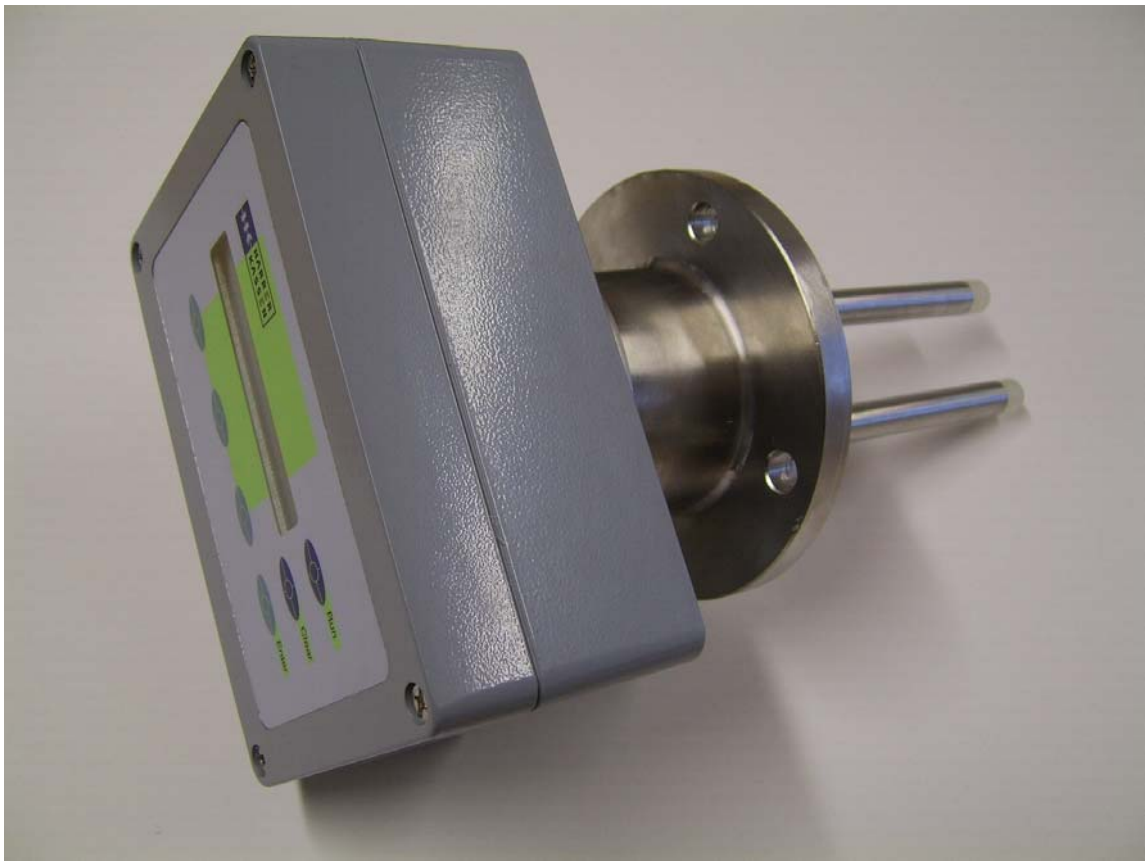
HARRER KASSEN

Compact System

HK6

Operating Manual



POLZ
Radomír POLZ Okružní 2326, 544 01 Dvůr Králové n.L., Czech republic
tel.:+420 602 649 663, fax: +420 491 541 663, www.polz.cz, e-mail: polz@wo.cz

Content

1. User interface

The instrument is operated by menus. These menus can be accessed and operated by push buttons at the front panel of the instrument. The keys <SK1>, <SK2> and <SK3> have different functions depending on the actual menu.

1.1 Keyboard

<SK1>:
- Brach to sub-meues
- Entering numbers
- Viewing of options at certain entries

<SK2>:
- Branch to sub-meues
- Movement of cursor while entering numbers
- Brach back to main menu

<SK3>:
- Next option in dialouge

<Enter>:
- Confirmation of inputs
- Deletion of error messages
- In input fields with more than 1 parameters, selection of the next parameter

<Clear>:
- Clearance of new input and return to last known value

<Run>:
- Start and stop of measurement

The buttons <SK1>, <SK2> und <SK3> are located under the display. They are counted from the left to the right.

1.2 Dialogue structure

The dialogue is structured in sub-menus with the the following items. This sub-menus can be accesd from the main-menu.

Main menu

The main menu has the following sub-menus:

Measurement, Measurement Parameters, Calibration, General, System, Temperature

- **Measurement**

  . Display of the actual process value averaged with the time constant
  . Display of actual measuring value, actual attenuation and if a temperature sensor is installed actual temperature

- **Measurement paramaters**

  . Time constant: Time constant for process value averaging. Range 0 to 999s
  . Current out #1 0/4mA: Process value for 0/4 mA. Range 0 to 10000 (Standard Output)
  . Current out #1 20mA: Process value for 20 mA. Range 0 to 10000 (Standard Output)
  . Current out #2 0/4mA: Process value for 0/4 mA. Range 0 to 10000 (Second span, Option, see chapter 4.4)
  . Current out #2 20mA: Process value for 20 mA. Range 0 to 10000 (Second span, Option, see chapter 4.4)
  . Min/Max-Threshold: Process value at which the relais switches. Range 0 to 10000 (Option, see chapter 3.4 and chapter 2.2.3)
  . Hysteresis: Hysteresis used for switching of MIN- and MAX-relais. Range 0 to 100 (Option, see chapter 3.4 and chapter 2.2.3)

- **Calibration**

  . Coefficients

    - A0/A1: Constant set (see 2.4 Calibration). Range 100000 to 100000

  . Data

    - Calibration point 1: First calibration pair consisting of laboratory value and the measured raw value. Range for the laboratory value 0 to 10000, Range for the raw value -100000 to 100000.

    - Calibration point 2: Second calibration pair consisting of laboratory value and the measured raw value. Range for the laboratory value 0 to 10000, Range for the raw value -100000 to 100000.

    - Calibration point10: Last calibration pair consisting of laboratory value and the measured raw value. Range for the laboratory value 0 to 10000, Range for the raw value -100000 to 100000.

    - Start Calibration: Start calculation of calibration curve. Start with <Enter>.

- **General**

. Lock keyboard: Entering of a password to lock the keyboard. Range 0 to 999999.

. Unlock keyboard: Entering of the password to unlock the keyboard. Range 0 to 999999.

. Language: Selction of dialogue language. German/English/French/Czechoslovak

. Relay function: Define relay function: MIN-threshold, MAX-threshold, ERROR or Frequency Generator.

. Dimension: Selection of measurement unit, %H2O, %Ts, Bx, %, g/cm3, g/l, mg/l.

- **System**

. User

- Baudrate: Baudrate for data transfer 9600, 4800 Baud
- Data Format: Option to define the format of the data output string: EXCEL or NORMAL
- Print cycle: Frequency for data transfer through RS232: Off, 10s, 30s or 60s
- Frequency signal: Option to generate with the relay output a timing signal for various applications. T1 range 1 to 9999s, T2 range 1 to 9999s (Option see chapter 3.8)

. Current

- Current Output: Selection of current output if 0-20mA or 4-20mA.
- Test current: Test value for curent output 1 and 2 Range 1-21.

. Limits

- Output clamping: Option to enter a min. and a max. attenuation at which the current output of the instrument is clamped to 0/4mA.
- P-Value-Min: Option to define a low threshold of valid measuring values. Range -999 to 10000
- P-Value-Max: Option to define a high threshold of valid measuring values. Range -999 to 10000
- Brix-Max: Option, if measuring Bx, to enter a max. threshold for the measurement at which the current output is set to 0/4mA. Range 0 to 1000

. Reference

- Reference: Option to perform a reference measurement for the instrument (attenuation and phase shift)
- LAB value: Option to enter the laboratory value at reference.
- Reference adjsut: Option to adjust the reference measurement to the desired measuring range, defined by IOUT(0/4mA) and IOUT(20mA).

. Proteced

- password: Option to enter the required password to access this menue.
- HF-Mode: Sets the micro wave operating mode of the instrument. Range: Standard, Mode1, Mode2
- Evaluation: Selection of which raw value is used for measuring value calcuation. Phase or attenuation or the ratio phase/attenuation
- Iout2 definition: Defines the function of the second 0/4-20mA output. Range: Temperature output, second span output

. Factory

- The factory menu is not accessabe

- **Temperature**

  See apendix temperature compensation

1.3 Entering numbers

The instrument has no option to directly enter numbers. The entering of necessary numbers is done with the soft keys. When numbers can be entered the following is displayed:

SCROLL CURSOR NEXT

With the following functions:

SROLL: increment digit
CURSOR: move cursor
NEXT: next menu entry

The cursor (underscore) indicates the digit, which can be changed. With SCROLL the right value for the selected digit can be entered. After this the next digit can be selected by pressing CURSOR. This should be repeated until the total number has been entered. To make data entering easier the actual, by the cursor marked, digit is blinking. Confirmation of the complete number has must be done by pressing <Enter> .

Example: Lock keyboard by entering 268 as password

Display: LOCK KEYBOARD: _
SCROLL CURSOR NEXT

The cursor points to the last digit. With SCROLL the number 8 should be entered and after this, the next digit should be selected by pressing CURSOR.

Display: LOCK KEYBOARD: _8
SCROLL CURSOR NEXT

Now use SCROLL to enter 6 and and after this use CURSOR to move the curesor one position to the left.

Display: LOCK KEYBOARD: _68
SCROLL CURSOR NEXT

Use SCROLL to enter 2.

Display: LOCK KEYBOARD: _268
SCROLL CURSOR NEXT

Now the total number is entered. To confirm press <Enter>. The display stops blinking, use NEXT to move to the next menu entry.

1.4 Error messages

If the instrument discoveres an error, it display an error message. Also the relay - if defined as error output - switches. To delete an error message press <Enter>. The following error messages could appear:

ILLEGAL PASSWORD! PLEASE CORRECT!	Illegal password
VALUE OUT OF RANGE!	Entered value out of range
ILLEGAL INPUT!	Illegal input (e.g. 2 decimal points entered)

MISSING CALIBRATION POINTS!	Less than 2 calibration pairs (see also 2.4 calibration)
PARAMTER ERROR! CHECK IOUTL, IOUTH AND REF.!	One of the indicated paramters is missing, the one point calibration could not be done.
CALIBRATION IMPOSSIBLE! MEASURING RANGE=0!	One point calibration impossible. Measuring Range=0 (defined by IOUT(0/4mA) and IOUT(20mA))

2. System installation

The following installation steps are recommended:

- Set instrument configuration
- Enter measurement parameters
- Calibration
- Start measurement

2.1 Selection of system configuration

2.1.1 Language

Select the sub-menu 'GENERAL' in the main menu. Use NEXT to move the dialogue until the display for the language selection appears.

LANGUAGE: _ENGLISH
SCROLL MAIN NEXT

Use SCROLL to select the desired language (german, english, french, czechoslovak) and confirm by pressing <Enter>.

2.1.2 Measuring unit

Select the sub-menu 'GENERAL' in the main menu. Use NEXT to move the dialogue until the display for the measuring unit selection appears.

DIMENSION: _%H2O
SCROLL MAIN

Use SCROLL to select the measuring dimension (%H2O, %Ts, Bx, %, g/cm3, g/l, mg/l) and confirm by pressing <Enter>. MAIN leads back to the main menu.

2.1.3 Current output

Select the sub-menu 'SYSTEM' in the main menu. In this sub-menu select the sub-menu 'CURRENT'. The first entry in this sub-menu is the display for the current output selection.

CURRENT OUTPUT: _0-20mA
SCROLL MAIN NEXT

Use SCROLL to select the current output (0-20 mA or 4-20 mA) and confirm by pressing <Enter>.

2.2 Measurement parameters

The parameters which influence the display and the output of the measurement value are summarized in the sub-menu 'MEAS.PAR.'.

2.2.1 Time constant

The instrument determines a measurement value each 250 ms. To minimize short-therm variations, it is possible to use a linear filter. The averaged measurement value will be displayed and will be available through the current output. The time constant is entered in seconds.

e.g.:

MEASURING TIME: 5s
SCROLL CURSOR NEXT

2.2.2 Current Output (Standard Output)

The current output signal will be defined by two values: one for lower limt (0/4 mA) and one for the upper limit (20 mA). These can be defined freely depending on the range of interrest of the measuring value.

e.g.:

IOUT(0/4mA)= 5%Ts
IOUT(20mA) 15%Ts

This means that a current output of 0/4 mA is eaqual to 5%Ts and 20 mA is equal to 15%Ts. If the measurement exeeds 15%Ts the current output is kept at 20mA and if the measurement is below 5%Ts the current output is will stay at 0/4 mA.

If the instrument is equipped with the second currend output, it is possible to define a second span for the process value. E.g. the standard output is used for a global view of the total measuring range and the second output is used to show a special region of interrest with a higher resolution.

2.2.3 Threshold output (Option)

Depending on the selected relay function (see chapter 3.4) it is possible to configure a minimum or a maximum threshold output, which for example could be used as an alarm. When this threshold is crossed the relay will be switsched. To avoid continuous switching of the relais a hysteresis can be defined.

e.g:

MIN-THRESH= 20%H2O or MAX-THESH= 40%H2O
HYSTERESIS= 1%H2O

When a measurement exceeds 40%H2O the relay will swith and if the measurement is again below 39%H2O the relay switches back. When the measurement goes below 20%H2O the relay will switch and if the measurement exceeds again 21%H2O the relay switches back.

2.3 Reference Measurement

As the instrument is factory precalibrated it is not necessary to take a reference measurement. But to perform a one point calibration it is necessary to do a reference measurement (see chapter 3.2.1). To perform a reference measurement proceed as followes:

Select the sub-menu 'SYSTEM' in the main menu and select in this sub-menu the sub-menu 'REFERENCE'. The first entry in this sub-menu is the display for the reference paramaters:

REF: A= xx.x dB PHI= xxx.x
MAIN NEXT

To execute the reference measurement press 'Run'. The instrument asks now:

ARE YOU SURE?
YES NO

If you want to do the reference confirm with YES. If not, abort with NO. After the reference measurement is done the the instrument shows the nre reference phase and the new reference attenuation. All further measurements of phase and attenuation will be related to this values.

2.4 Calibration

The instrument calculates the process value with a linear function:

Process value = A1*x + A0

With A1: slope
A0: intercept
x: raw value, measured by the instrument (phase or attenuation)

2.2.1 One Point Calibration

The instrument is delivered with a preset A1of -0,235 and a preset A0 of 0. The entered value for A1 is an average value which we have calculated during many instrument calibrations. This gives the opportunety to perform a one-point calibration, as only A0 is unknown. To calculate A0 the following has to be done:

1. Perform a referece measurement and take **at the same time** a product sample.

2. Measure the value for the taken sample in the laboratory and do the following steps:

Select the sub-menu 'SYSTEM' in the main menu and select 'REFERENCE'. Use NEXT until the following display apeares:

LAB VALUE AT REF: xx.x
SCROLL CURSOR NEXT

Use SCROLL and CURSOR to enter the laboratory value of the previous taken sample and confirm with ENTER.

3. Use NEXT to step to the next display:

ADJUST REF. TO MEAS.RANGE
SET CALC NEXT

4. Press CALC. The instrument ask now the following question:

START CALCULATION?
YES NO

5. Press YES. Now the instrument adjustes the refereence value into the measuring range, which is defined by IOUT(0/4mA) and IOUT(20mA). After calculation is done it shows the following display:

   REF. AT xx.x% OF M.RANGE
   SCROLL CURSOR NEXT

   This means, that the reference has been taken at xx.x% of the defined measuring range.

6. Now the one point calibration is done and A0 is automatically set.

2.2.1 Built in multi point auto calibration

The process value is calculated with a linear function of the following form:

Process value = A1*x + A0, x = raw value (phase or attenuation)

The coefficients A0 and A1 can be entered directly or can be determined by the instrument via a linear regression of up to 10 calibration points. Each calibration point exists of a laboratory value and a raw value, measured by the instrument.

Select 'CALIBR.' in the main menu and select 'DATA' in the calibration sub-meun. In the display the first calibration point is given. The cursor is in the input field for the laboratory value.

MP01:W= 0.0 P= 0.0
SCROLL CURSOR NEXT

Press <Enter> to move the cursor to the input field for the raw value. Now the raw value could be entered or measured.
Press <Run>. The display shows now the actual measured raw value. The message RUN is displayed to indicate the measurement is underway.
Wait until the display of the raw value has stabilized and stop measureement by pressing <Run> (the displayed raw value is the arithmetic average over the elepsed measuring time).
The sample for the laboratory must be taken during the measuring time of the raw value.

Mark:	If the cursor is not on the input field for the raw value, pressing the <Run> key will start a 'normal' measurement. The display will jump to the measure sub-menu.

The next calibration point can be selected by pressing NEXT. With this method up to 10 calibration point could be taken. After the laboratory values are determined, they should be entered in the related calibration points.
In this way, all 10 calibration point can be entered. Threre are at least 2 calibration points necessary to lead the calibration fit.

The linear regression can be started by moving the display with NEXT to the following question:

CAL (Enter):
BACK

Pressing <Enter> starts the calculation. After completion A0 and A1 will be stored in the instruments memory. After calculation is done the message DONE will be displayed.

CAL (Enter): DONE
BACK

Pressing BACK leads back to the calibration sub-menu. For the calibration at least 2 calibration points are necessary. Otherwise an error message will be displayed:

MISSING CALIBRATION
POINTS!

2.2.2 External calibration

The linear regression could also be done on a PC with the available spread sheet software, like EXCEL or LOTUS. This method gives the advantage of more than 10 calibration point. After executing the regression the calculated coefficients could be directly enterd in the calibration sub-menu 'COEFF.'.

2.5 Start measurement

The measurement will be started by pressing the <Run> button. When the instrument is started, the display will automatically swith to the 'MEASURE' sub-menu and the actaul measured process value will be shown. The message RUN is shown in the display to indicate, that the measurement is running.

With this steps the standard startup is done.

During measurement ‘RUN’ is displayed to indicate a proper measurement. If the instrument detects any error or if any threshold, entered by the user, is crossed the instrument display RNx instead of RUN. The various meanings are:

RUN:	everything o.k.
RN1:	ADC-overflow. This means the sensor is not covered with product and the measured results are not valid. (For example an empty pipe)
RN2:	The measured attenuation has crossed the entered thresholds and the current output is clamped to 0/4mA (see chapter 3.5)
RN3:	The measured Brix value has crossed the Brix-Max threshold and the output is clamped to 0/4mA see chapter 3.7).
RN4:	Evaluation of the raw phase is unstable. If this occours the actual measuring value is rejected and the output is keept on the last valid value.

RN5: Evaluation of the raw phase is unstable. If this occours the actual measuring value is rejected and the output is keept on the last valid value.
RN6: The measured value has crossed the min. threshold of the valid measuring range. the actual measuring value is rejected and the output is hold on the last valid value (see chapter 3.6).
RN7: The measured value has crossed the max. threshold of the valid measuring range. the actual measuring value is rejected and the output is hold on the last valid value (see chapter 3.6).
RN8: T3 active (if relay is used for timing functions, see chapter 3.7)

3. Miscelaneous

3.1 Test current

Located in the system sub-menu CURRENT.

To test the fuction of the current output loop it is possible to to set a constant current. The following values are availabel:

Input: 0 = Test current off
1 = Current output = 0 mA
2 = Current output = 1 mA

21 = Current output = 20mA

Remark: The test function operates only when the measurement is switched off!

3.2 Keyboard lock

The keybord can be locked with a password, which is a number in the range of 0 to 999999. The following procedure has to be done:

- Select 'GENERAL' from the main menu
- The display shows:

  LOCK KEYBOARD:
  SCROLL CURSOR NEXT

  The value of the password is not displayed

- Enter the preferred password and confirm with <Enter>. (See also paragraph 1.3).

When the keyboard is locked only the menu item 'unlock keyboard' will be accessable. All other options can not be reached. The values of the parameters however can still be observed. Also the key <Run> will be locked. To indicate the locked keyboard the message LOCKED will be displayed.

3.3 Keyboard unlock

The following proceure has to be done to unlock the keyboard:

- Selct 'GENERAL' from the main menu and press NEXT until the following display appears.

  UNLOCK KEYBOARD:
  SCROLL CURSOR NEXT

- Enter the password and confirm with <Enter> .

If the correct password is entered the message LOCKED dissapeares from the display. If a wrong password is entered, an error message ILLEGAL PASSWORD! PLEASE CORRECT! Is displayed and the entering of the password has be repeated.

3.4 Relay function

As an option the instrument could be supplied with a relay output. It is possible to use this relay for several functions. This function is located in the sub-menue GENERAL. There are four options availabe:

- Error:	If an error occures the relay switches.
- Min threshold:	Min. threshold for the the measuring value (min. alarm)
- Max threshold:	Max. threshold for the the measuring value (min. alarm)
- Frequency output:	Generating a square wave signal, to be used a timing signal (e.g. to control a valve)

3.5 Current Output Clamping

The instrument gives the opportunety to clamp the current output to 0/4 mA if the measured attenuation crosses two free selectable thresholds. To set the thresholds perform as followes:

Select 'LIMITS' in the system menue and press NEXT until the following display appears:

ATT-L: -50.0 ATT-H: 100
SCROLL CURSOR NEXT

Enter the desired thresholds and confirm with enter.

If during measurement the entered thresholds are crossed, the current output is forced to 0/4mA. The clamping of the current output is indicated by displaying 'RN2' instead of 'RUN'.

3.6 Setting valid measuring range

It is possible to define a valid measuring range. I.e. measuring values out of range will be rejected. This is a useful option on belt applications (bulk materials).

Select 'LIMITS' from the system menu and press NEXT until the following displays appear.

P-VALUE MIN: -100.0
SCROLL CURSOR NEXT

P-VALUE MAX: 1000.0
SCROLL CURSOR NEXT

Enter the desired thresholds and confirm with enter.

If during measurement the entered thresholds are crossed, the actual measuring values are rejected. The rejection of measuring values is indicated by displaying 'RN6' or ‘RN7’ instead of 'RUN'.

3.6 Setting Brix-Max

When measuring Brix it is possible to define a max. threshold for the Brix value.

Select 'LIMITS' from the system menu and press NEXT until the following displays appear.

BRIX-MAX: 1000.0
SCROLL CURSOR NEXT

Enter the desired thresholds and confirm with enter.

If, during measurement, this threshold is crossed the output signal is set to 0/4mA. To indicate, that this threshold is crossed, instead of 'RUN' 'RN3' is displayed.

3.7 Using the relay a frequency generator

If it is necessary to generate simple timing functions by the instrument it is possible to use the relay for this purpose.

Go to the sub-menue ‘GENERAL’ and select RELAY FNCT: FREQ.OUTPUT

After this is done go to the system sub-menue ‘USER’ and move the display until the following display appears:

```
FREQ: T1= 1800s  T2=    5s
SCROLL  CURSOR   NEXT
```

With entering T1 and T2 it is possible to generate a square wave, available on the relay output.

T1 defines the time in seconds where the relay is off
T2 defines the time in seconds where the relay is on

After pressing NEXT the following display is shown:

```
T3=    0s
SCROLL  CURSOR   NEXT
```

With T3 it is possible to hold the measurement (display and current output signal) during T3 on the last value before T2 starts.

EXAMPLE: The sensor of the instrument is installed on a continuous sugar cooking pan, And it is necessary to clean the sensor periodically with water. So it is necessary to control a valve, which supplies the cleaning device periodically with water. We want to clean the sensor every 30 minutes for a periode of 5 seconds. We have to enter T1=1800s (30minutes * 60s) and we have to enter T2=5s. After this is done the relay performes as followes:

During the periode T1 the relay is off (valve switched off, no water)
Durind the periode T2 the relay is on (valve switched on, water)

In this way it is possible to generate square wave signals.

But the cleaning water disturbes the measurement until the water is completely removed from the measuring path. This leads to an unstable output signal of the instrument, which disturbes the control loop of the cooking pan. To avoid this we can use T3. Let us assume, it takes 60s to remove the water from the measuring path, so we have to enter 60s for T3. The complete function would be:

During T1 the relay is off (no water). During T2 the relay is on (water). Together with T2 T3 starts. Until T3 is elapsed, the output signal is kept on the last measuring value before T2 (and T3) starts. When T3 is elapsed the measurement continues as normal.

While T3 is active RN8 is displayed to indicate active T3.

4. The system menue ‘PROTECTED’

This menue contains data which should only be changed by the advanced users of the instrument. Any change in this menue modifies the operating mode of the instrument, and some changes even require a new calibration of the instrument. This is why the instrument is protected by a password. The password which allowes access to this menue is 911 and should only be nown by authorized persons.

4.1 HF mode

The instrument has three operating modes for the HF-part of the instrument. There are three operating modes available: Standard, Mode1, Mode2. All instruments are delivered in the standard mode, which covers almost all applications. If, during calibration or operation of the instrument, there are problems. It is possible to go from standard mode to mode1 or mode2. Changing the HF-operating mode has no effect on the calibration of the instrument. Before changing the HF-mode we recommend to contact us or our local distributor.

4.2. Evaluation mode

The instrument measures phase and attenuation (called the raw values) caused by the properties of the product. As both values are moisture depending, it is possible to do a measurement/calibration based on phase or attenuation. At delivery the instrument is set up to use phase. For measuring special products attenuation sometimes gives a higher resolution and it is useful to swith to attenuation (for example: measuring acids).

4.3 Second 0/4-20mA output

If the instrument is equipped with the second 0/4-20mA output it is possible to define the output as temperature output or as second span of the measuring value.

5. Technical data

System:	Microprocessor with NV-memeory
Housing:	Aluminium, IP65 HxBxD = 200 x 140 x 90 mm
Weight:	about 5kg
Volatage:	230 / 115 VAC +/- 15% 47 - 65Hz
Power consumption:	50VA
Current output:	0/4 - 20mA isolated, max. laod 500 Ohm
RS232 interface:	4800, 9600 Baud, 8 data bit, 1 stop bit, no paritity
Display:	2x24 character LCD, LED-backlight
Microwave frequency:	2,45GHz ISM-Band
Maximum power:	0 dBm, 1mW
Sensitivity:	-80 dBm, 1nW
Sensor:	2 sensor pins installed in flange DN65 PN6 (other flanges as option) operating temperature -30 - 170 °C (250°C on request)
Operating temperature:	-20 - 85 °C
Storage temperature:	-30 - 95 °C
Radiation:	EN55011 Teil B
Noice immunity:	EN50082/1
safety:	IEC1010-1

Options

Current output 2:	0/4 - 20mA, isolated, temperature or 2'nd output for process value, max. load 500 Ohm
Temperature sensor:	installed in flange or as a clamp
Relay:	AC 250VA, DC 30V 1A

Apendix 1 Temperature compensation / temperature acquisition

To increase the accuracy of the measurement when the product temperature is changing the instrument offers the option of a temperature compensation. The temperature compensation is done with a linear or a cubic function:

W=a1*Xk + a0; mit Xk = X + (T-TREF)*TK1 + (T-TREF)^2*TK2

Mit W: measuirng value
a1,a0: constants (see calibration)
Xk: temperature compensated raw value (phase or attenuation)
X: uncompensated raw value
T: actual product temperature
TREF: referenence temperature
TK1: linear temperature coefficient
TK2: cubic temperature coefficient

A1.1 Temperature acquisition basics

The temperature sub-menu is structured as followes:

- Temperature enable :	Enabling /disabling of temperature measurement
- Temperature offset:	Adjustment for temperature display. Range -100°C to 100°C
- Product temperature:	Display of actual product temperature
- Temperature current output:	Define current output span for 0/4mA und 20mA output. Range -50°C bis 255°C. **Option**
- Temperature compensation on:	Enabling / diasabling of temperature compensation
- Linear TC und T-Ref:	Input for linear temperature coefficient an reference temperature. Range for TK1 -100 bis 100. Range for T-Ref -50°C bis 255°C
- Cubic TK:	cubic temperature coefficient . Range -999 bis 999. (Input *E03)

Default the temperature compensation is disabled. The temperature system first has to be enabled (in the temeprature sub-menu). If the temperature system is disabled all temperature related parameters are not displayed. To enable enter the sub-menu 'TEMPR.' and enable the temperature system as followes:

TEMP:MEASUREMENT: _ON
SCROLL MAIN NEXT

Select ON and confirm with <Enter>.

The instrument measures temperature with a sensor directely mounted to the flange or clamped to a pipe-line.

If there is any reason to adjust the temeprature display with a constant value, this could be done by entering an offset. It might be, for example, necessary to adjust the instruments temperature reading to a parallel running temperature gauge.

T-OFFSET= 0°C
SCROLL CURSOR NEXT

At delivery this value is zero.If this value is not zero the entered value is added to the measured temperature.

A1.2 Enabling / disabling the temperature compensation

Temperature compensation on/off

To enable the temperature compensation switch to the temperature sub-menu. To enable the temperature compensation set it to ON.

TEMP.COMPENSATION: _ON
SCROLL MAIN NEXT

Entering the linear temperature coefficient and Reference temperature

Go to the temperature sub-menu and select the display for the linear temperature coefficient and enter the required value.

TK1: 0.0000 TREF: 0°
SCROLL CURSOR NEXT

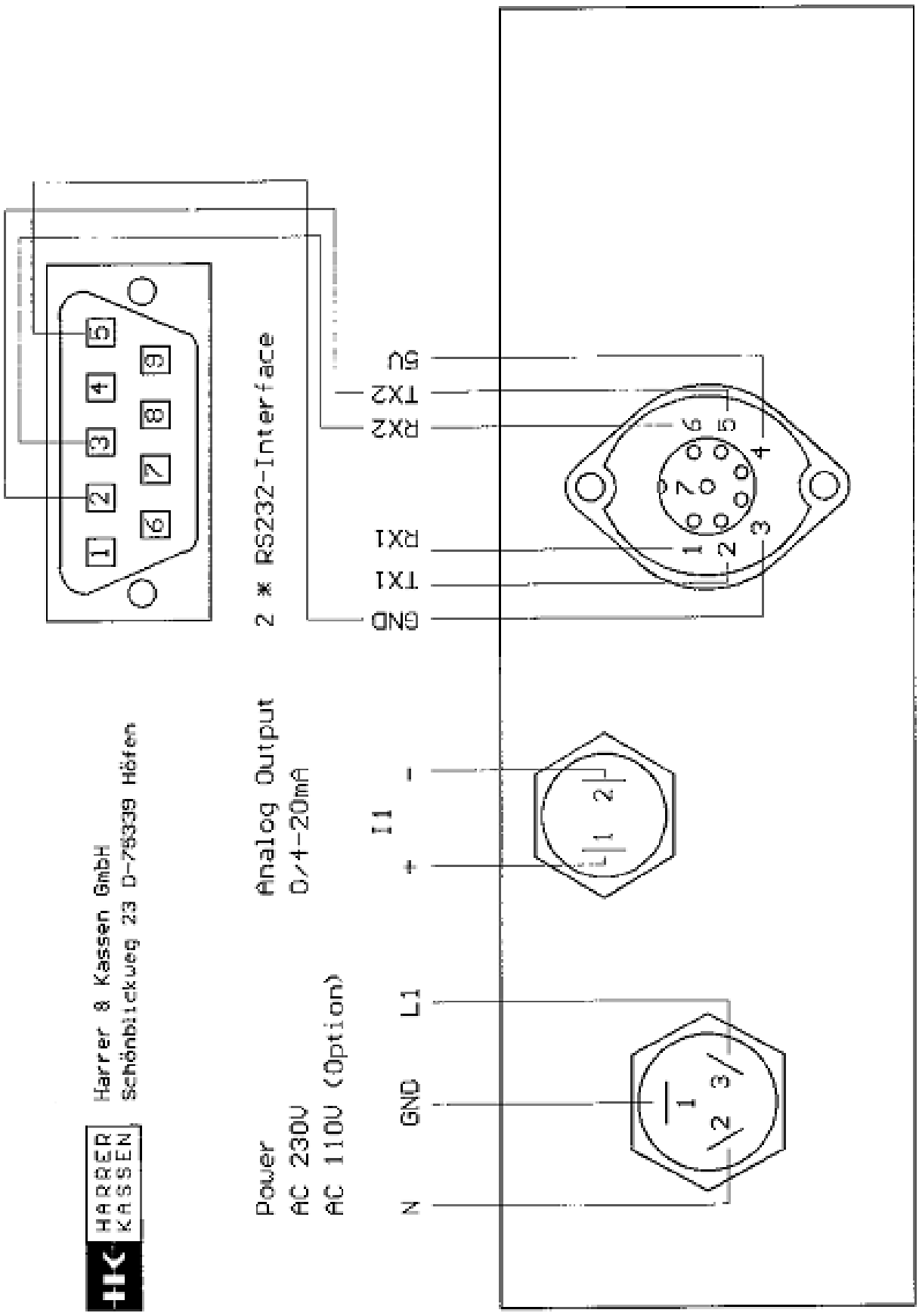
Confirm with <Enter> and the cursor moves to the input field for the reference temeprature. Enter the reference temeprature and confirm with <Enter>.

Entering the cubic temperature coefficient

Go to the temperature sub-menu and select the display for the cubic temperature coefficient and enter the required value.

TK2: 0.0000 E-3
SCROLL CURSOR MAIN

Remark: The cubic temperature coefficient has to be entered multiplied by 1000. For example: TK2 required is 0.001 leads to an input value of 0.001*1000=1.


2 * RS232-Interface
GND
TX1
RX1
RX2
TX2
SU
Analog Output
0/4-20mA
I1
-
+
Power
AC 230V
AC 110V (Option)
N
GND
L1
Harrer & Kassen GmbH
Schönblickweg 23 D-75339 Höfen
HARRER
KASSEN