-F1



evaluation unit HK2-C



## 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  
no softkeys

**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-spectralyser)

#### **Latest NIR-technology with diode array.**

The spectrometer HK4 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**

aluminium pressure casting housing  
h x w x d: 230 x 280 x 110mm

#### **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-4BTR**

#### **1 NIR-sensor**

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



## 2.3.2 HK4-2

**HK4-20**


evaluation unit HK4

**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**

aluminium pressure casting housing  
h x w x d: 230 x 280 x 110mm

**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-4BTR**1 NIR-sensor

halogen lamp 4S stainless steel  
3A-tankcell 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**

aluminium pressure casting housing  
h x w x d: 230 x 280 x 110mm

**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

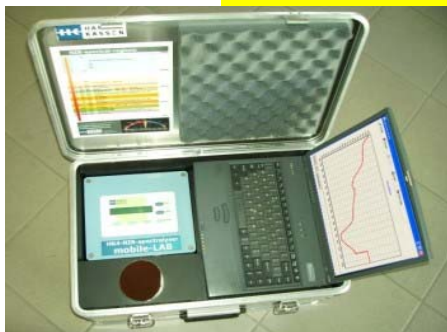
halogen lamp 4B black enodized  
3A-tankcell DN50 / reflection

**NIR-4BTR**1 NIR-sensor

halogen lamp 4S stainless steel  
3A-tankcell 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

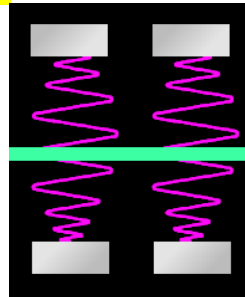




**HK5-14 GHZ-0010**  
**HK5-14 GHZ-0024**

4 sensors

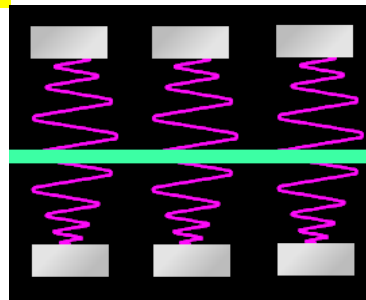
10 GHz-sensors  
 24 GHz-sensors



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

6 sensors

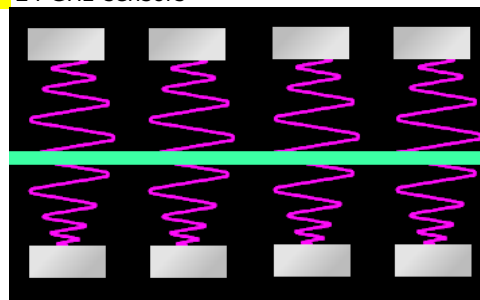
10 GHz-sensors  
 24 GHz-sensors



**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.**

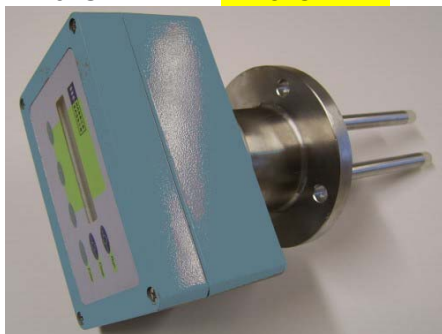
The microwave instrument HK6 is available in 2 product versions:

- 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 sensors / antennas

##### 3.1.1 PT100 **HKA-TE**



PT100-cable

#### **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

##### 3.1.2 pinantennas **HKA-MW**



pinantennas with flange

#### **range of application**

Microwavemeasurement 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





## 3.1.3 pinantennas with cleaning

HKA-MW



pinantennas with cleaning

**range of application**

Microwavemeasurement TS (total solids)  
in pipes and tanks.  
BRIX-measurement in the sugarindustry.

**design**

immersion depth 195mm

PAC-6506 flange DN65

in use with:

- HK2-M

## 3.1.4 3A-spiralantennas

HKA-MW



3A-spiralantenna

**range of application**

Microwavemeasurement TS (total solids)  
in pipes.

**design**3SA-3AFC distance max. 200mm

in use with:

- HK1-M

- HK1-Mp

## 3.1.5 short 3A-pinantennas

HKA-MW



short 3A-pinantenna

**range of application**

Microwavemeasurement TS (total solids)  
in pipes.

**design**3SP-FLC1 distance max. 80mm

in use with:

- HK1-M



## 3.1.6 mini-spiralantennas

**HKA-MW**

mini-spiralantenna

**MSA-FLC2****range of application**

Microwavemeasurement TS (total solids) in pipes.

**design**

distance max. 200mm

in use with:

- HK1-M
- HK1-Mp

## 3.1.7 spiralantennas

**HKA-MW**

spiralantenna

**SPA-0000****range of application**

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

**design**

distance max. 500mm

in use with:

- HK1-M
- HK1-Mc

## 3.1.8 hornantennas

**HKA-MW**

hornantenna

**HOA-0000****range of application**

Microwavemeasurement TS (total solids) at conveyer belts.

**design**

distance max. 1000mm

in use with:

- HK1-M



## 3.1.9 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

## 3.1.10 NIR-sensor / halogenlamp

**HKA-IR**

NIR-sensor

**range of application**

NIR-reflection- oder -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



### 3.2 Measure cells

#### 3.2.1 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

#### 3.2.2 3A-flowcell (for short 3A-pinantennas)

**HKC-PR**



3A-flowcell

**3SP-FLC1**

#### **range of application**

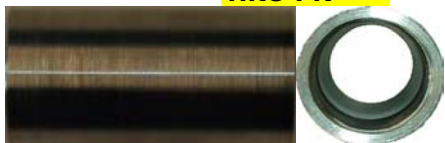
Microwavemeasurement TS (total solids) in pipes.

#### **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



### 3.2.3 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

### 3.2.4 3A-flowcell (for NIR-reflection)

**HKC-PR**



3A-flowcell

#### **range of application**

NIR-reflection 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**



### 3.2.5 3A-flowcell (for NIR-transmission)

**HKC-PR**



Durchfluss-Messzelle

#### **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

### 3.2.6 3A-tankcell (for NIR-reflection)

**HKC-PR**



3A-tankcell

#### **range of application**

NIR-reflection 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





## 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 and 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 and 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 and 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 (cheese/curd)

in use with:

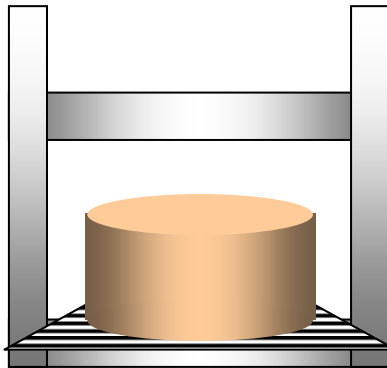
- HK1-Mc

**design**

**LAS-0001** h x w x d: 300 x 500 x 167mm



## 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

4.2 spareparts

## 4.2.1 halogen bulbs

**HKS-LA****range of application**

exchange/rebuild of halogenbulbs in the NIR-sensor

in use with::

- HK4

**design****NIR-0001**

1 halogenbulb 5V / 6,5W

**NIR-0004**

set von 4 halogenbulbs each 5V / 6,5W



## 5 Technische Daten

### 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	110/230V / AC		quick-connection
2 analog output	0/4 - 20mA		quick-connection
1 analog input	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	analog/digital-conversion		cyclic 250ms
rating in pipes	x	TS/liquids	0,2%
rating in tanks	x	TS/liquids	0,2%
rating 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	110/230V / AC		quick-connection
2 analog output	0/4 - 20mA		quick-connection
1 analog input	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	analog/digital-conversion		cyclic 250ms
rating in pipes	x	TS/liquids	0,2%
rating in tanks	x	TS/liquids	0,2%
rating at conveyer belts		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	110/230V / AC		quick-connection
2 analog output	0/4 - 20mA		quick-connection
1 analog input	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	analog/digital-conversion		cyclic 250ms
rating in pipes	TS/liquids		0,2%
rating in tanks	TS/liquids		0,2%
rating at conveyer belts	x	TS/bulk material	1%
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	110/230V / AC		quick-connection
2 analog output	0/4 - 20mA		quick-connection
1 analog input	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	analog/digital-conversion		cyclic 250ms
rating in pipes	x	TS/liquids	0,2%
rating in tanks	x	TS/liquids	0,2%
rating at conveyer belts		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	110/230V / AC		quick-connection
2 analog output	0/4 - 20mA		quick-connection
1 analog input	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	analog/digital-conversion		cyclic 250ms
rating in pipes	x    TS/liquids		0,2%
rating in tanks	x    TS/liquids		0,2%
rating at conveyer belts		TS/bulk material	1%
sensorsystems			
pinantennas 195mm / DN65	x	option: sensor cleaning	
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	110/230V / AC		quick-connection
2 analog output	0/4 - 20mA		quick-connection
1 analog input	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	analog/digital-conversion		cyclic 250ms
rating in pipes	x	TS/liquids	0,2%
rating in tanks	x	TS/liquids	0,2%
rating at conveyer belts		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	110/230V / AC		quick-connection
2 analog output	0/4 - 20mA		quick-connection
1 analog input	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	analog/digital-conversion		cyclic 250ms
rating in pipes	x	TS/liquids	0,2%
rating in tanks	x	TS/liquids	0,2%
rating at conveyer belts		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	aluminium pressure casting housing		
dimensions h x w x d	230 x 280 x 110mm		
protection class	IP65		
weight			
colour	RAL 5024		
circuit points			
power supply	various 100-240V / AC		quick-connection
3 analog 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-interfaces	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	<b>spectral range</b>	<b>600nm - 1100nm</b>	
rating in pipes	CH-/NH-/OH-compounds	assortments / powder	0,5%
rating in tanks	CH-/NH-/OH-compounds	assortments / powder	0,5%
rating at jiggle chuts	CH-/NH-/OH-compounds	powder	0,5%
sensorsystems			
NIR-sensor reflection	x		
NIR-sensor transmission	x		
calibration and commissioning	chemometric software SPECTER		
ambient conditions			
environment temperature	-20°C - +45°C		
product temperature	>0°C - +130°C		



## 5.9

**HK4-2**

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		
circuit points			
power supply	various 100-240V / AC		quick-connection
4 analog 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-interfaces	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	<b>spectral range</b>	<b>1200nm - 1700nm</b>	
rating in pipes	CH-/NH-/OH-compounds	assortments / powder	0,1%
rating in tanks	CH-/NH-/OH-compounds	assortments / powder	0,1%
rating at jiggle chuts	CH-/NH-/OH-compounds	powder	0,1%
sensorsystems			
NIR-sensor reflection	x		
NIR-sensor transmission	x		
calibration and commissioning	chemometric software SPECTER		
ambient conditions			
environment temperature	-20°C - +45°C		
product temperature	>0°C - +130°C		





## 5.10

**HK4-3**

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		
circuit points			
power supply	various 100-240V / AC		quick-connection
5 analog 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-interfaces	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	<b>spectral range 1700nm - 2500nm</b>		
rating in pipes	CH-/NH-/OH-compounds	assortments / powder	0,1%
rating in tanks	CH-/NH-/OH-compounds	assortments / powder	0,1%
rating at jiggle chuts	CH-/NH-/OH-compounds	powder	0,1%
sensorsystems			
NIR-sensor reflection	x		
NIR-sensor transmission	x		
calibration and commissioning	chemometric software SPECTER		
ambient conditions			
environment temperature	-20°C - +45°C		
product temperature	>0°C - +130°C		

## 5.11

**HK4-mobile-LAB**

measuring method	NIR-spectrometer with diodearray		
housing evaluation unit	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	various 100-240V / AC		quick-connection
5 analog values			
1 PS-halogenlamp			
1 notebook	x		
1 measure Kit	x		
1 chemometric software	x	SPECTER	
user interface			
operating	6 softkeys in integrated keypad		
monitoring	2 x 24 characters in illuminated display		
measuring accuracy / scanning	<b>spektral range 1700nm - 2500nm</b>		
rating in petri dishes	CH-/NH-/OH-compounds	assortments / powders	0,1%



## 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	110/230V / AC	quick-connection	
2 analog output	0/4 - 20mA	quick-connection	
1 analog input	0/4 - 20mA	quick-connection	
1 temperature/PT100		quick-connection	
1 relay contact		quick-connection	
2 sensor-plugs	standardcable	quick-connection	
2 computer-interfaces	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	analog/digital-conversion	cyclic 250ms	
rating in pipes	TS/liquids	0,2%	
rating in tanks	TS/liquids	0,2%	
rating 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			
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	130 x 200 x 90mm		
protection class	IP65		
weight			
colour	RAL 5024		
circuit points			
power supply	various 100-240V / AC		quick-connection
2 analog output	0/4 - 20mA		quick-connection
1 analog input	0/4 - 20mA		quick-connection
1 temperature/PT100	NTC		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
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	analog/digital-conversion		cyclic 250ms
rating in pipes	x    TS/liquids		0,2%
rating in tanks	x    TS/liquids		0,2%
rating at conveyer belts		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	130 x 200 x 90mm		
protection class	IP65		
weight			
colour	RAL 5024		
circuit points			
power supply	various 100-240V / AC	quick-connection	
2 analog output	0/4 - 20mA	quick-connection	
1 analog input	0/4 - 20mA	quick-connection	
1 temperature/PT100	NTC	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	
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	analog/digital-conversion	cyclic 250ms	
rating in pipes	x    TS/liquids	0,2%	
rating in tanks	x    TS/liquids	0,2%	
rating at conveyer belts		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 Operation / Commissioning

In the plants, our instruments are in operation permanently, i.e. independent from the status of the engineering process. This can be normal operation, start up, shut down or standstill.



The microwave instruments are designed for ambient temperatures of about **>0°C to +85°C**

The NIR-spectrometer is designed for ambient temperatures of about **>0°C to +45°C**

For both measuring devices the temperature range of the to be rated product is **>0°C to +130°C**

The measuring instruments provide the rated values as standard-analogsignals (0/4 - 20mA) for the further processing in superposed open-loop-, closed-loop or controlsystems.

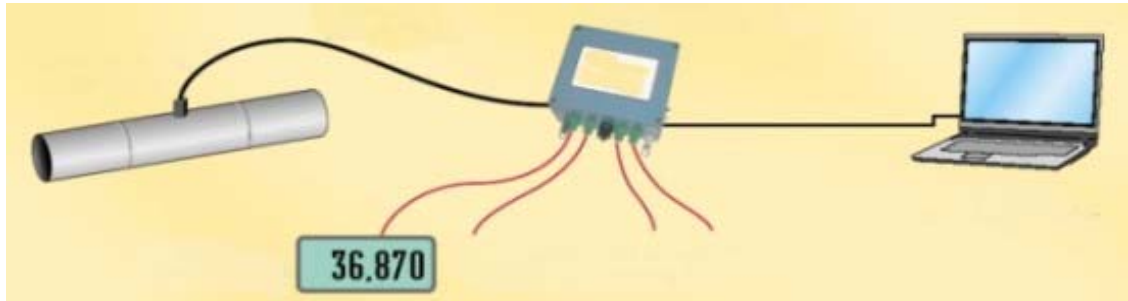
The measuring instruments can be pre-calibrated for different product-lines, the change from product 1 to product 2 is effected by manual operation or by the superposed system.

The manual fine-tuning of the setted parameters in the microwave-instruments occurs with the user interface of the evaluation unit. The user interface of each evaluation unit is menue controlled. This is realized by softkeys with a keypad control. This means, that the softkeys below the display with 2 x 24 characters have a different relevance in dependance of the status of operation.

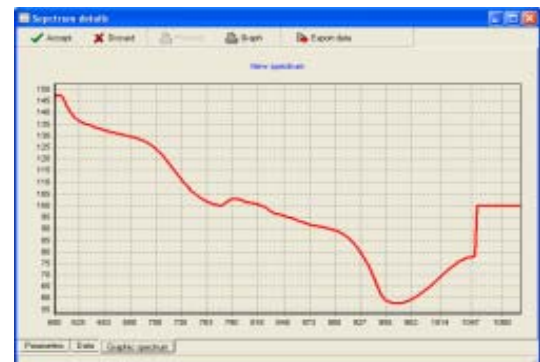
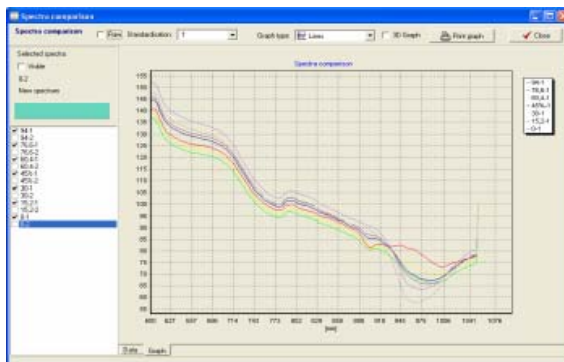




The NIR-spectrometer performs the same user-interface with the evaluation unit. But in the online-mode it is used only for displaying the current values. Adjustments of parameters or the calibration of new products is performed with



the chemometric software SPECTER. Productspecific calibrations of samples are stored in a database and can be used as references for new and further calibrations.



### Engineering:

The know-how for the technical layout of our measuring equipment is the intellectual property of Harrer & Kassen GmbH. By the planning of microwave-system the dependences of antenna distance, product temperature and pipe diameter is only one example for many engineering steps, which have to be executed. By the planning of NIR-equipments nothing has the importance, in addition to the accuracy of spectroscopy and calibration, like the location of the glass window. Together with our clients we work out the only reasonable and efficient solutions.

### Installation:

For all sensorsystems of our measuring equipments regulations for installation are worked out. The required mechanical devices like welding-sockets or -flanges are in the scope of supply of the measuring equipment and delivered by us. Normally the client takes responsibility of the mounting.

### Commissioning:

For each of our measurement instruments a manual is available. In detail every step of commissioning is explained. The commissioning is also an option in our offers and can be executed by us. We also offer professional trainings, to make sure, that our clients have the capability to provide commissioning, calibration and process operation on their own.





**7 Article Numbers / Pricelist 2007-04-A6**

**7.1 HK1**

article number EUR

**7.1.1 HK1-M**

- evaluation-unit with 2x2m HF-cable
- 2 pinantennas (with PT100 and flange DN65)
- 2 pinantennas (with PT100 and flange DN80)
- 2 3A-spiralantennas (for 3A-flowcell\*\*)
- 2 short 3A-pinantennas (for 3A-flowcell\*\*)
- 2 mini-spiralantennas with sockets (for flowcell\*\*)

- HK1-M1-
- PAN- 6506
- PAN- 8006
- 3SA- 3AFC
- 3SP- FLC1
- MSA- FLC2

\*\*not included in the delivery range

- evaluation-unit with 2x2m HF-cable
- 2 spiralantennas
- 2 hornantennas

- HK1-M2-
- SPA- 0000
- HOA- 0000

**7.1.2 HK1-Mp**

- evaluation-unit with 2x2m HF-cable
  - 2 pinantennas (with PT100 and flange DN80)
  - 2 3A-spiralantennas (for welding-flanges\*\*)
  - 2 mini-spiralantennas with sockets (for flowcell\*\*)
- \*\*not included in the delivery range

- HK1-MP-
- PAN- 8006
- 3SA- WFL1
- MSA- FLC2

**7.1.3 HK1-Mc**

- evaluation-unit with 2x2m HF-cable
- 2 spiralantennas
- incl. 1 stainless steel housing
- incl. 1 "distance-lasersensor" with PS and cables

- HK1-MC-
- SPA- CH01

**7.1.4 HK1-Mc-LAB**

- evaluation-unit with 2x2m HF-cable
- 2 spiralantennas
- incl. 1 laboratory-device (stainless steel/teflon)
- incl. 1 "distance-lasersensor" with PS and cables

- HK1-MC-
- LAB- CH02

**7.1.5 HK1-C**

- evaluation-unit
- 2 pinantennas 195mm (with PT100 and flange DN80)

- HK1-C1-
- PAN- 8006

**7.2 HK2**

**7.2.1 HK2-M**

- evaluation-unit with 2x2m HF-cable
- 2 pinantennas (flange DN65)
- 2 pinantennas (with cleaning and flange DN65)

- HK2-M1-
- PAN- 6506
- PAN- 6516

**7.2.2 HK2-C**

- evaluation-unit
- 2 pinantennas 195mm (with NTC and flange DN65)

- HK2-C1-
- PAN- 6506

**7.2.3 HK2-F**

- evaluation-unit without softkeys
- 2 pinantennas (with NTC and flange DN65)
- 1 operating-device (with 10m connection-cable)

- HK2-F1-
- OPE- 6506



**7.3 HK4**

**7.3.1 HK4-1**

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

article number

EUR

HK4-10-  
 NIR- 4BFR  
 NIR- 4SFR  
 NIR- 4BFT  
 NIR- 4SFT  
 NIR- 4BTR  
 NIR- 4STR

**7.3.2 HK4-2**

evaluation-unit 1200nm-1700nm / 4C / 0,1%  
 1 NIR-sensor 4B (with 3A-flowcell DN50 / reflexion)  
 1 NIR-sensor 4S (with 3A-flowcell DN50 / reflexion)  
 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 / reflexion)  
 1 NIR-sensor 4S (with 3A-tank-cell DN50 / reflexion)  
 (1-4 halogen-bulbs / B black enodized / S stainless steel)

HK4-20-  
 NIR- 4BFR  
 NIR- 4SFR  
 NIR- 4BFT  
 NIR- 4SFT  
 NIR- 4BTR  
 NIR- 4STR

**7.3.3 HK4-3**

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

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

**7.3.4 HK4-mobile-LAB**

evaluation-unit 1700nm-2500nm / 5C / 0,1%  
 1 NIR-sensor 4B (reflexion)  
 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
<b>7.4.3</b>	<b><u>HK5-3</u></b>		
	evaluation-unit 10/24GHz	HK5-16-	
	6 10GHz-sensors	GHZ- 0010	<input type="text"/>
	6 24GHz-sensors	GHZ- 0024	<input type="text"/>
<b>7.4.4</b>	<b><u>HK5-4</u></b>		
	evaluation-unit 10/24GHz	HK5-18-	
	8 10GHz-sensors	GHZ- 0010	<input type="text"/>
	8 24GHz-sensors	GHZ- 0024	<input type="text"/>
<b>7.5</b>	<b>HK6</b>		
<b>7.5.1</b>	<b><u>HK6-C</u></b>		
	evaluation-unit	HK6-C1-	
	2 pinantennas 195mm (with NTC and flange DN65)	PAN- 6506	<input type="text"/>
<b>7.5.1</b>	<b><u>HK6-F</u></b>		
	evaluation-unit without softkeys	HK6-F1-	
	2 pinantennas 195mm (with NTC and flange DN65)	OPE 6506	<input type="text"/>
	1 operating-device (with 10m connection-cable)		
<b>7.6</b>	<b>components</b>		
<b>7.6.1</b>	<b><u>evaluation-units</u></b>		
	1 HK1-M	HK1-M1- XXX- 0000	<input type="text"/>
	1 HK1-Mp	HK1-MP- XXX- 0000	<input type="text"/>
	1 HK2-M	HK2-M1- XXX- 0000	<input type="text"/>
	1 HK5	HK5-00- XXX- 1224	<input type="text"/>
<b>7.6.2</b>	<b><u>sensors / antennas</u></b>		
	1 PT100	HKA-TE- PT1- 0100	<input type="text"/>
	1 PT100 plus connection-electronic	HKA-TE- PT2- E100	<input type="text"/>
	2 pinantennas 195mm / DN65	HKA-MW- PAN- 6506	<input type="text"/>
	2 pinantennas 195mm / DN80	HKA-MW- PAN- 8006	<input type="text"/>
	2 pinantennas 195mm / DN65 / cleaning	HKA-MW- PAC- 6506	<input type="text"/>
	2 3A-spiralantennas	HKA-MW- 3SA- 3AFC	<input type="text"/>
	2 short 3A-pinantennas	HKA-MW- 3SP- FLC1	<input type="text"/>
	2 mini-spiralantennas	HKA-MW- MSA- FLC2	<input type="text"/>
	2 spiralantennas	HKA-MW- SPA- 0000	<input type="text"/>
	2 hornantennas	HKA-MW- HOA- 0000	<input type="text"/>
	2 12GHz-sensors	HKA-MW- GHZ- 0012	<input type="text"/>
	2 24GHz-sensors	HKA-MW- GHZ- 0024	<input type="text"/>
	1 NIR-sensor 4B (4 halogen-bulbs/body black enodized/transmission)	HKA-IR- NIR- 4BT1	<input type="text"/>
	1 NIR-sensor 4S (4 halogen-bulbs/body stainless steel/transmission)	HKA-IR- NIR- 4ST1	<input type="text"/>
	1 NIR-sensor 4B (4 halogen-bulbs/body black enodized/reflexion)	HKA-IR- NIR- 4BR1	<input type="text"/>
	1 NIR-sensor 4S (4 halogen-bulbs/body stainless steel/reflexion)	HKA-IR- NIR- 4SR1	<input type="text"/>



					article number	EUR
<b>7.6.3 cells</b>						
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-reflexion)				HKC-PR- NIR- 3AFR	
1	3A-flowcell DN50 (for NIR-transmission)				HKC-PR- NIR- 3AFT	
1	3A-tank-cell DN50 (for NIR-reflexion)				HKC-PR- NIR- 3ATR	
<u>all other diameters and special manufactures on request</u>						
<b>7.7 devices / spare parts</b>						
<b>7.7.1 devices</b>						
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 (300x500x167mm)				HKD-CH- BOX- 0001	
1	"distance-lasersensor" incl. PS and cables				HKD-CH- LAS- 0001	
1	laboratory-device (stainless steel/teflon) for HK1-Mc				HKD-CH- TEF- 0001	
1	monitoring-software for HK4-applications				HKD-SW- MON- A001	
*lengths in full meters free selectable						
<b>7.7.2 spare parts</b>						
1	halogen-bulb				HKS-LA- NIR- 0001	
1	set with 4 halogen-bulbs				HKS-LA- NIR- 0004	
<b>7.8 services</b>						
<b>7.8.1 commissioning COM (in Germany)</b>						
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	
<b>7.8.2 preparation for calibration (in-house)</b>						
1	samplespectra-scanning (for 1 organic constituent)				HKF-CA- NIR- 0001	
<b>7.8.3 training (in-house)</b>						
1	training operating personnel	microwave-systems/3 persons			HKT-TE- MWT- 0001	
1	training operating personnel	NIR-spectrometer/3persons			HKT-TE- NIR- 0001	



## 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:	Horst Harrer Dipl.Ing.
Commercial Trade Register:	County Court Calw HRB829
VAT-Identification:	DE144606035

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

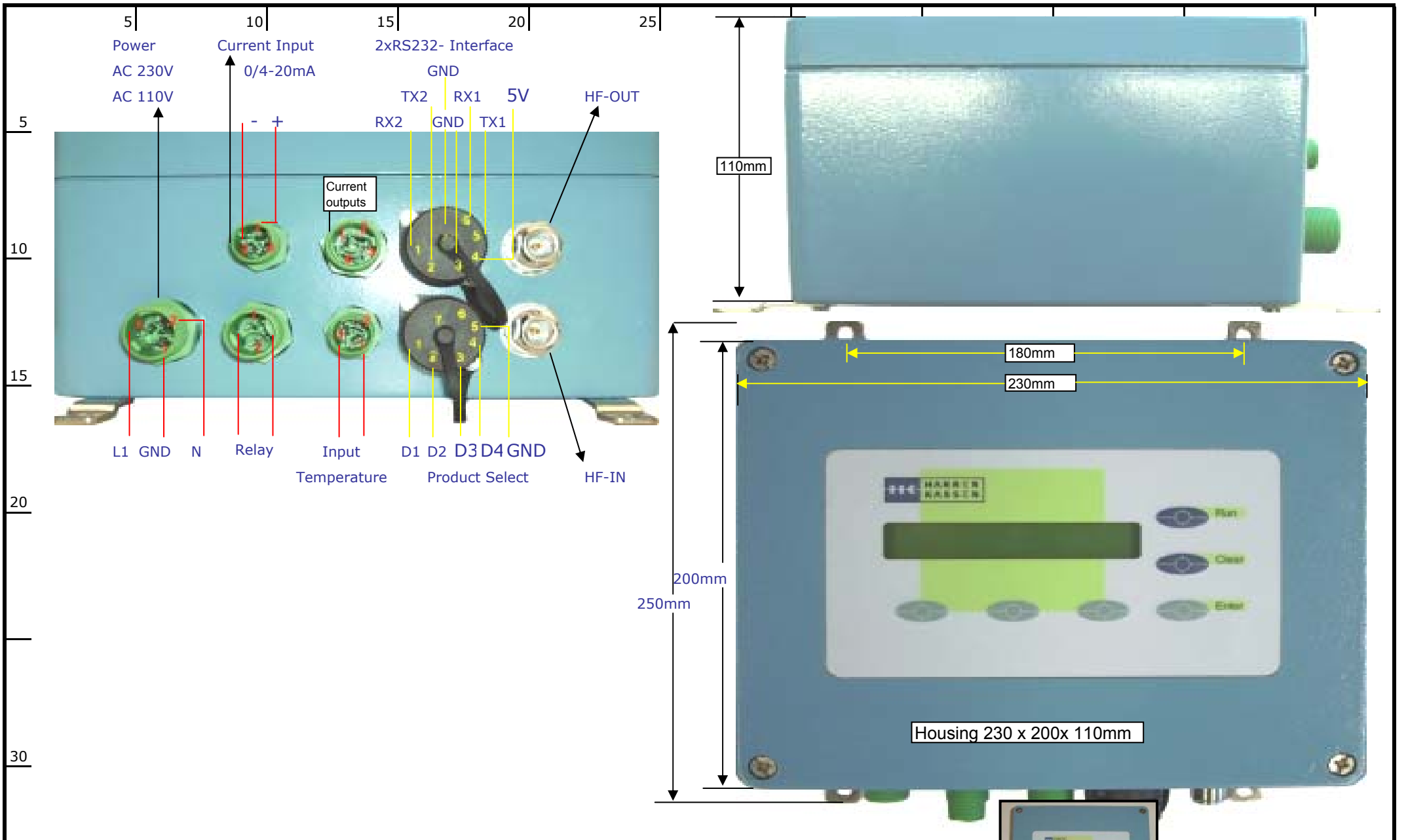
Tel: 0049 (0)7084 9248-15  
eMail: ottenburger@harrerkassen.com



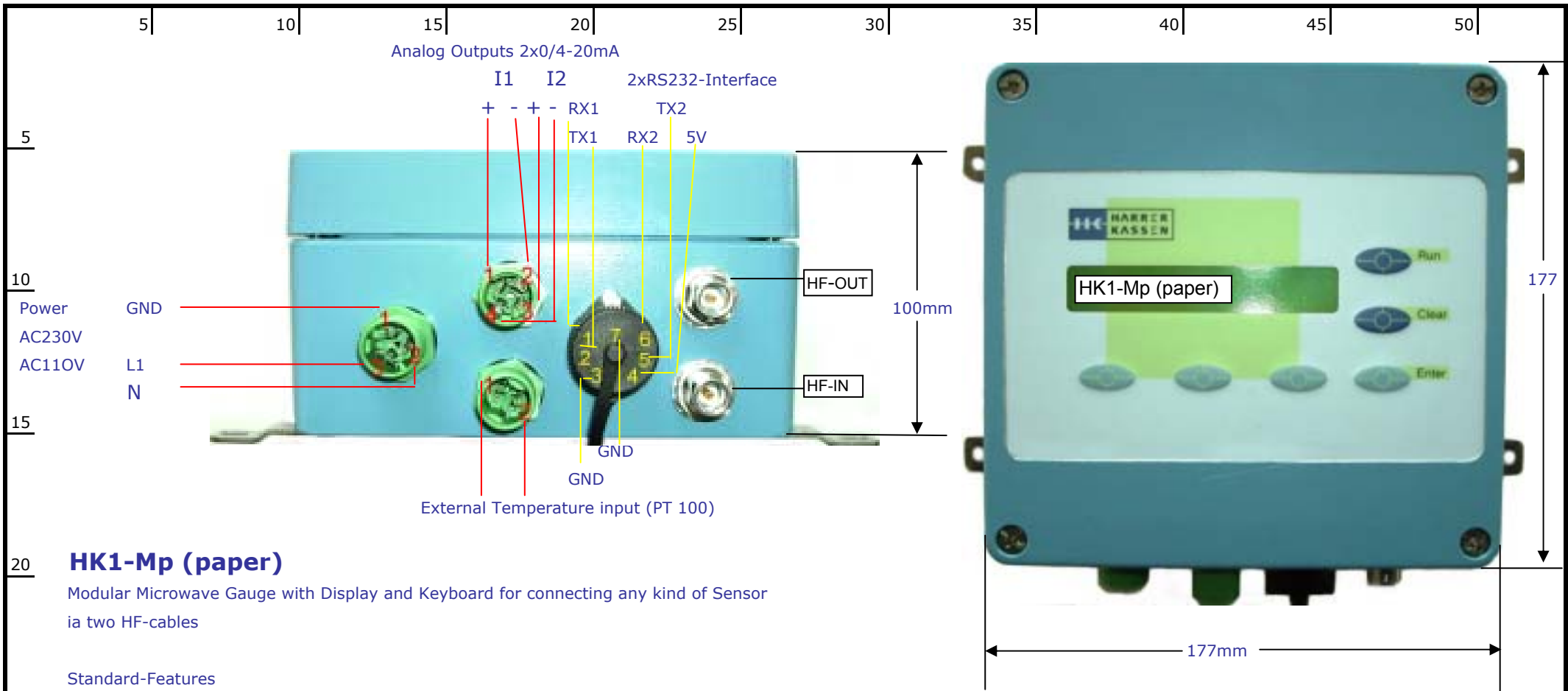
## 9 Technical Annex

### Technical dimension- and datasheets

- > HK1-M
- > HK1-Mp
- > HK1-Ca
- > HK1-Cb
- > HK2-M
- > HK2-Ca
- > HK2-Cb
- > HK2-Fa
- > HK2-Fb
- > HK4a
- > HK4b
- > HK5
- > HK6-Ca
- > HK6-Cb
- > HK6-Fa
- > HK6-Fb
  
- > PT100
- > pinantennas 195mm / DN65
- > pinantennas 195mm / DN80
- > pinantennas / cleaning
- > 3A-spiralantennas
- > short 3A-pinantennas
- > mini-spiralantennas
- > spiralantennas
- > hornantennas
- > 10/24GHz-sensors
- > NIR-sensor 4B
  
- > 3A-flowcell (for 3A-spiralantennas/NIR-reflection/-transmission)
- > 3A-flowcell (for short 3A-pinantennas) and welding sockets
- > flowcell (for mini-spiralantennas) and welding sockets (a)
- > flowcell (for mini-spiralantennas) and welding sockets (b)
- > 3A-tankcell (for NIR-reflection)
  
- > remote control (operating device)
- > HF-cable
- > standard cable
- > optical fiber
  
- > swiffle flange DN65
- > swiffle flange DN80







### HK1-Mp (paper)

Modular Microwave Gauge with Display and Keyboard for connecting any kind of Sensor via two HF-cables

#### Standard-Features

- Voltage: 239V +/-15%, 47-65HZ
- Analog current output for process value, 0/4-20mA, load resistance 500Ohm
- Two HF-cables
- Two RS 232 ports for data logging and remote control
- Different kinds of Sensors or Antennas
- external temperature input PT100
- second current output for process value or temperature

#### Options:

- Voltage: 115V +/-15%, 47-65HZ
- Remote control box



**HK1-Mp**  
evaluation-unit

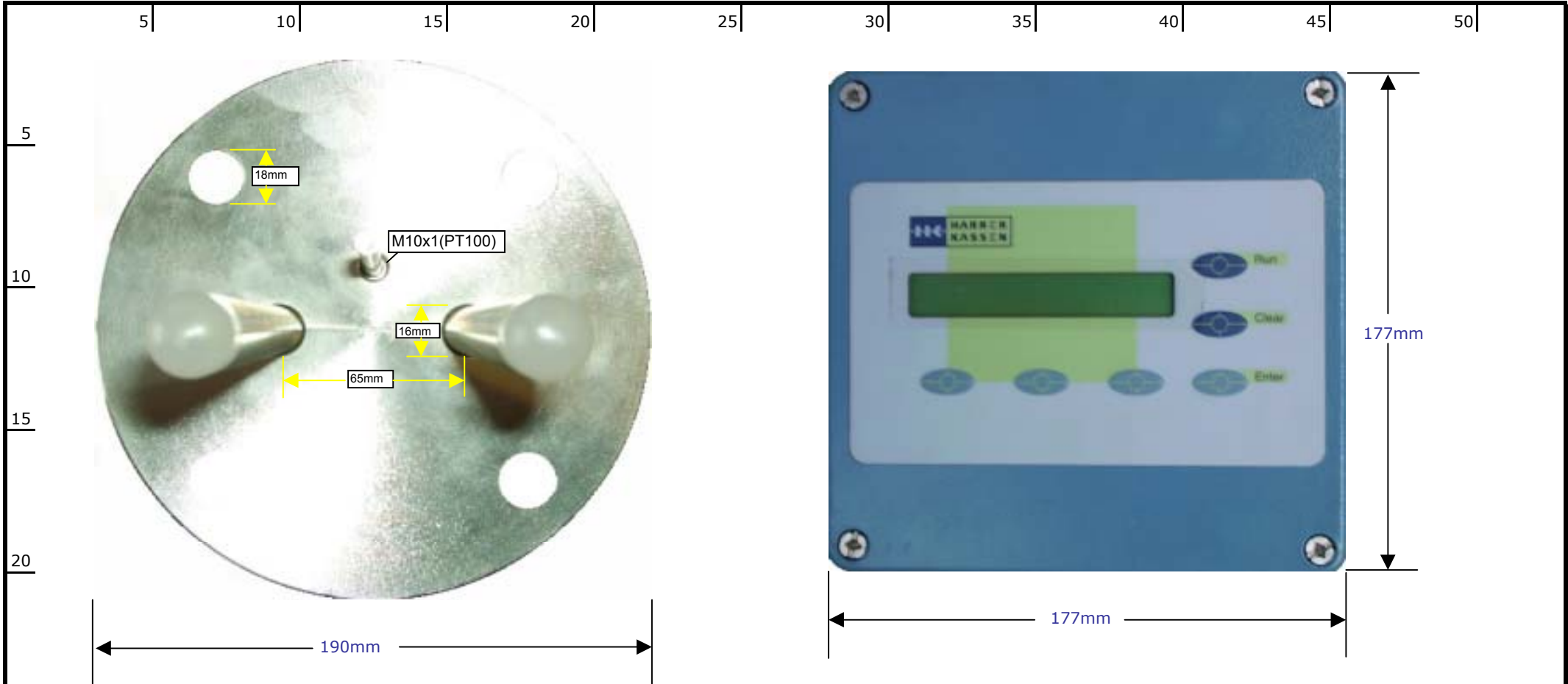
copyright Harrer & Kassen GmbH / all rights reserved

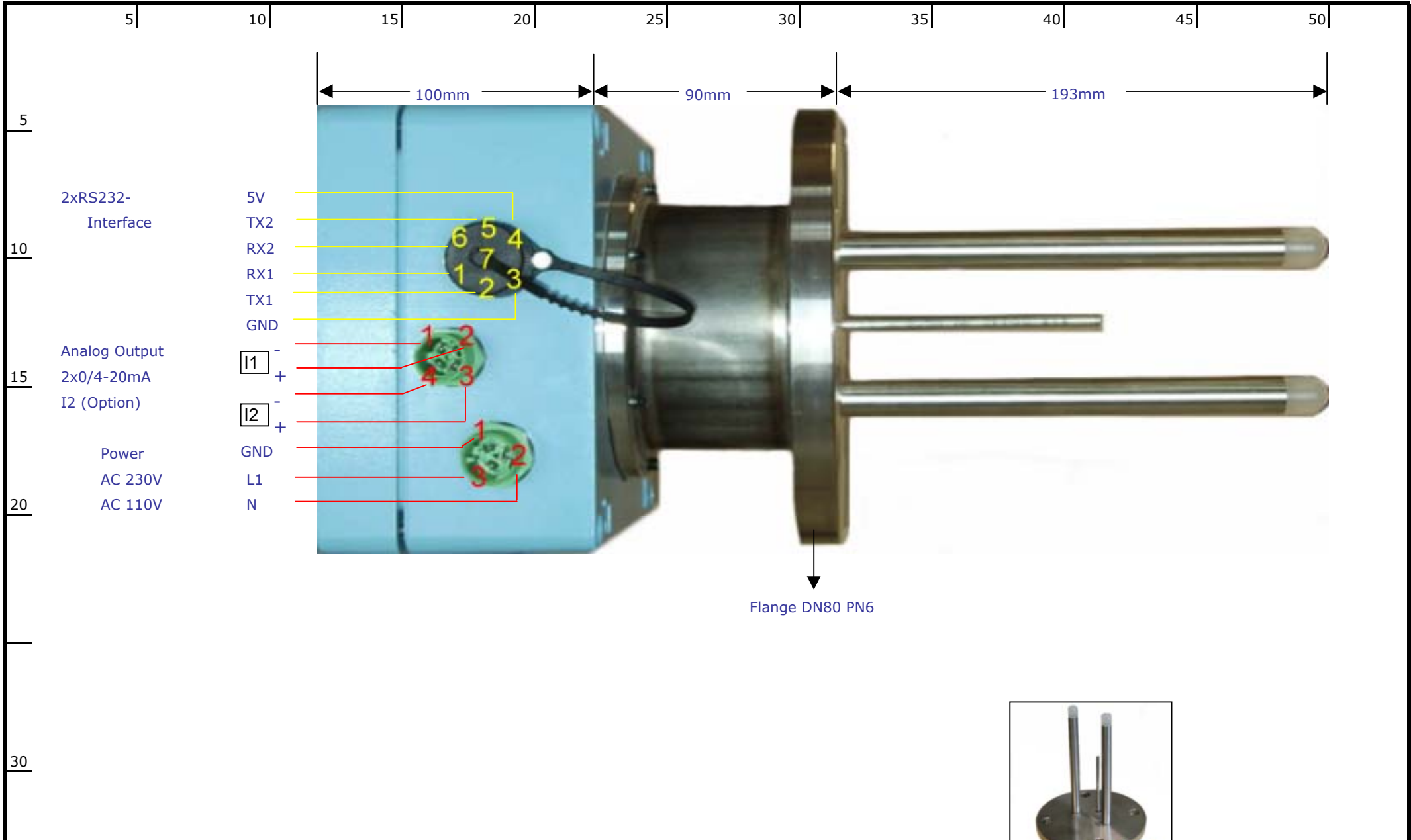
**HK1-MP-XXX-0000**

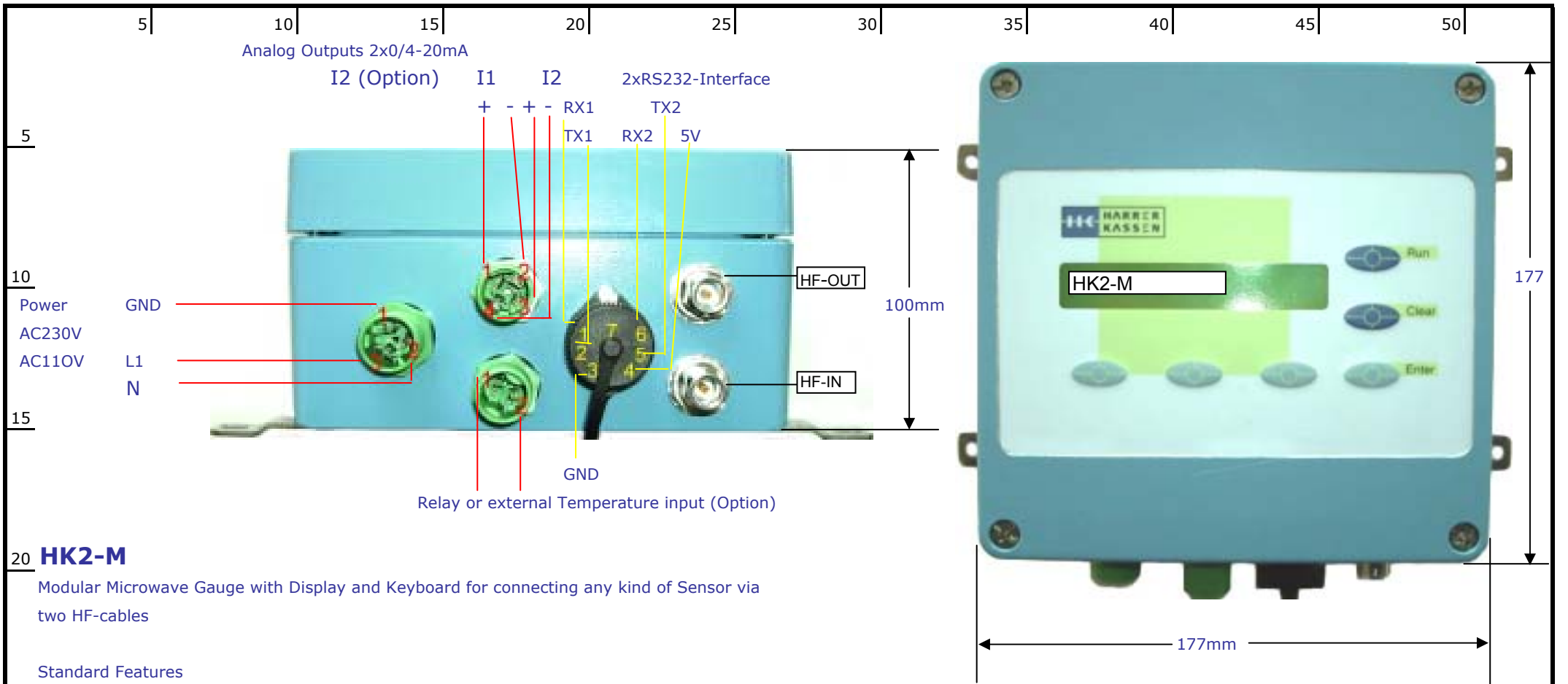
22.August 2006 ot



Harrer & Kassen GmbH  
Am Heschen 6  
D-75328 Langenbrand  
Germany







**20 HK2-M**

Modular Microwave Gauge with Display and Keyboard for connecting any kind of Sensor via two HF-cables

**Standard Features**

- Voltage: 230V +/-15%, 47-65HZ
- Analog current output for process value, 0/4-20mA, load resistance 500Ohm
- Two HF-cables
- Two RS 232 ports for data logging or remote control
- Different kinds of Sensors or Antennas

**Options:**

- Voltage: 115 +/-15%, 47-65HZ
- Second current output for process value or temperature
- Relay output for min and max measurement values to give an alarm
- Relay output to control the cleaning times, when a sensor with cleaning device is required
- external temperature input PT100 or NTC
- Remote control box

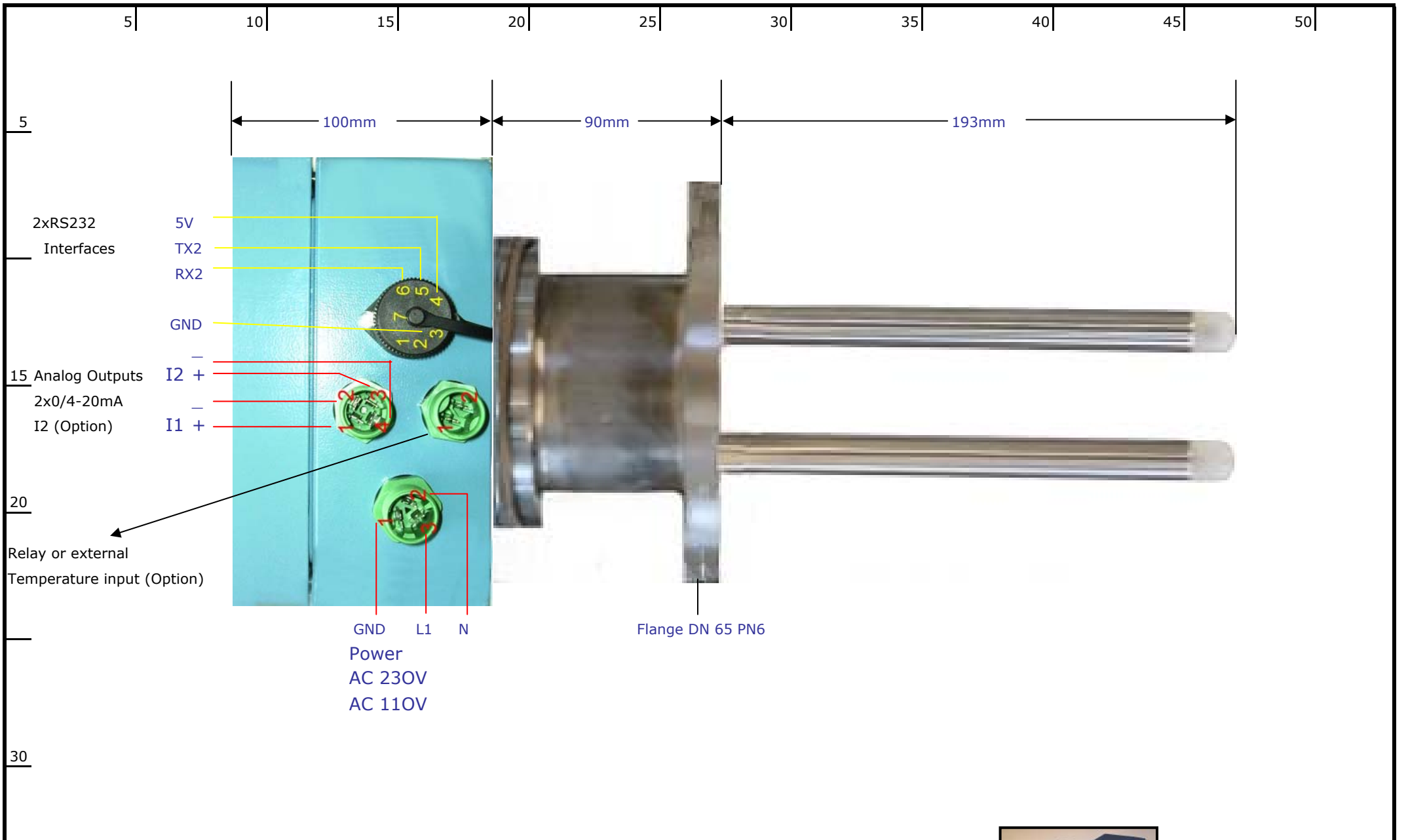


**HK2-M**  
 evaluation-unit  
 copyright Harrer & Kassen GmbH / all rights reserved

**HK2-M1-XXX-0000**  
 22.August 2006 ot

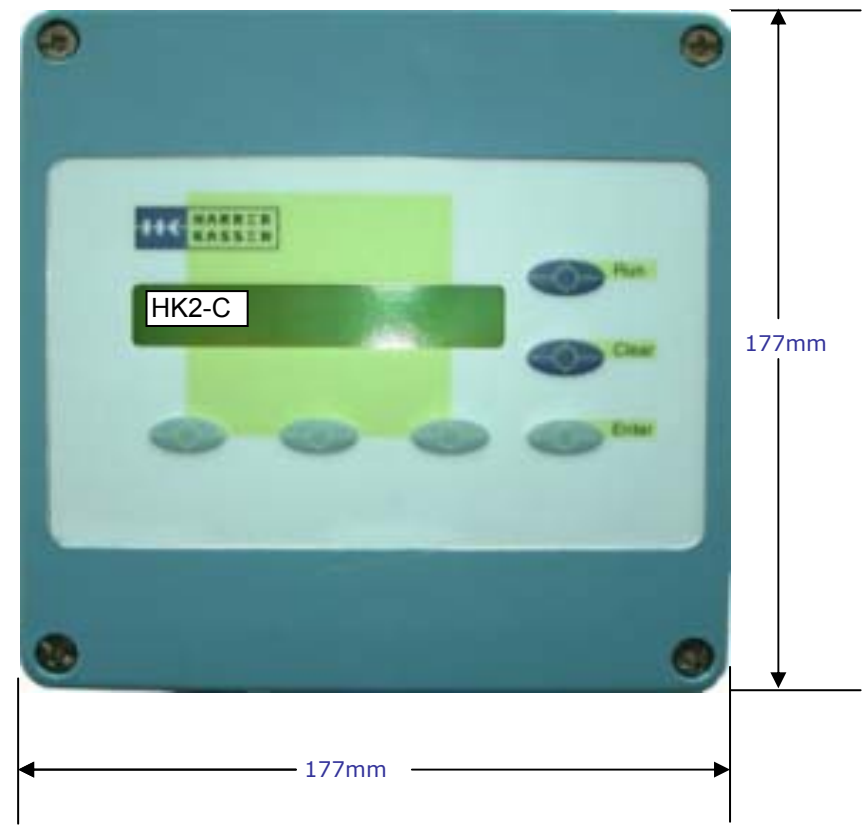
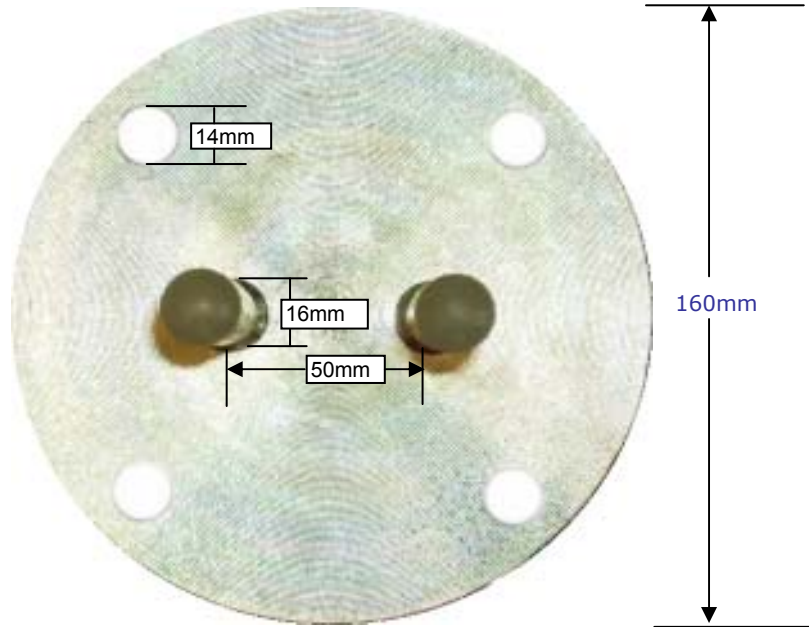


Harrer & Kassen GmbH  
 Am Heschen 6  
 D-75328 Langenbrand  
 Germany

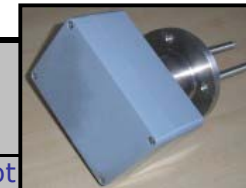
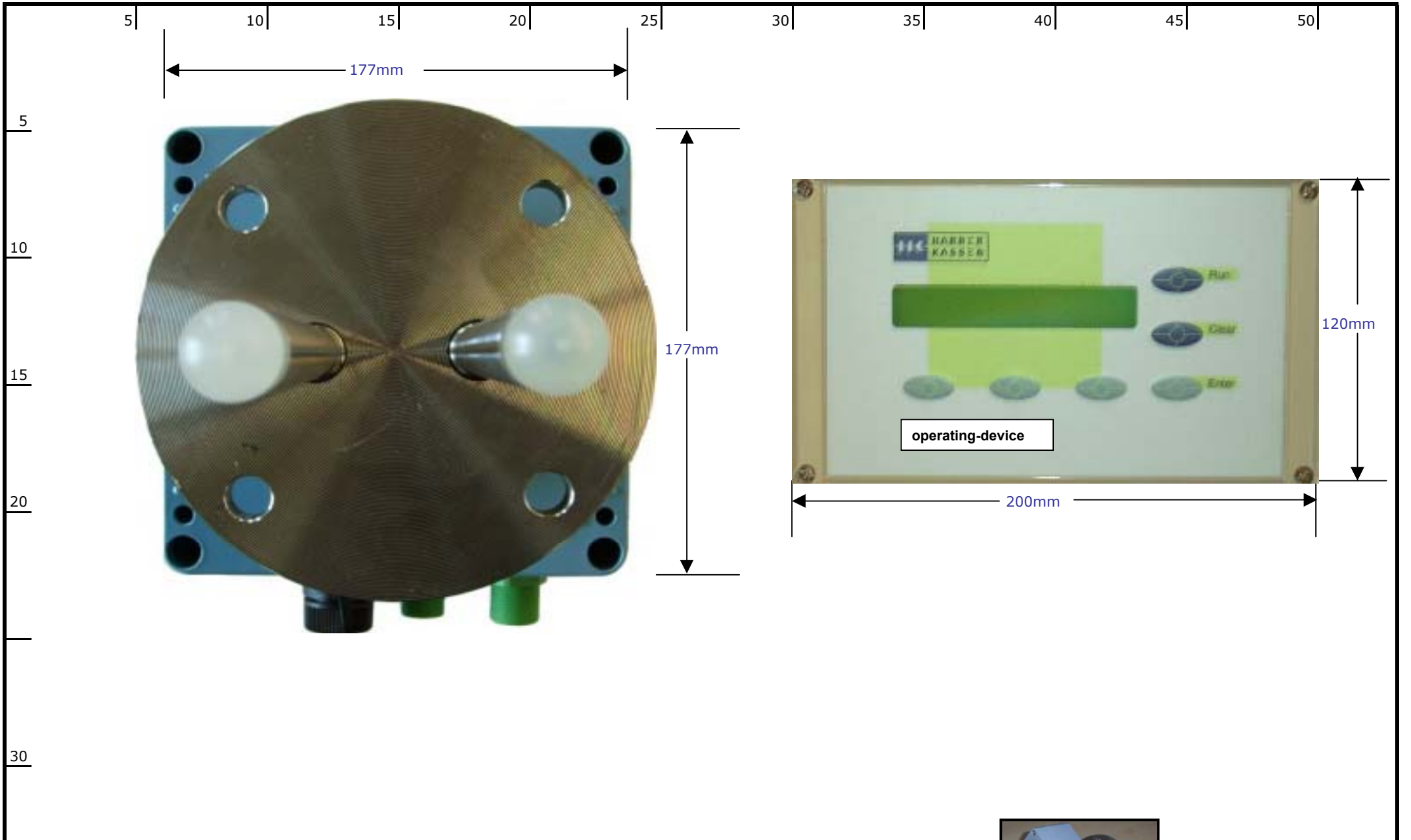


5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50

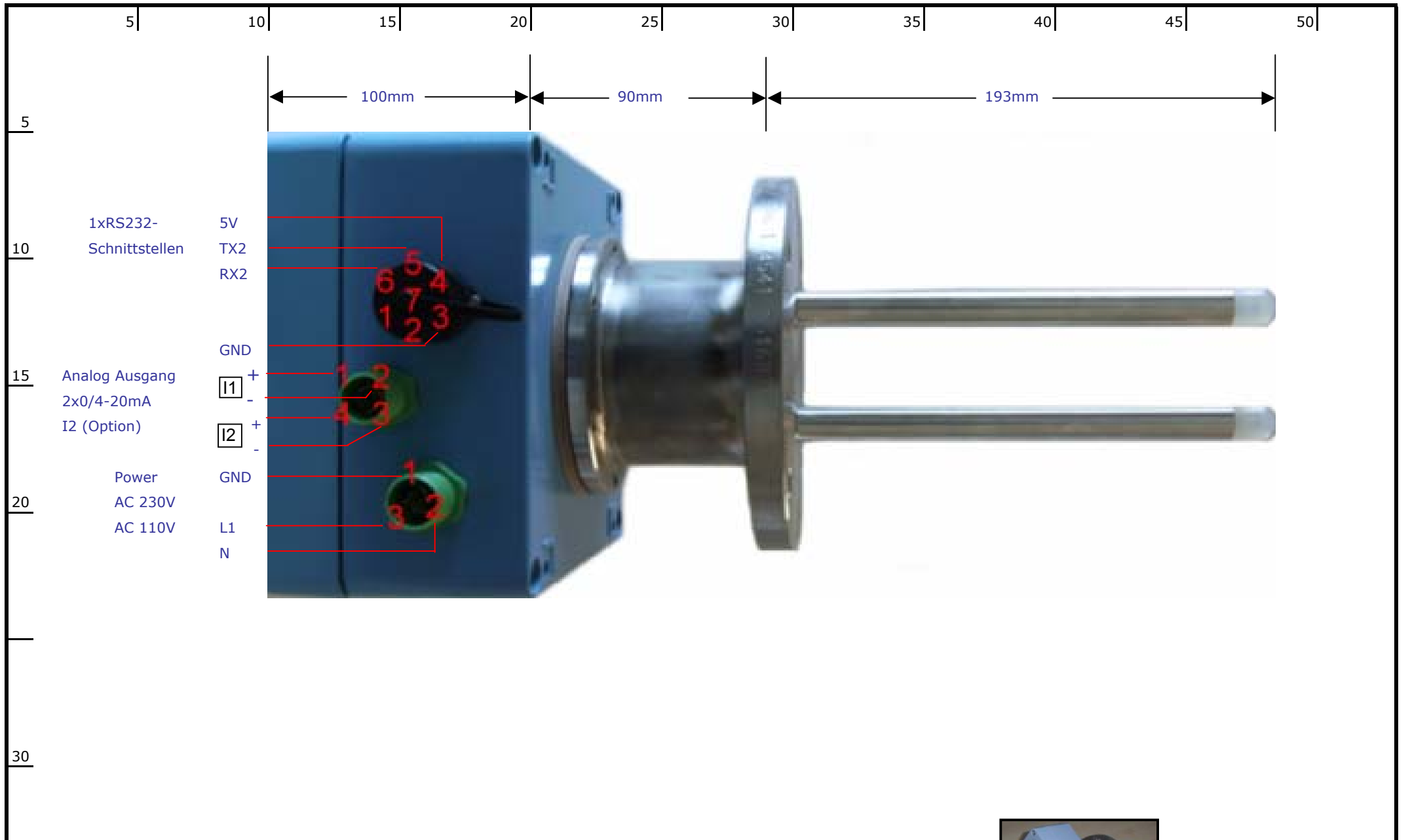
5  
10  
15  
20  
30











5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50

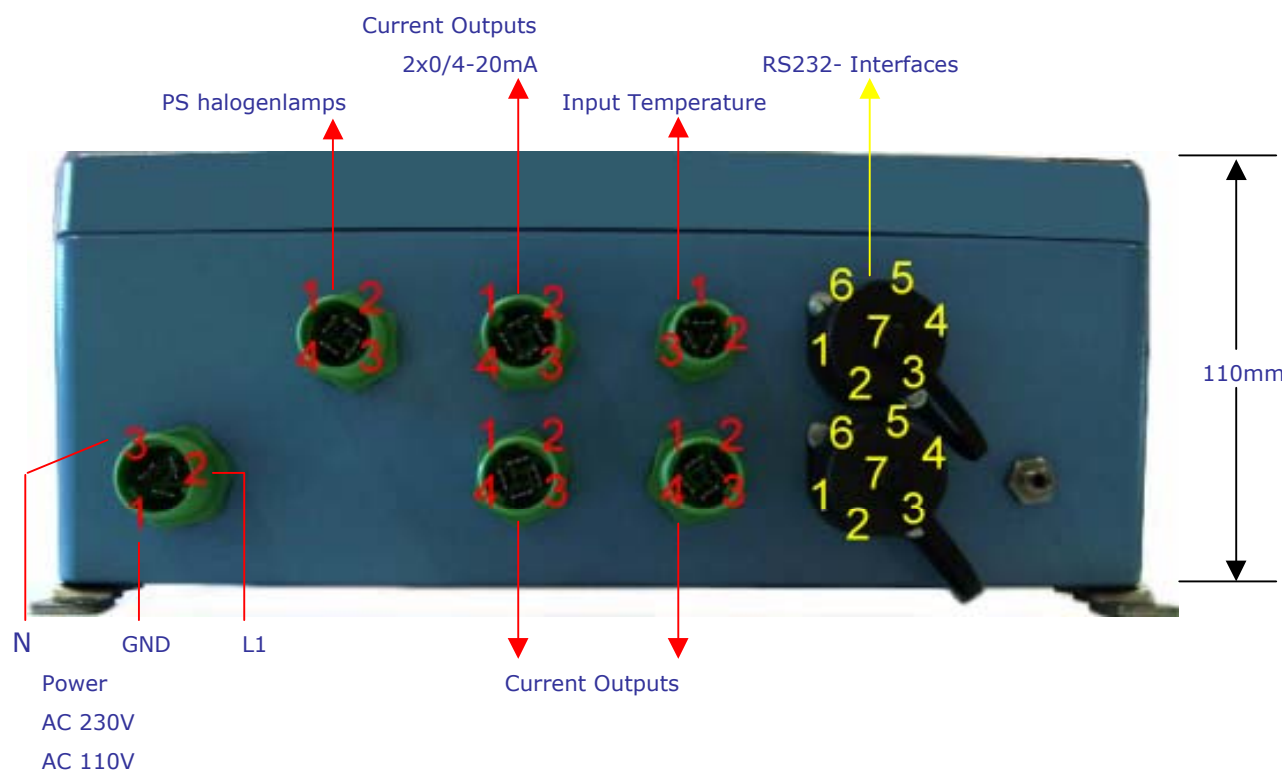
5

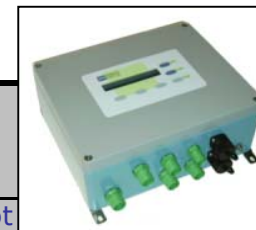
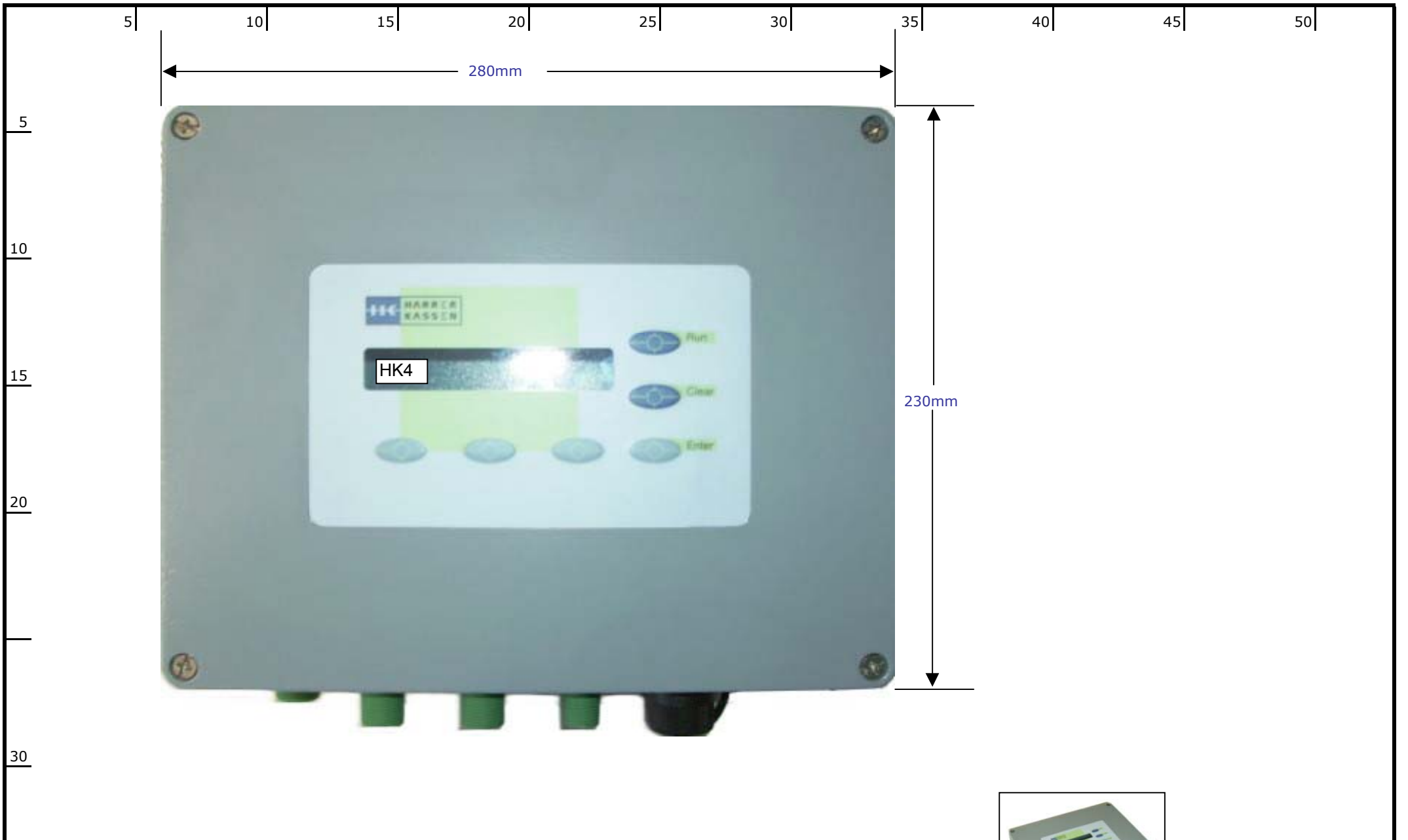
10

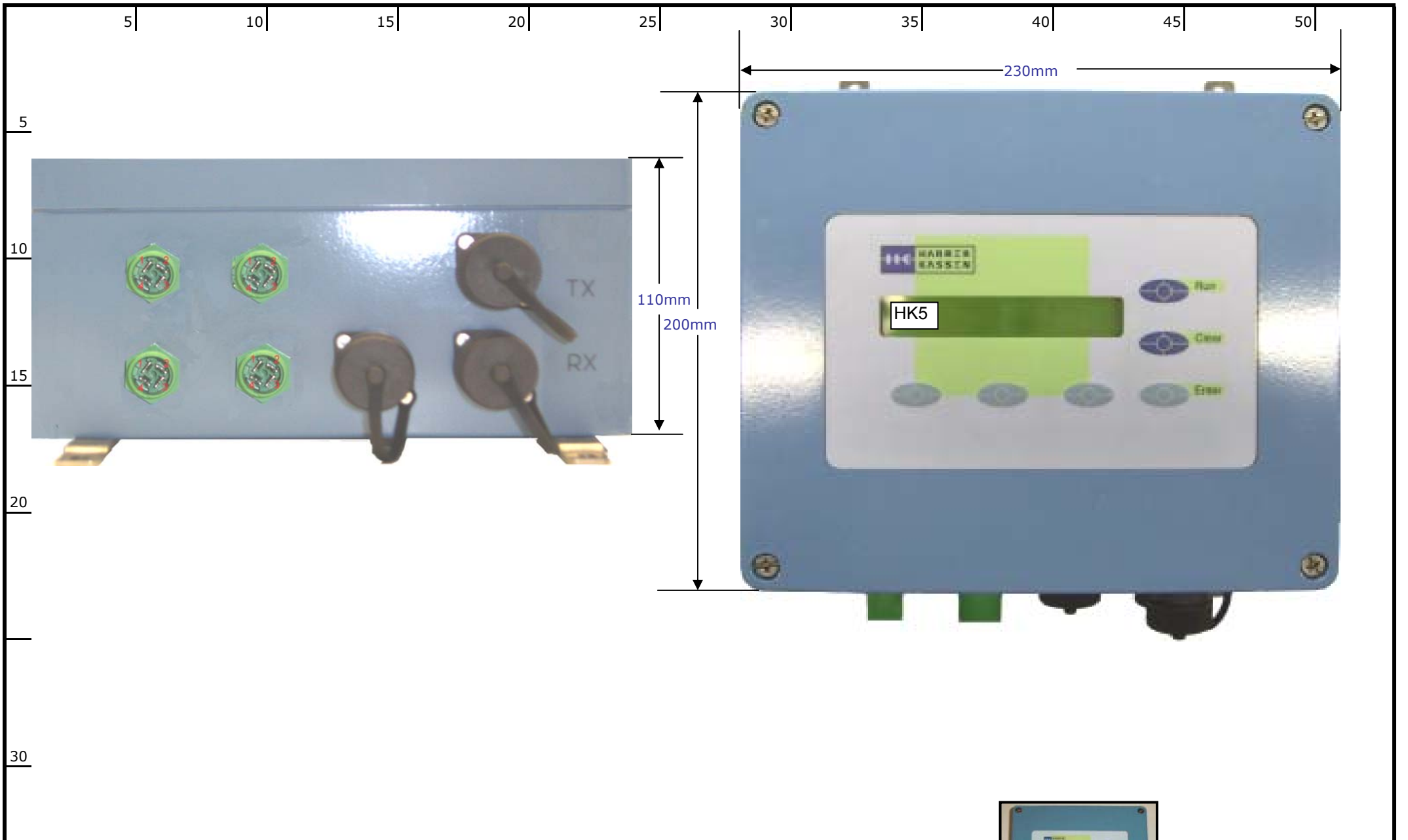
15

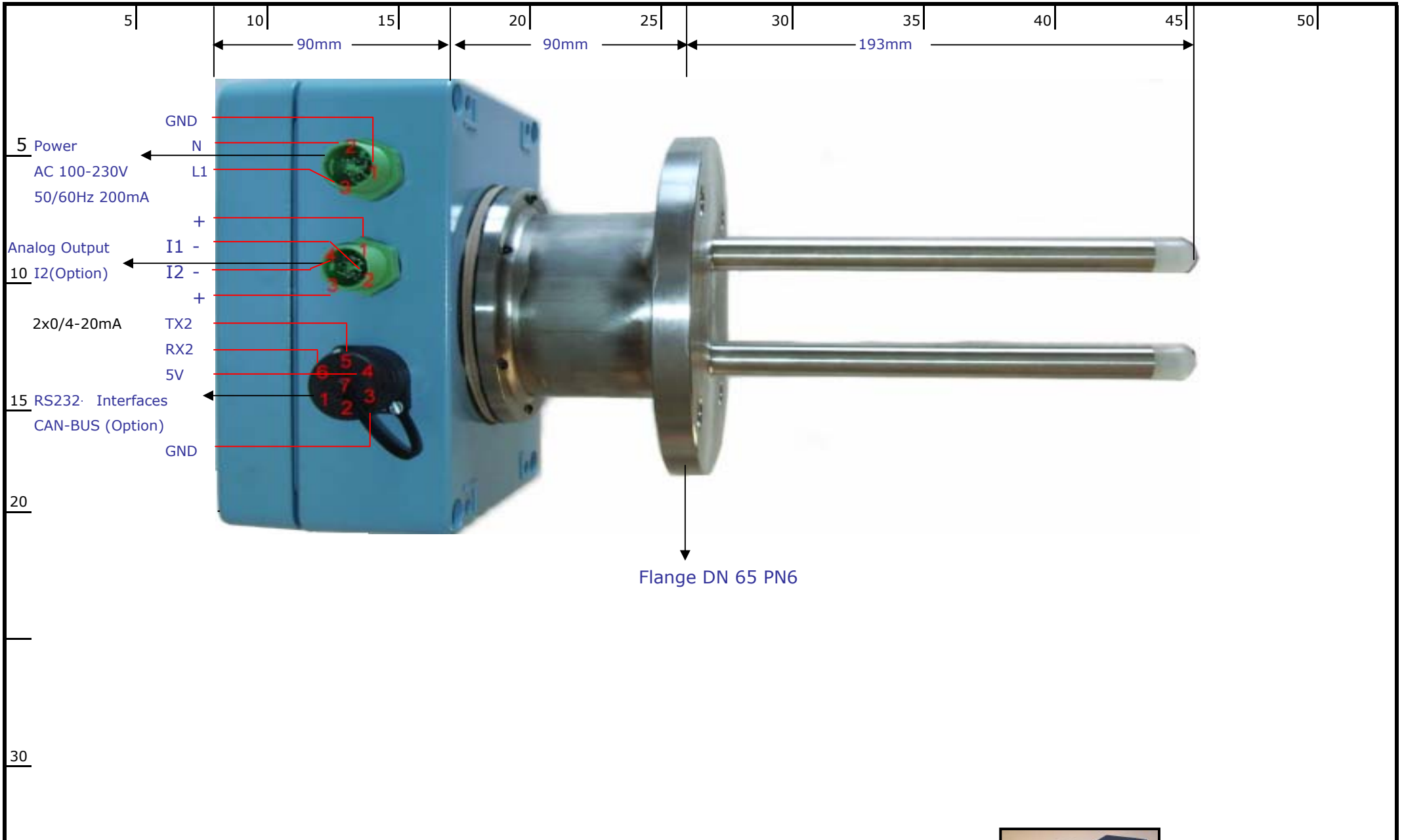
20

30



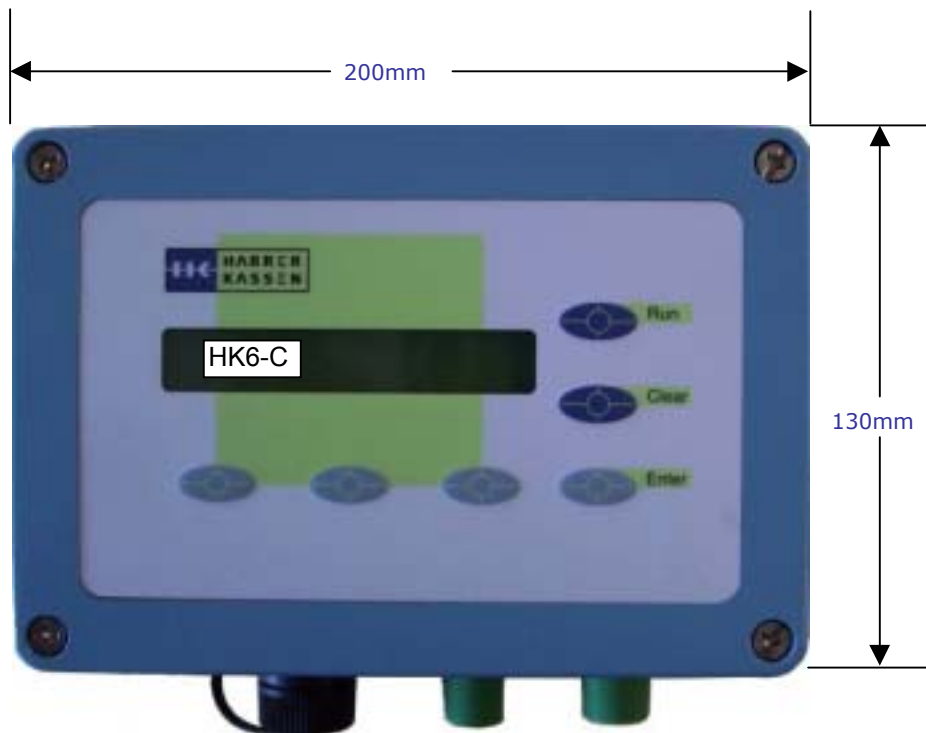
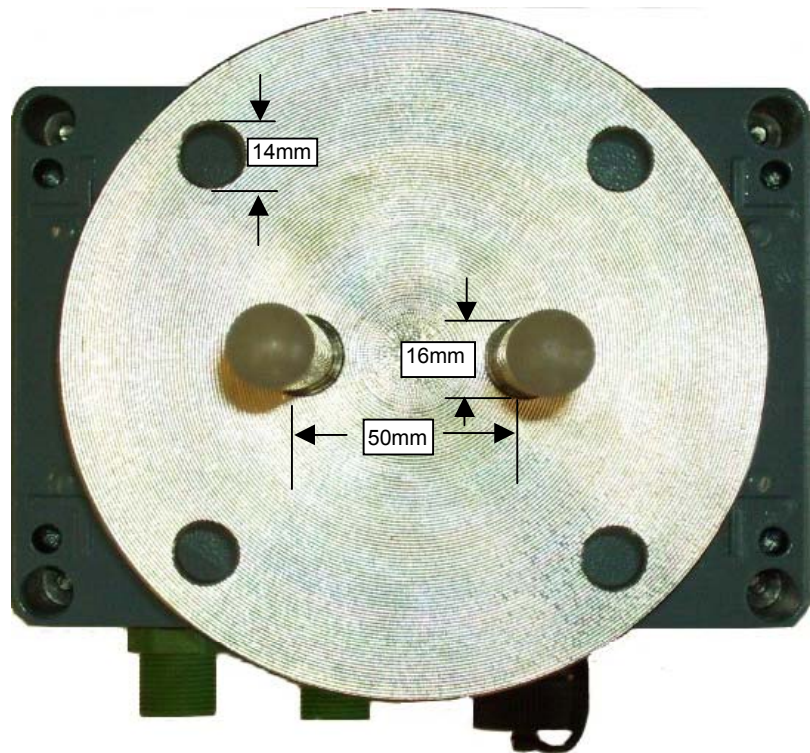




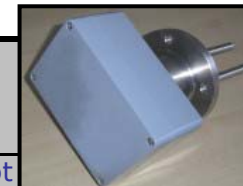
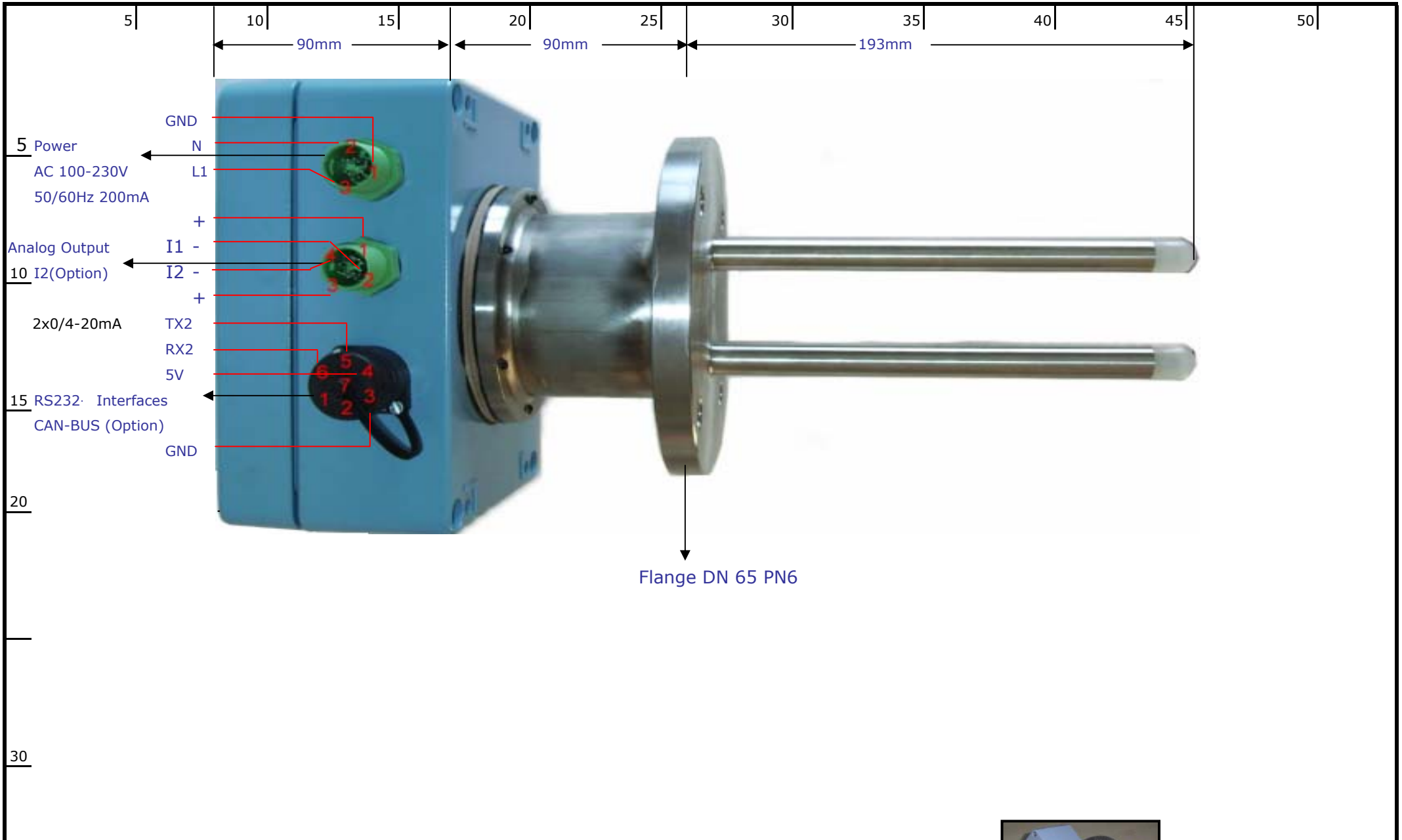


5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50

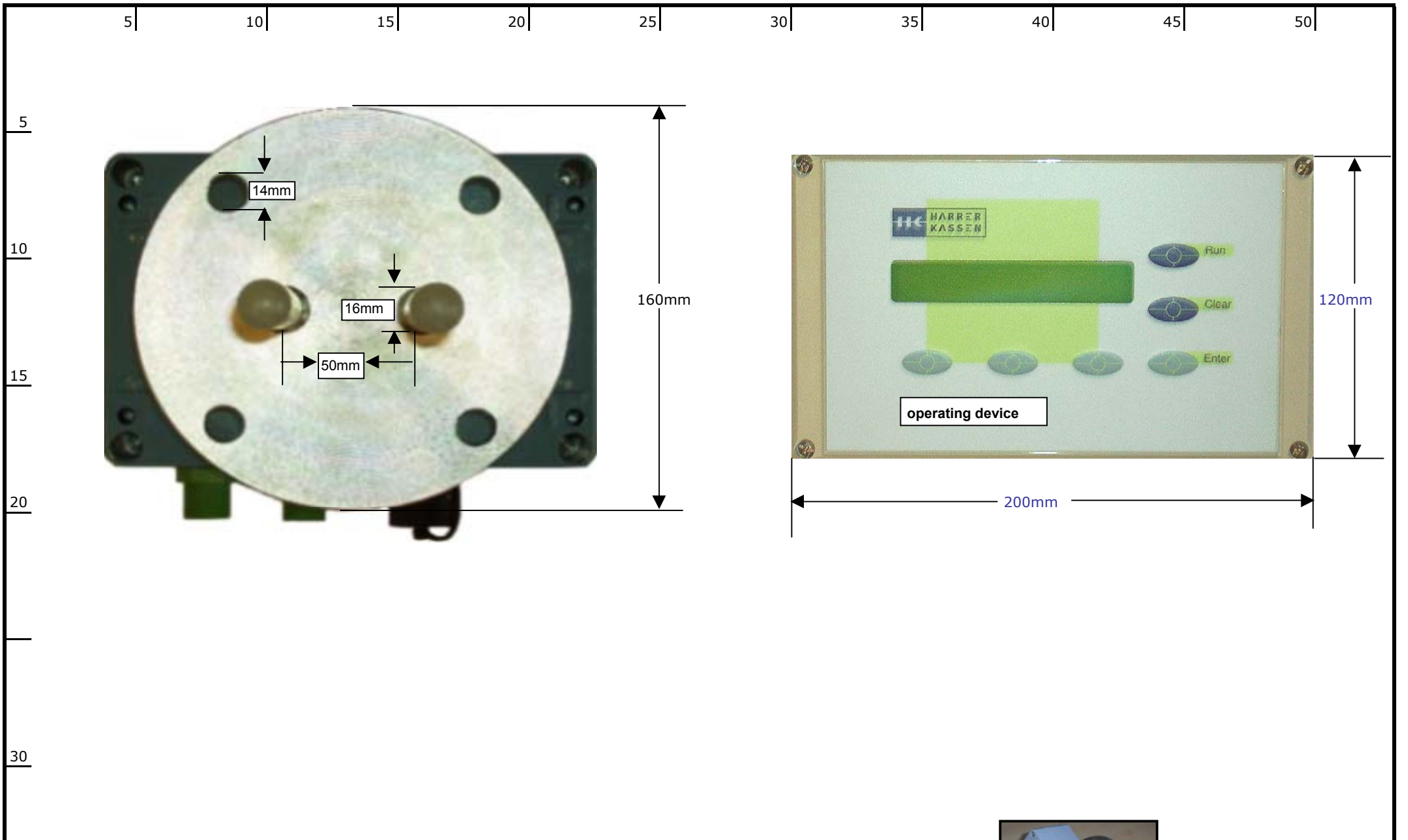
5  
10  
15  
20  
30











5

10

15

20

25

5

10

15



 **HARRER  
KASSEN**  
[www.harrer-kassen.com](http://www.harrer-kassen.com)

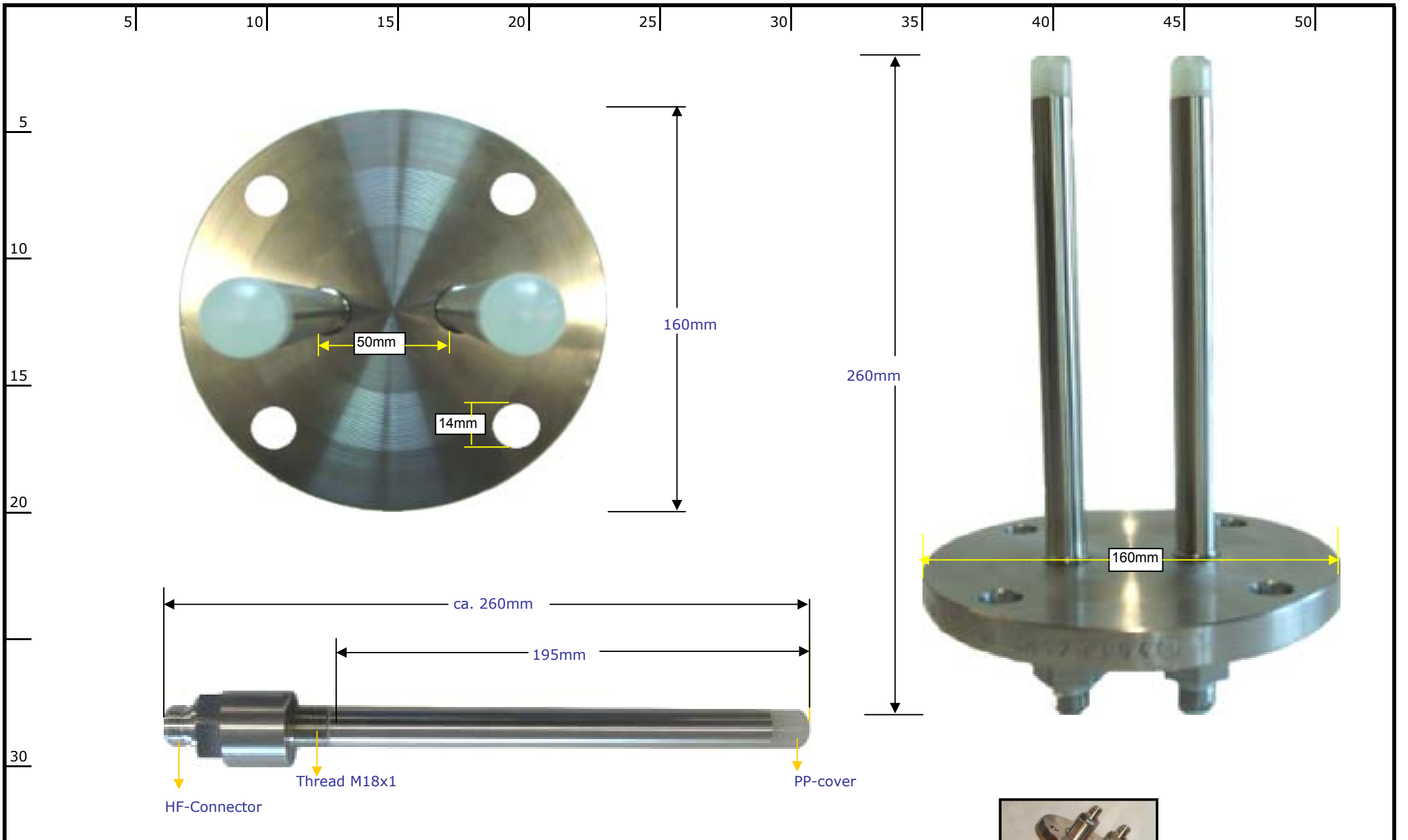
**PT 100**  
(+connection-electronic)

copyright Harrer & Kassen GmbH / all rights reserved

HKA-TE-PT1-0100  
with connection-electronic:  
HKA-TE-PT2-E100

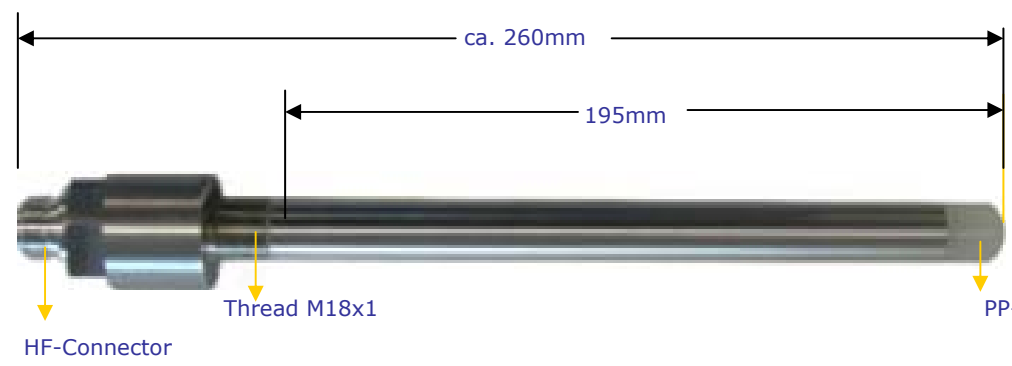
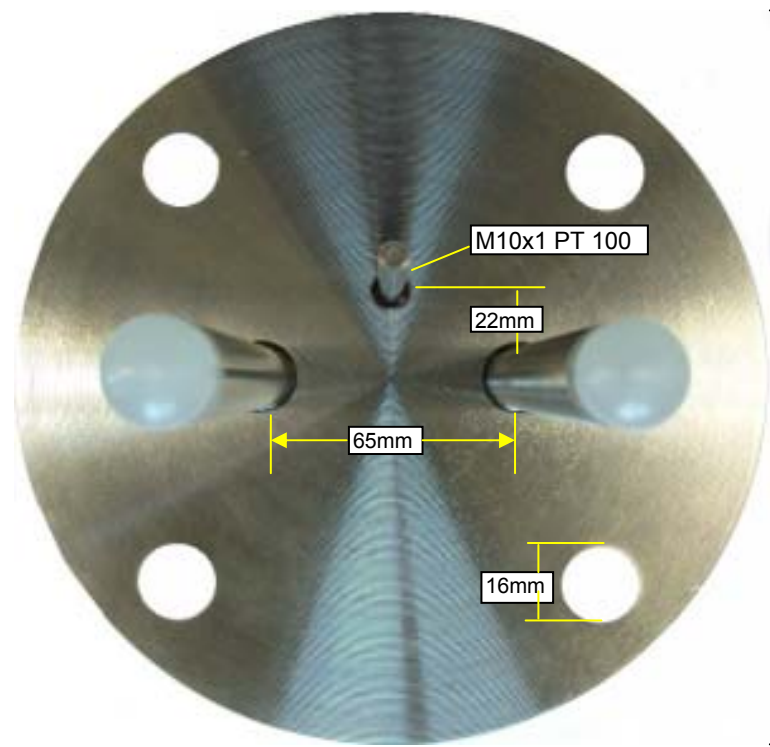
22.August 2006 ot

Harrer & Kassen GmbH  
Am Heschen 6  
D-75328 Langenbrand  
Germany



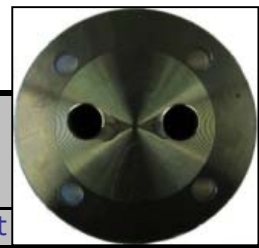
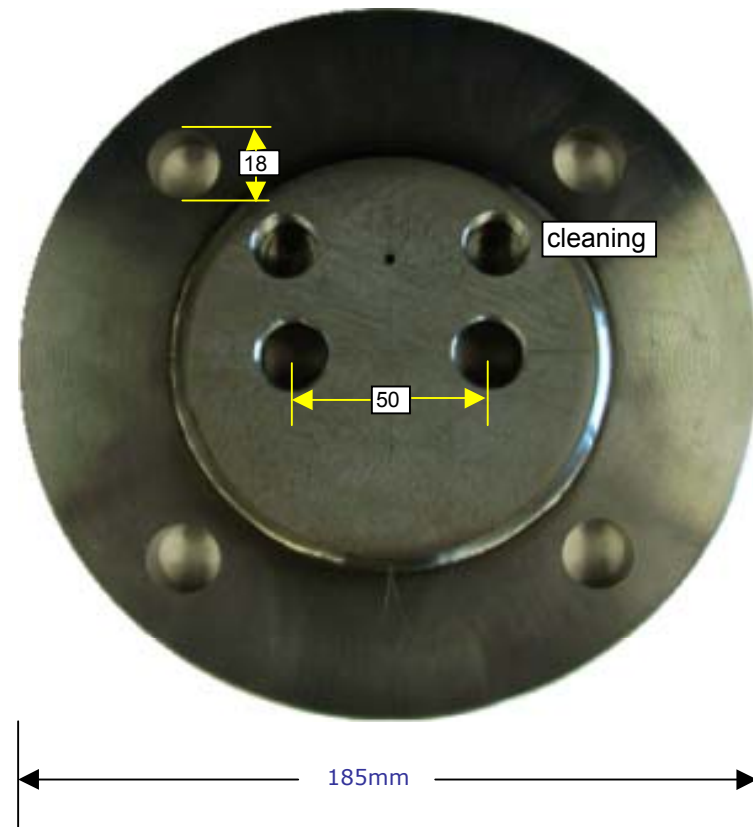
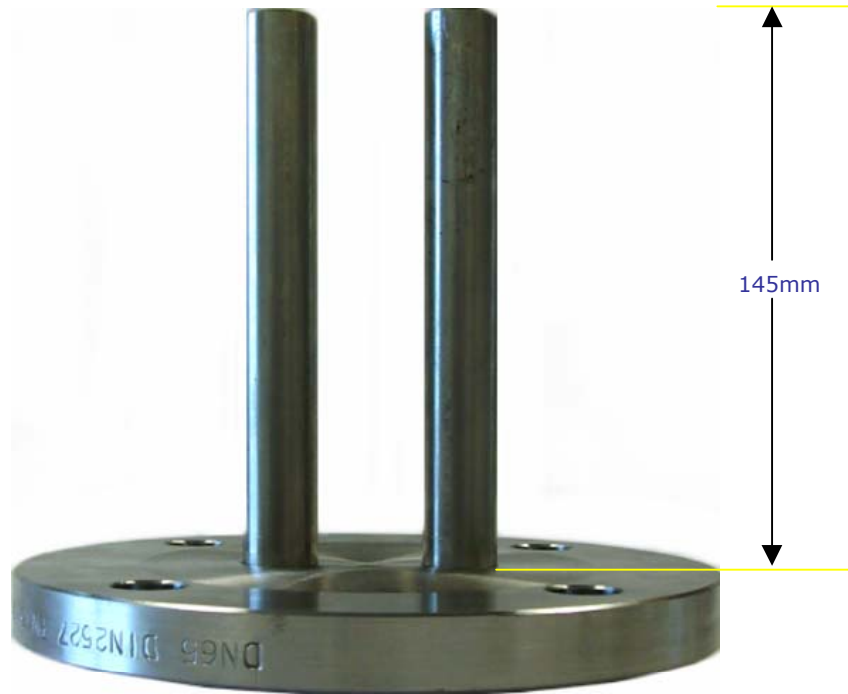
5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50

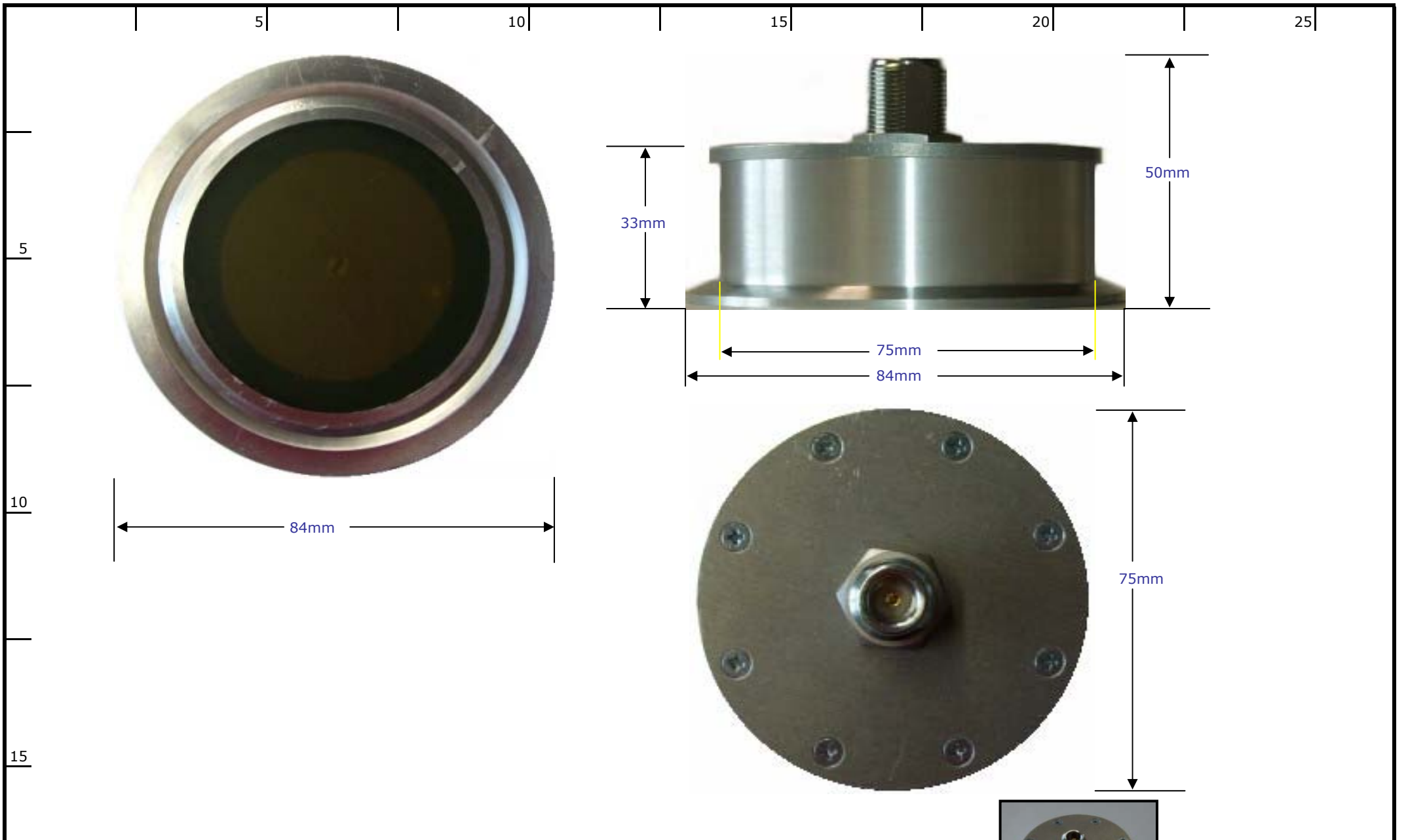
5  
10  
15  
20  
30



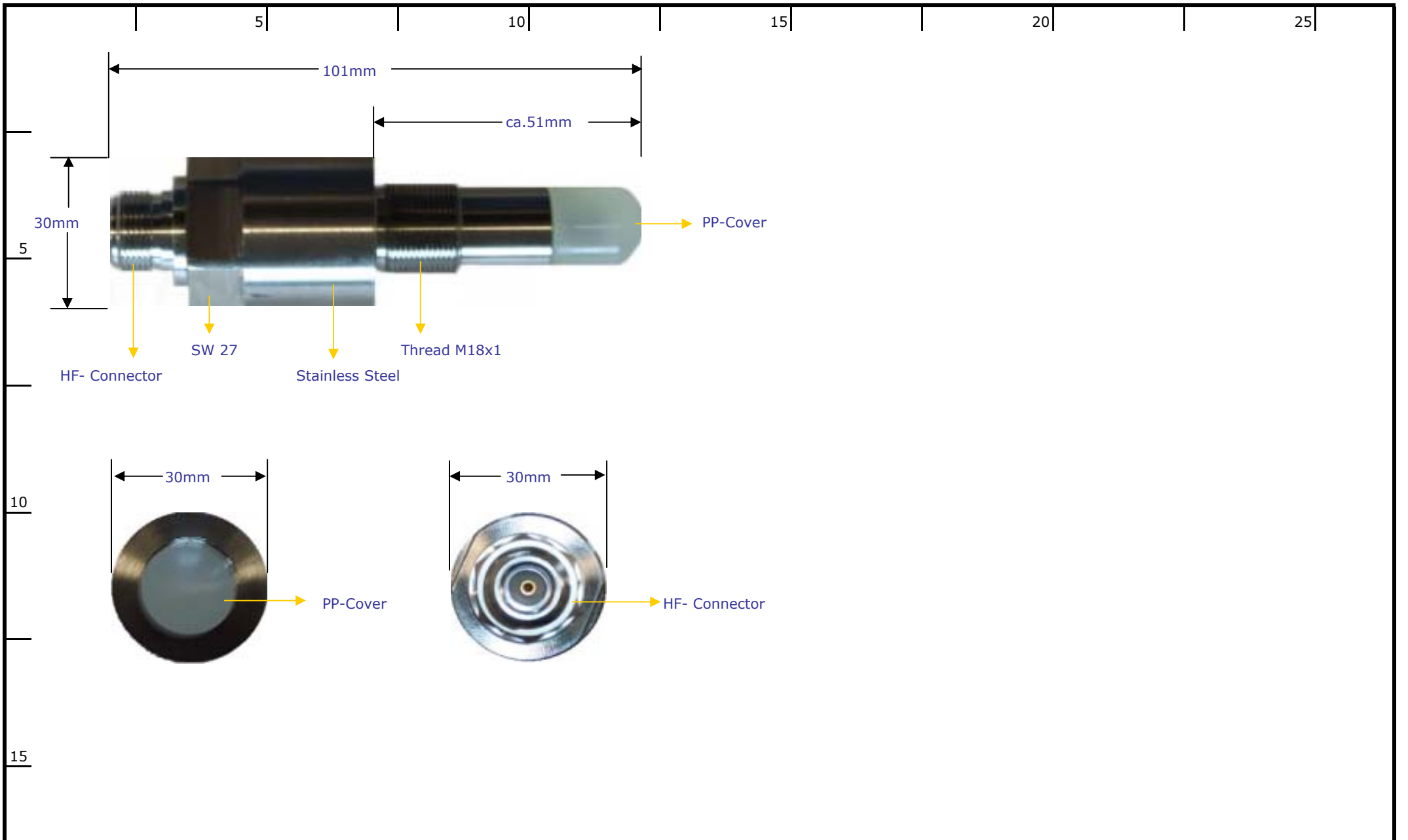
5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50

5  
10  
15  
20  
30

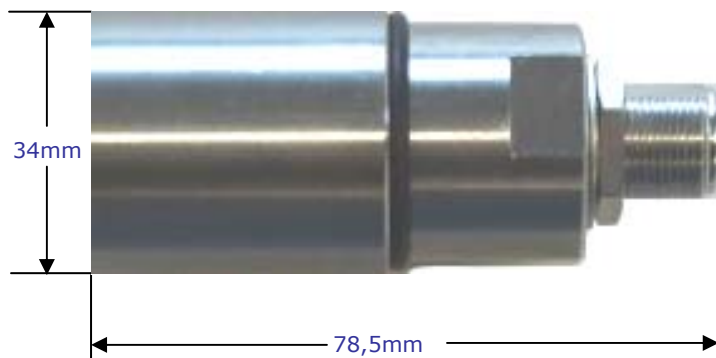


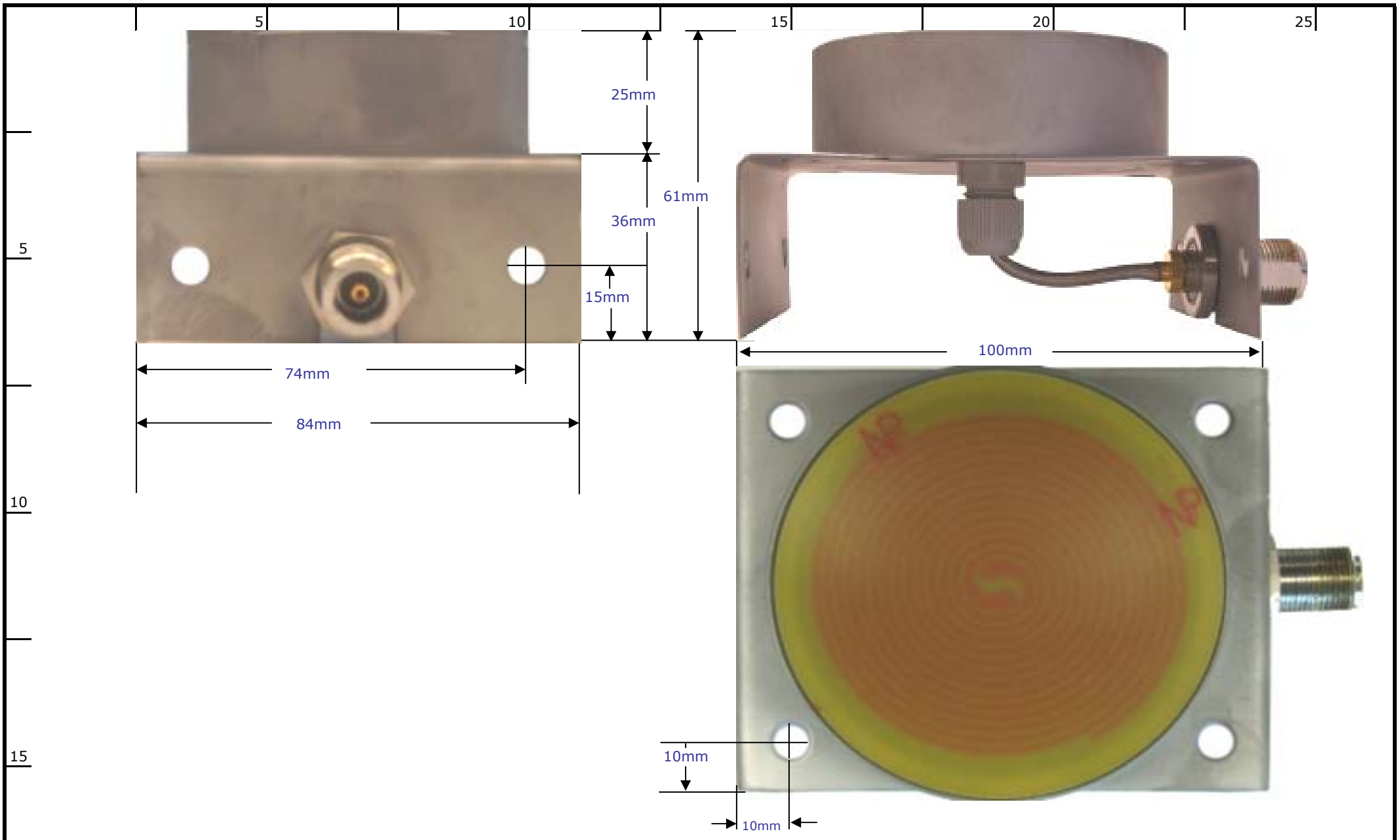


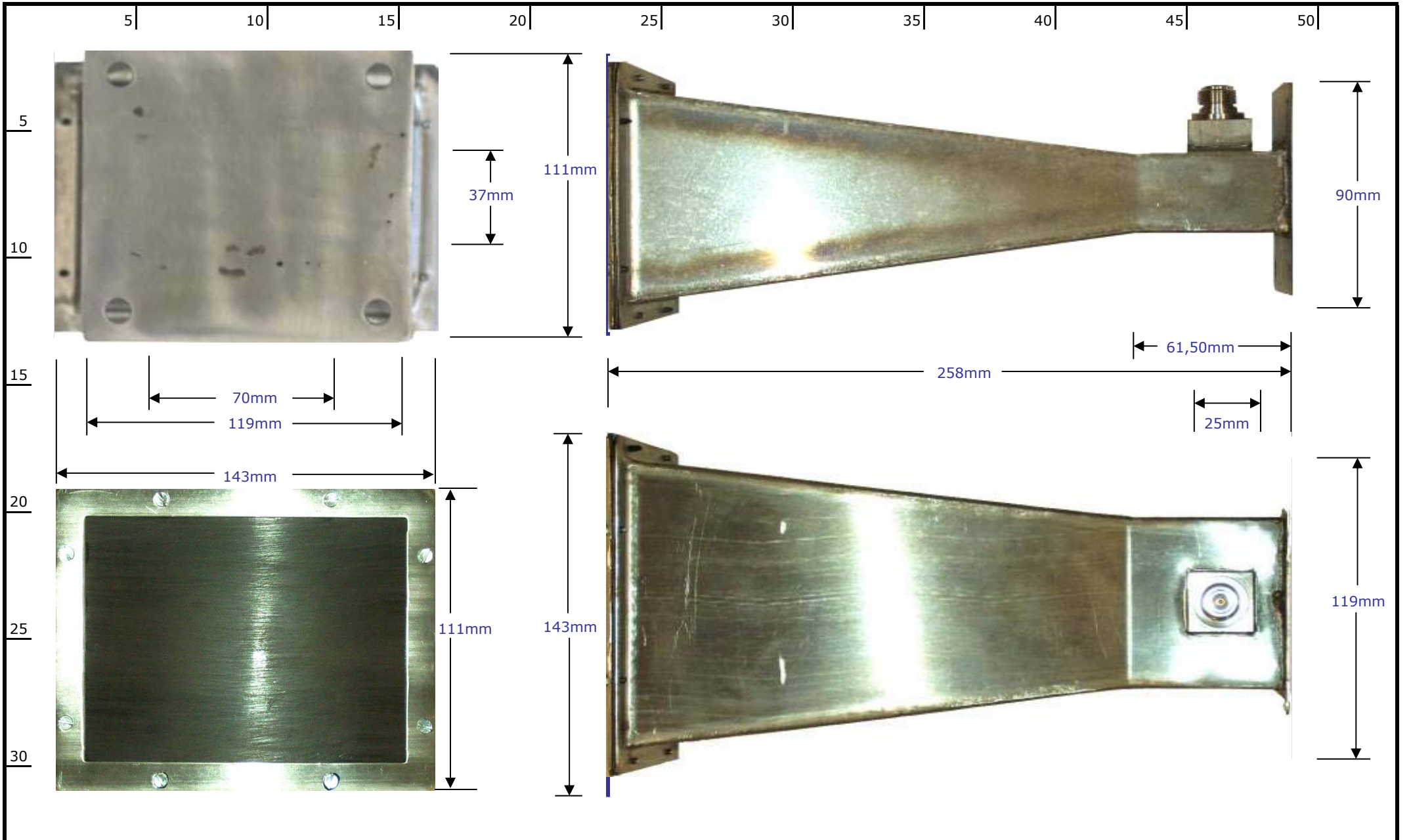


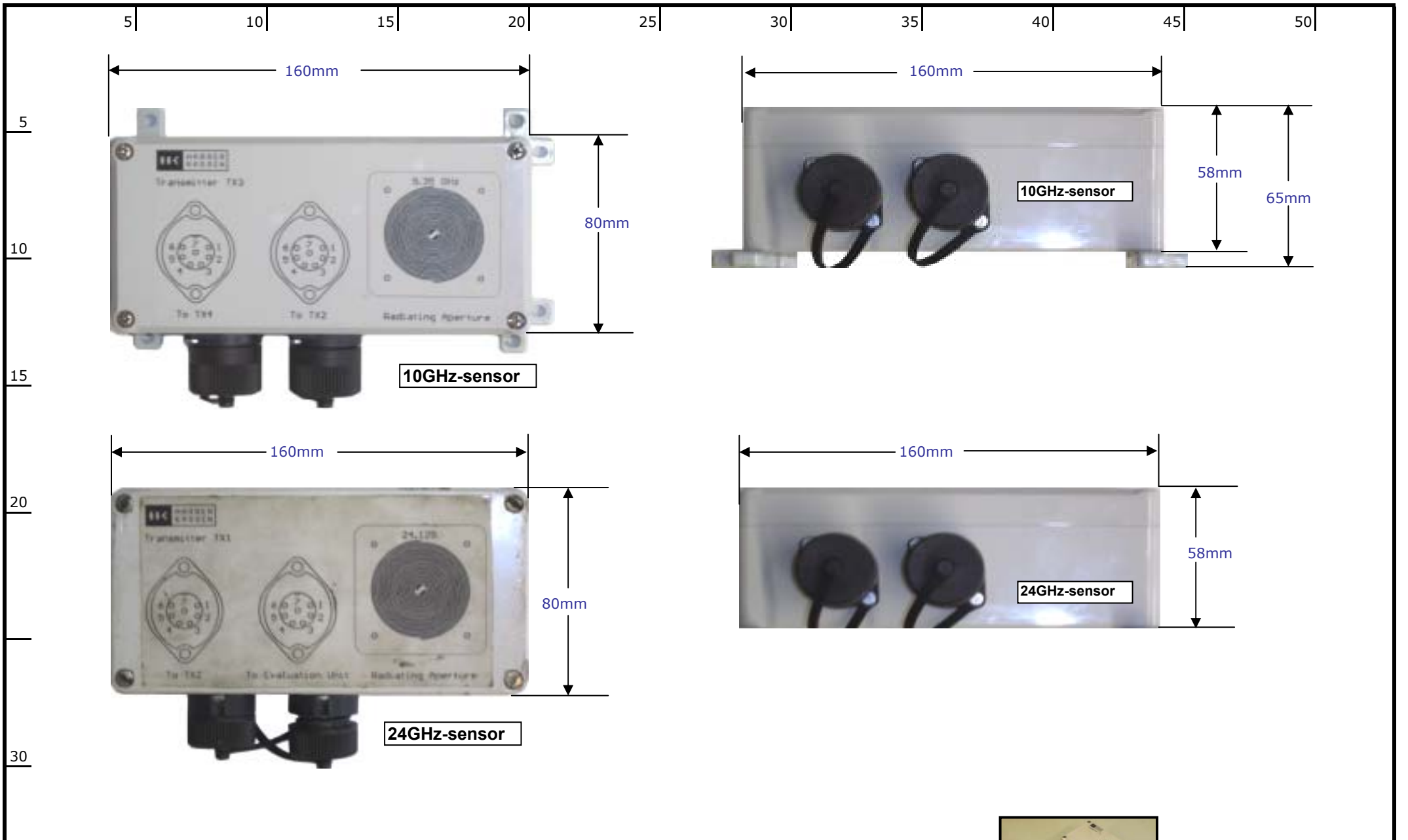












5

10

15

20

25

65mm

78mm

5

10

15



[www.harrer-kassen.com](http://www.harrer-kassen.com)

**NIR-sensor 4B**

(4 halogen-bulbs/ body black enodized)

HKA-IR-NIR-4BR1

copyright Harrer & Kassen GmbH / all rights reserved

23.August 2006 ot



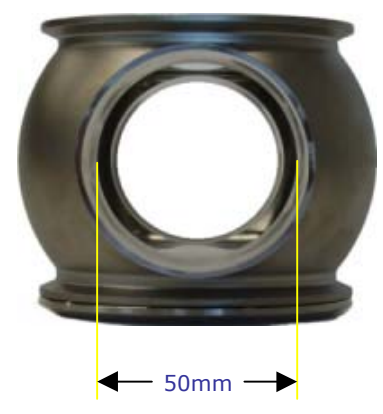
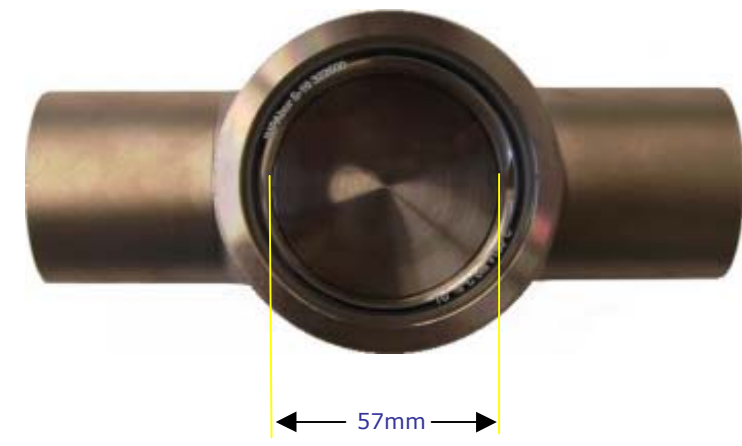
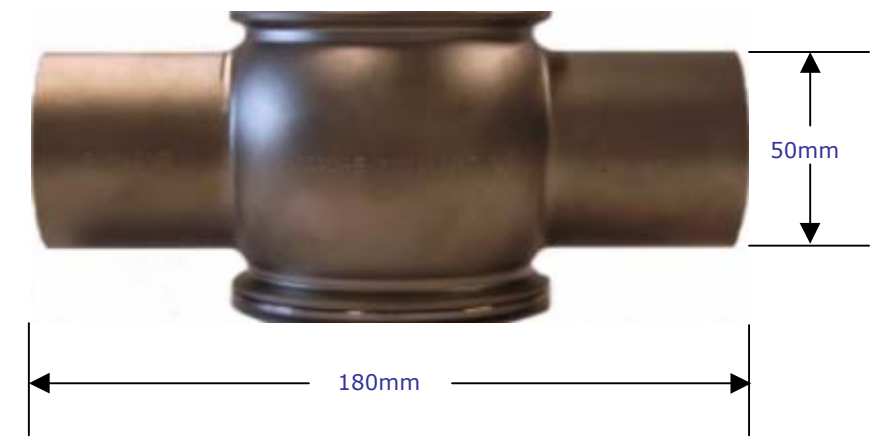
Harrer & Kassen GmbH

Am Heschen 6

D-75328 Langenbrand

Germany

5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50



**3A-flowcell DN50:**

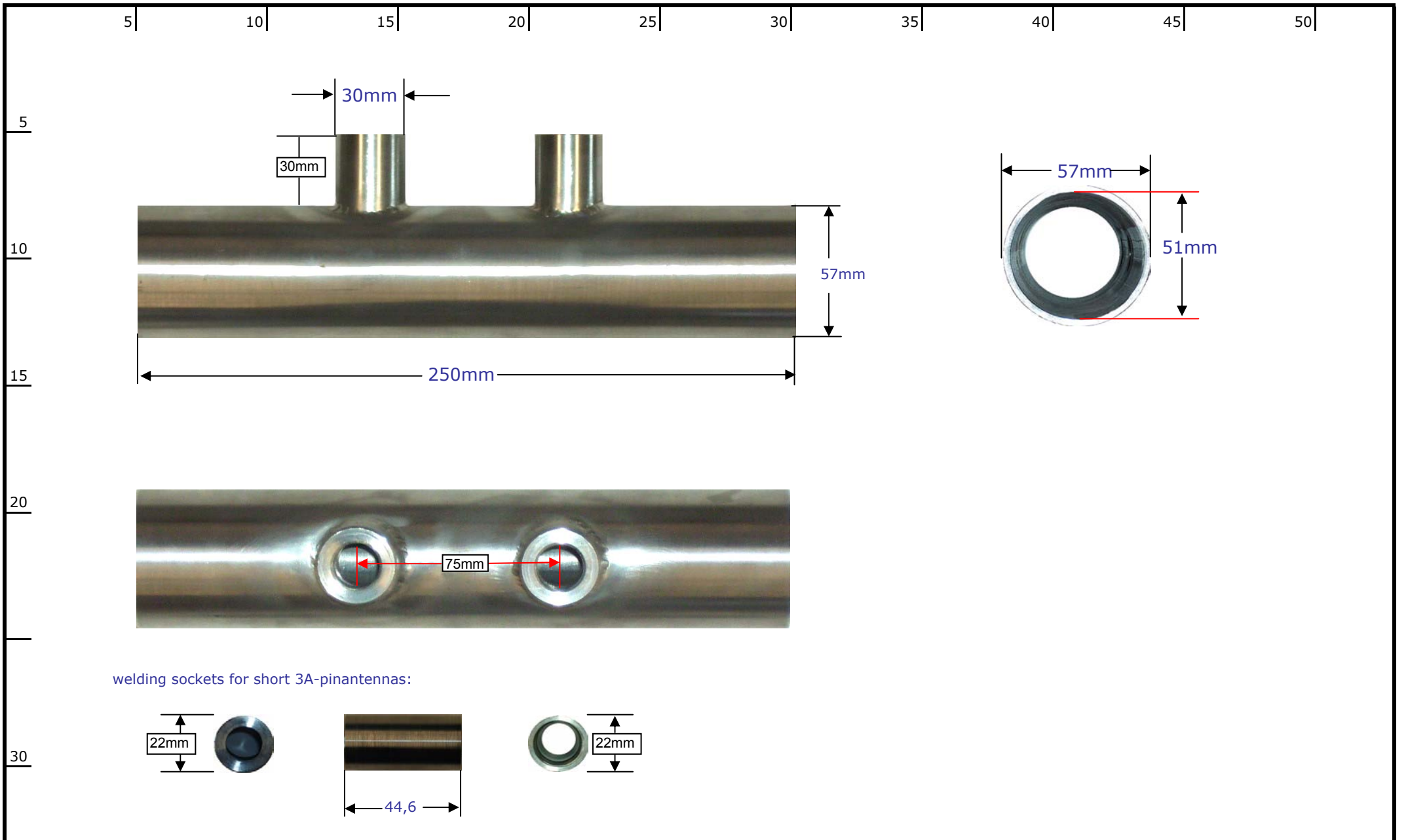
- 3A-flowcell DN50 (for 3A-spiralantennas)
- 3A-flowcell DN50 (for NIR-reflexion)
- 3A-flowcell DN50 (for NIR-transmission)

**article number:**

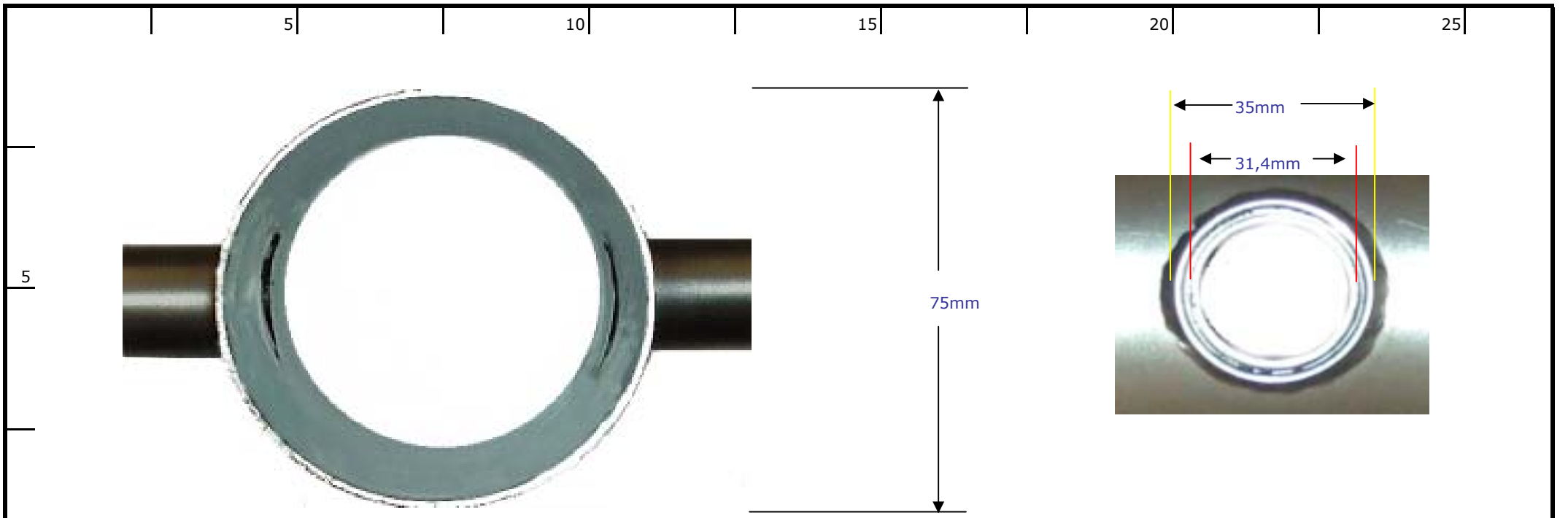
- HKC-PR-3SA-3AFC
- HKC-PR-NIR-3AFR
- HKC-PR-NIR-3AFT



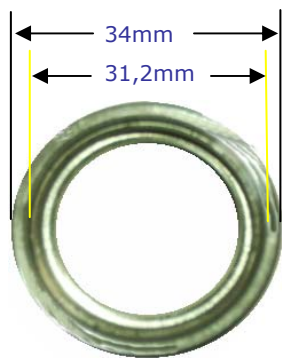








welding sockets stainless steel (for mini-spiralantennas):



article number: HKC-NO-MSA-WSO1



5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50

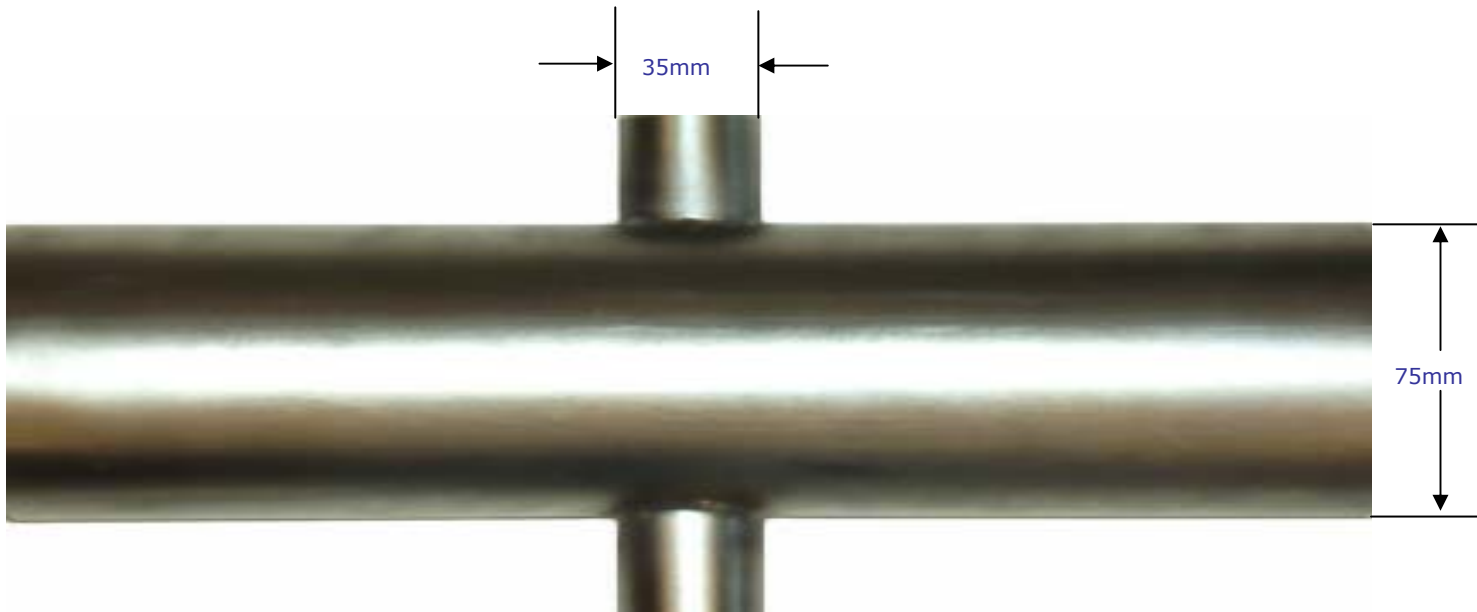
5

10

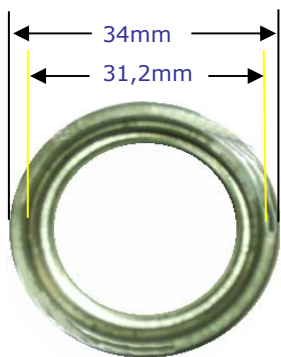
15

20

30

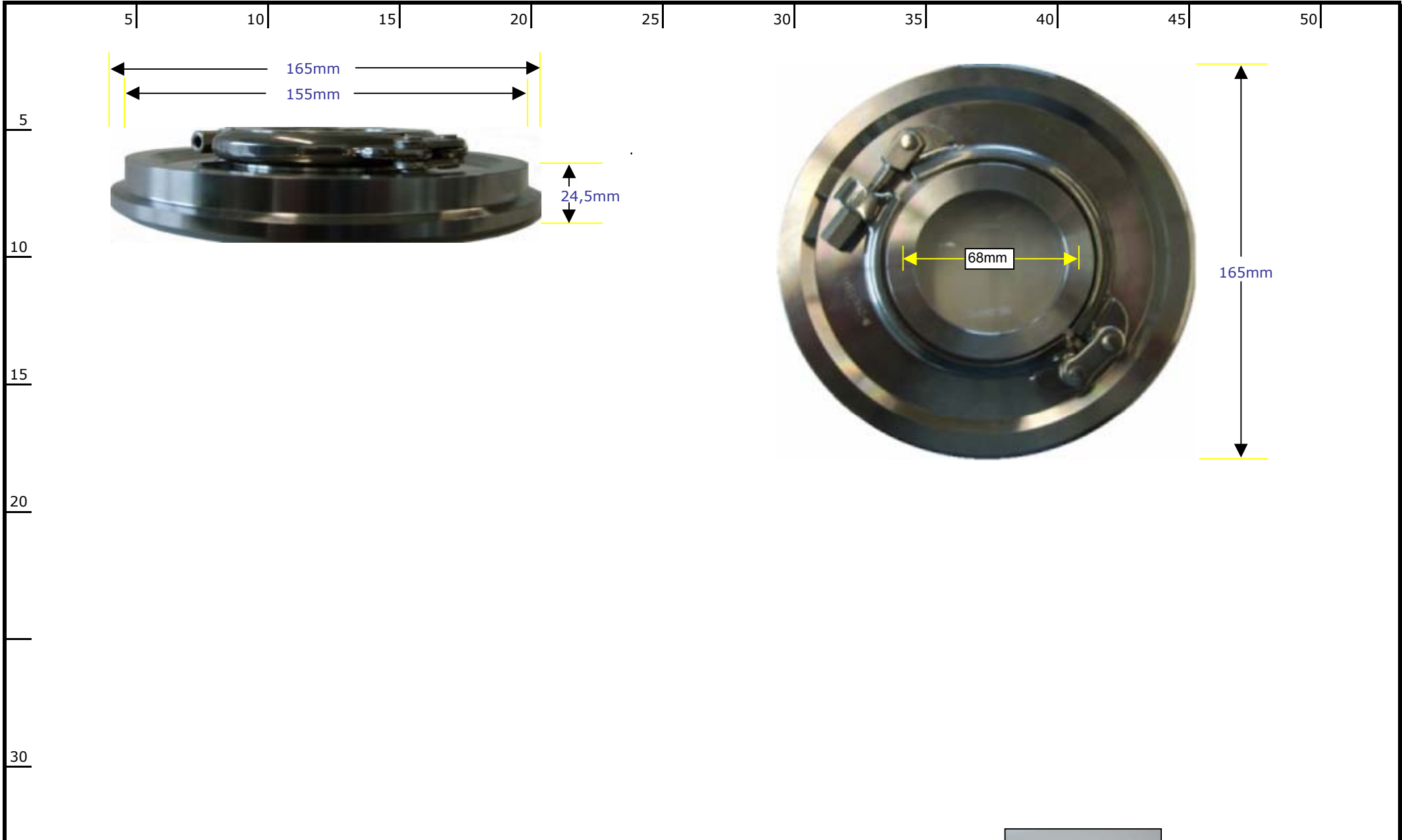


welding sockets stainless steel (for mini-spiralantennas):



article number: HKC-NO-MSA-WSO1





5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50

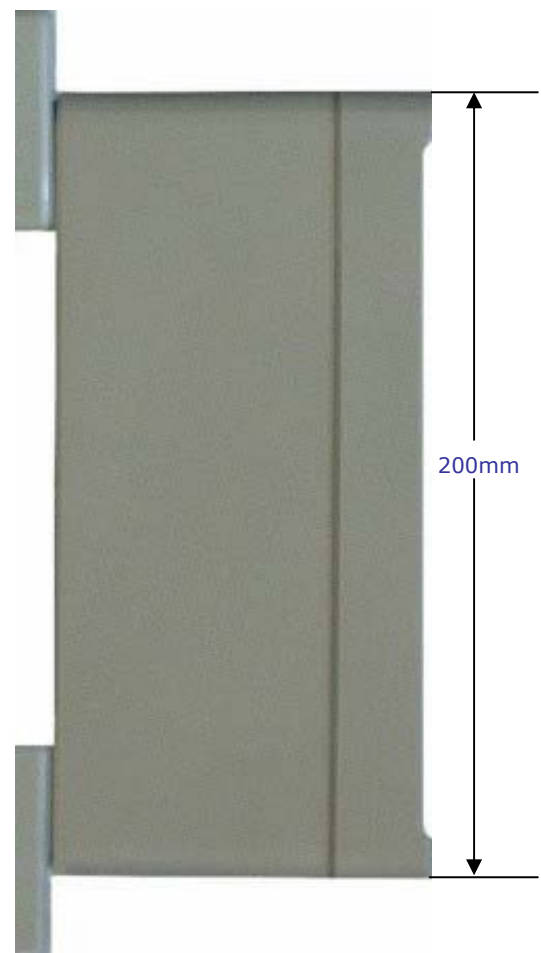
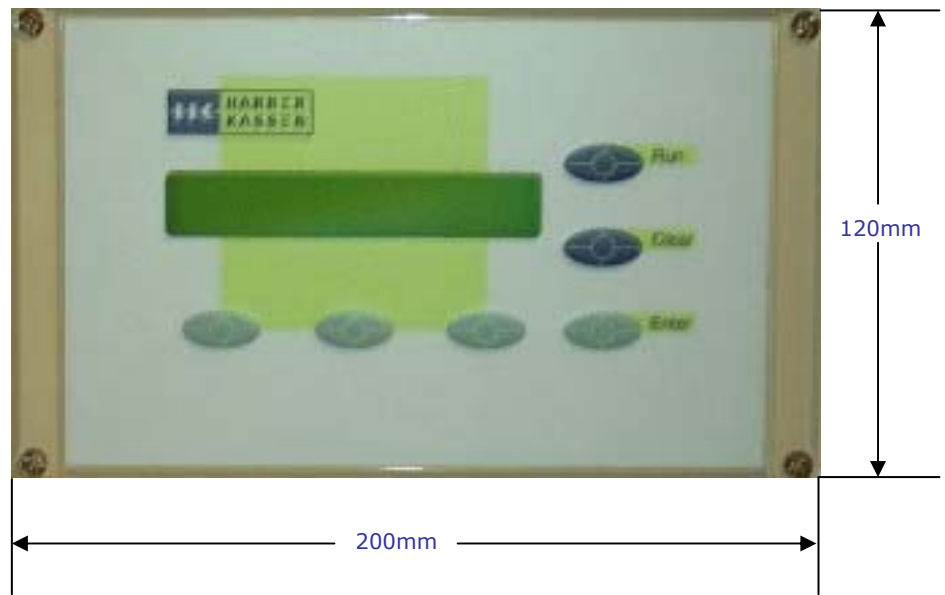
5

10

15

20

30



5

10

15

20

25

5

10

15



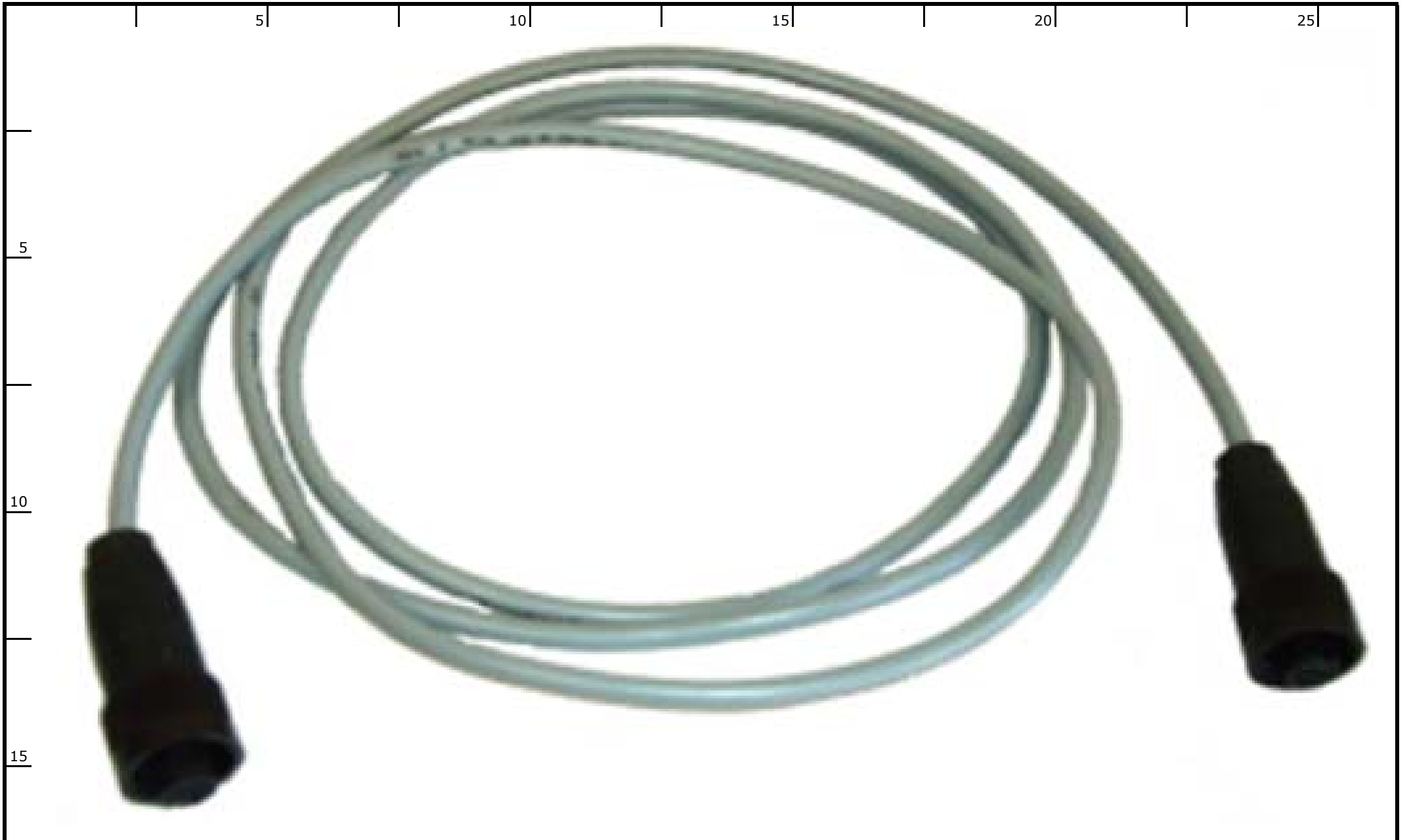
HF-cable 1m/2m

HKD-CA-HFC-0001/0002

copyright Harrer & Kassen GmbH / all rights reserved

22.August 2006 ot

Harrer & Kassen GmbH  
Am Heschen 6  
D-75328 Langenbrand  
Germany



 **HARRER  
KASSEN**  
[www.harrer-kassen.com](http://www.harrer-kassen.com)

**standard-cable**  
(lengths in meters free selectable)  
copyright Harrer & Kassen GmbH / all rights reserved

HKD-CA-STA-L001/L100  
22.August 2006 ot



Harrer & Kassen GmbH  
Am Heschen 6  
D-75328 Langenbrand  
Germany

5 | 10 | 15 | 20 | 25

5

10

15



**HARRER  
KASSEN**  
[www.harrer-kassen.com](http://www.harrer-kassen.com)

**optical fiber 1m/100m**  
(lengths in meters free selectable)  
copyright Harrer & Kassen GmbH / all rights reserved

HKD-OF-NIR-L001/L100  
22.August 2006 ot



Harrer & Kassen GmbH  
Am Heschen 6  
D-75328 Langenbrand  
Germany



5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50

5

10

15

20

30

