Küppers Elektromechanik GmbH

Certified according to DIN ISO 9001

Manual

KRD8000

Remote Display for Coriolis Mass Flow Meter

SW-Version

Main: V2.0x

Display: V2.0x

Manual-Revision: See rear cover

1 General Information

1.1 Features

The TRD8001 is a remote display for the C-Flow Coriolis Mass Flow Meter.

It can be used for units with KCE8000 electronics as a second display or for units with the KCE6000 electronics as temporary display for setup or as permanent display.

…

Fig. 1: KRD8001

1.2 Safety

1.2.1 General Safety

All statements regarding safety of operation and technical data in this manual will only apply when the unit is operated correctly in accordance with this manual.

The data for Ingress Protection will only apply when all connectors are caped properly with the corresponding counterpart with the same or better IP rating. Cable glands must be populated with cables with the specified diameter and closed properly. The display cover must be closed.

During operation all openings of the housing must be closed unless otherwise noted in this manual.

All connections to the load and to the supply must be made with shielded cables unless otherwise noted in this manual. This unit must be grounded.

As a protection against fire in the positive supply a fuse with a current rating not higher than the current carrying capacity of the cable used is required.

Before installing the flow meter and transmitter the user is responsible to ensure that all wetted parts are compatible with the fluid or gas to be measured.

The user has to adhere to the instructions for installing electrical devices and corresponding instructions.

The devices described in this manual may only be connected and operated by authorized and qualified personnel.

1.2.2 Special requirements for Ex installations

The KRD8001 must not be located in hazardous areas.

As the KRD8001 has no inputs or outputs except the connection to the KCE electronics, it can be used as a second display, located outside the hazardous area, for a KCE8000 electronics located inside the hazardous area.

1.2.3 Warnings in this manual

NOTE:

Notes provide important information for the correct usage of the equipment. If the notes are not observed, a malfunction of the equipment is possible.

WARNING!

Warnings provide very important information for the correct usage of the equipment. Not observing the warnings may lead to danger for the equipment and to danger for health and life of the user

1.3 Ordering Codes and Accessories

1.3.1 Ordering Code

Ordering Code	Description
KRD8001	Remote display for C-Flow coriolis mass flow meter
KRD8001-Ex	KRD8001 for hazardous areas, zone 2 (ATEX II 3G Ex nA IIC T4)

1.3.2 Accessories

Ordering Code	Description
(Contact KEM)	Connecting Cable KRD ⇔ KCE8000 electronics
(Contact KEM)	Connecting Cable KRD ⇔ KCE6000 electronics

2 Getting started

2.1 Unpacking

Verify that you have received the following items:

- KRD8001
- User's manual
- Connecting cable to the C-Flow (when ordered)

2.2 Operating Elements

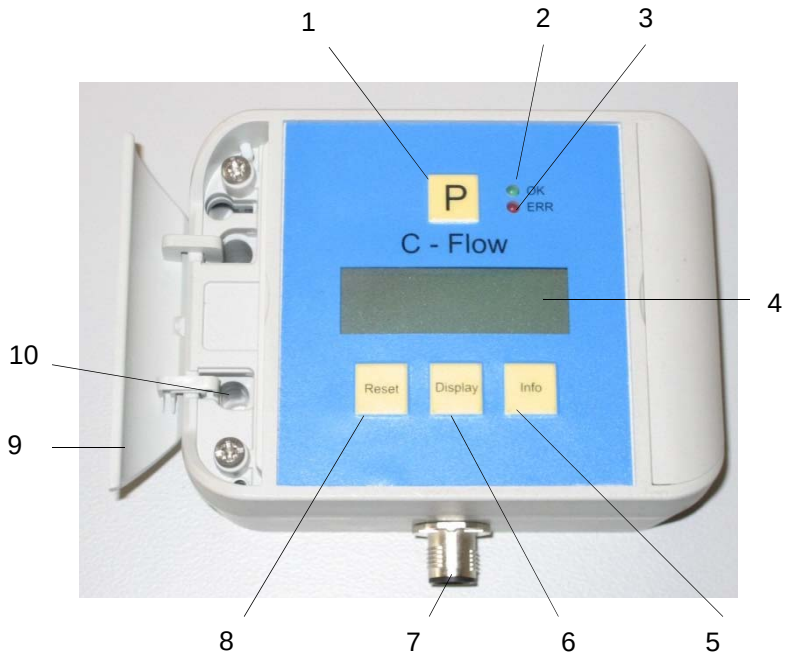


Fig. 2: Operating Elements of KCE80xx-SG

1 = Pushbutton “P”, activates / selects the different menus and confirms the settings

2 = LED “OK”, flashes green when there is no error

3 = LED “ERR”, flashes red when an error occurs

4 = Display

5 = Pushbutton “Info”, normal: selects the status menu, SETUP: softkey

6 = Pushbutton “Display”, normal: toggles the display, SETUP: softkey

7 = I/O connector

8 = Pushbutton “Reset”, normal: resets the batch counter, SETUP: softkey

9 = Side cover

10 = Mounting hole

2.3 Pin Assignments

The I/O connector is an M12 connector, B coded, male.

I/O connector pin assignment

1	+ 24V	Positive supply
2	- RS485	RS485 negative line
3	GND	Supply ground
4	+RS485	RS485 positive line
5	n.c.	

2.4 Quick start

WARNING!

As for safety and accuracy reasons many precautions must be taken, read chapter 3 carefully before installing the unit!
If the unit is connected to a bigger system, for your personal make sure that the protective ground is connected!

In case the KRD8000 has to be used with a KCE6000, just connect it via the standard cable available from KEM.

If the KRD8000 is to be used with a KCE8000, connect the cable available from KEM in the KCE8000 according to the KCE8000 manual.

2.4.1 First Operation

Make sure that all mechanical and electrical connections are made properly.

Switch on the power supply. The LED “OK” will flash green.

After the power up sequence the display shows the preselected values (ex factory normally flow and batch)

Switch on the flow. The value indicated in the display should be positive.

In case of an error the LED “ERR” will flash red.

The display can be altered by pressing the key “Display”.

The error code, the device status and information like serial number, SW version a.s.o. can be viewed by pressing the key “Info” for 3 seconds.

If the function is activated, the BATCH reading can be reset to zero by pressing the key “Reset”.

For entering the CONTROL menu press “P” for 3 seconds.

2.4.2 CONTROL Menu

In the CONTROL menu all configurations can be made. This includes configuration of the analogue and digital outputs, customizing the display and other settings.

The menu itself is self-explaining, the function of the softkeys (5, 6, 7) is indicated in the display above the pushbutton.

For entering the CONTROL menu press the pushbutton “P” (4) for 3 seconds.

The submenu DISPLAY can be entered without a password as any changes in this submenu will not affect the operation of the unit.

The submenus SETUP, I/O-TEST and SERVICE are password protected for avoiding unintentional changes of the operating parameters.

For SETUP and I/O-TEST the password is “2207”, for SERVICE refer to chapter **6.4**.

Change the indicated number “2206” with the softkey “up” (6) to “2207” and confirm with “P” (4).

Select the desired submenu with the softkeys and confirm with “P” (4).

Every setting must be confirmed with “P” (4) for storing the setting or with “E” for exiting without storing.

For leaving the SETUP menu press “E” (7) in the main level.

3 Installation

3.1 Mechanical

The KRD8000 can be used as a handheld display for fast setting or check at an KCE6000 electronics or as wall mounted display.

For wall mount provide 2 or 4 fixing points according to the drawing in chapter 7.3.2.

Flip up the side covers of the housing, fix the housing with suitable screws to the wall and reclose the side covers.

NOTE

It is not necessary to open the housing for mounting the KRD8000.

3.2 Electrical installation

Make sure that the unit is properly mounted and the process input and output are connected before making the electrical connections.

The KRD8000 can be connected to or disconnected from the C-Flow electronics at any time via the M12 connector at the KRD8000, without switching off the power supply and without disturbing the operation of the C-Flow meter.

3.2.1 Connecting to a KCE8000

Switch off the power supply for the C-Flow and prepare the KCE8000 for installing the cables (see manual C-Flow with KCE8000).

Connect the cable to the KCE8000 according to Tab. 1.

If possible use end sleeves for the individual wires.

Terminal M12 conn.	Signal	Color	Terminal KCE8000
1	+ 24V	Yellow	50
2	-RS485	Green	21
3	GND	Grey	8 or 20 or 51
4	+RS485	Pink	22
5	n. c.		
Shield	Protective ground		

Tab. 1: Connections KCE8000

Connect the M12 connector of the cable to the KRD8000.

3.2.2 Connecting to a KCE6000

Connect the male connector of the cable to the connector “RS485” of the KCE6000.

Connect the female connector of the cable to the KRD8000.

3.3 Ex Installation

WARNING!

In hazardous locations all installations must only be carried out by qualified personnel!

Switch off all power supplies before installing or uninstalling the unit in hazardous locations!

The KRD8000 is available for hazardous areas, zone 2 (II 3G Ex nA IIC T4).

The KRD8000 can as well be used as a secondary display outside the hazardous area for a C-Flow with KCE8000 electronics located inside the hazardous area.

WARNING!

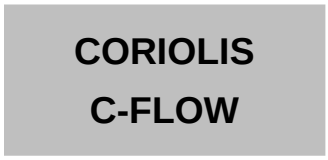
Never install any KRD8000 in zone 0 or 1!

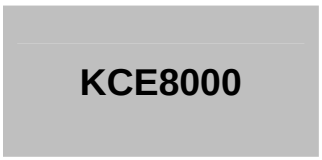
Connect the KRD to the KCE6000 or KCE8000 as described in chapter 3.2

4 Manual Operation

4.1 Power On Sequence and Principles of Manual Control

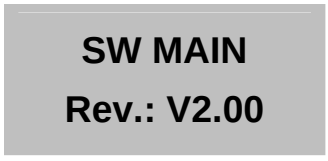
The power up sequence gives the following information, each for about 2 second:





This gives the type of electronics. At the time being the types KCE8001 (low power) and KCE8011 (high power) are available.

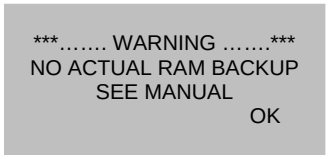
This gives the sensor size. At the time being Sensors from KCM0300 (300kg/h max.) to KCM3000k (3000kg/h max.) are available



This indicates the SW version of the main processor.

This indicates the SW version of the display processor.

If changes to the settings were made before the last power down and not saved to the backup EEPROM, the following message appears:



If no key is pressed the warning will disappear automatically after 10 seconds.
For further information refer to chapter 4.5.8.

Now the KCE8000 switches to the measuring mode, displaying the default screen:

The green LED “OK” flashes with a 1 second period. In case of an error the red LED “ERR” flashes.

In manual control the KCE is menu driven and provides 2 operational modes, the “Measuring Mode” and the “Control Mode”.

In the measuring mode the display shows the preselected measured values and all 4 pushbuttons have the function printed on them. The switch over between the different measuring displays and the error display can be made at any time without interrupting the measurements.

In the control mode the 3 pushbuttons below the display have varying functions. The actual function is indicated in the display, just above the pushbutton.

In the control menu all necessary settings can be made.

The control menu contains the 5 submenus “ZERO OFFSET”, “DISPLAY”, “SETUP”, “I/O-TEST” and “SERVICE”.

For protecting the unit against unintentional changes by unauthorized personnel, the menus “ZERO OFFSET”, “SETUP” and “I/O-TEST” are protected by a user password and the menu “SERVICE” by a service password.

For the description of the control menu see chapter 4.5.

4.2 Setup guidelines

Ex factory the C-Flow mass flow meter come with a setup optimized for normal applications. In more than 90% of the applications no further optimization except a regular offset adjustment is required.

The different possibilities for optimizing the settings are described below.

4.2.1 Meter Mode

A coriolis mass flow meter measures the mass flow and the density and can calculate the volume flow.

For avoiding strange effects with the total values when changing the dimensions, the KCE8000 can be set up as a mass flow OR a volume flow meter.

When set up as mass flow meter, only mass and mass flow engineering units can be selected, when set up as volume flow meter, only volume and volume flow engineering units can be selected.

For changing the meter mode refer to chapter 4.5.6.1.

4.2.2 Offset Calibration

In contrast to a PD meter, a coriolis mass flow meter has no “natural” zero. At no flow the measured time shift is nearly zero, but not exactly. The offset calibration determines this offset and corrects the measured value correspondingly.

As the offset depends slightly upon the temperature, the density of the medium and the operating pressure, it is strongly recommended to make the offset procedure under working conditions, i.e. with the medium to be measured and at operating pressure and temperature.

For making the offset calibration refer to chapter 4.4 and 4.5.3.

4.2.3 Flow filter

The rough data of a mass flow meter are relative noisy. For having a stable reading a filtering of the calculated flow is required.

The filters in the KCE8000 are set via the time constant t. The time constant is the time the output needs after a jump from x to 0 to go to x/e = x/2.72. A higher time constant means more stable reading but also a slower reaction to changing flows.

A rough relation between the time and the filtered flow value after a jump is

Elapsed time	Remaining error (% of the step)
1 * t	30
2 * t	10
3 * t	3
4 * t	1

A linear filter as it is realized in the KCE8000 electronics just delays the flow reading and consequently the total. Independent of the slope (fast or slow) of the rising and falling flow, the error of the internally calculated total and at the frequency output cancel out, if the flow rises from zero (or any other value) and later goes back to the starting value. For getting a correct total via the display or the frequency output, it is just necessary to wait long enough after the flow is switched off.

For best results the KCE8000 electronics provide 2 filters.

The FLOW FILTER filters the mass flow before calculating other parameters like volume flow, total or the frequency and current outputs. For normal applications a moderate filtering with t = 1s is recommended.

The DISPLAY FILTER filters the flow display additionally to the FLOW FILTER. It does not affect any other parameter or any of the outputs. The default setting is t = 1s.

If the flow is fast changing or sometimes makes a jump and the outputs have to react as fast as possible, set FLOW FILTER to t < 1s. If nevertheless the flow display has to be stable for better readability, the DISPLAY FILTER can be increased.

For setting up the FLOW FILTER refer to chapter 4.5.6.2, for the DISPLAY FILTER to chapter 4.5.4.1.

4.2.4 Cutoff

As mentioned above, a mass flow meter has no natural zero and the rough data are noisy. Consequently with now flow a meter would indicate and give out continuously a small fluctuating flow.

The parameter CUTOFF is used to provide a clear zero. If the calculated and filtered flow is below cutoff, the meter indicates zero, the total values remain unchanged and the outputs show zero flow as well.

The value for CUTOFF must be above the noise floor in the given application and well below the minimum flow to be measured.

As a good compromise the default value for CUTOFF is 0.5% of the full scale range of the meter.

For setting CUTOFF refer to chapter 4.5.6.3.

4.2.5 Step response

Sometimes it is necessary to react fast to a fast changing flow, but also to have a stable output, if the flow is (mostly) constant. This cannot be achieved by adjusting the flow filter.

The parameter STEP RESPONSE provides a fast reaction at fast changing flow, also the filter constant is high.

If the difference between the measured flow and the filtered flow is smaller than the step response value, the flow filter remains active. If the difference is higher than step response, the filter is cleared and filled with the new value.

The recommended value for constant or slowly changing flow is 99% (the default value ex works). If the unit has to react to fast changing flow, the optimum value depends on the individual situation. For ON / OFF operation a value of half the ON flow is recommended.

If STEP RESPONSE is set too low, even small changes in flow or even the internal noise will activate the step response function and partially or all the time deactivate the filter, leading to noisy readings and noisy output signals.

For setting STEP RESPONSE refer to chapter 4.5.6.4.

4.2.6 Interaction of the parameters

As each of the 3 parameters affects the calculation of the flow in a different way, a bad combination of different parameters can lead to systematical errors.

FLOW FILTER and CUTOFF

If the filter constant is set to a high value, the calculated flow is delayed compared to the actual flow. In ON-OFF operation this leads to the fact that it takes a long time until the calculated flow settles to the ON or OFF value. The total value remains correct if the unit measures long enough after the flow got switched off. If cutoff is set to a high value, the meters stops measuring too early and consequently the calculated total is too low. Also the number of pulses at the frequency output is too low. The error is systematic.

> **NOTE**
>
> In ON-OFF operation high values for the flow filter combined with high values for cutoff must be avoided!
>
> Jumps of the flow not going down to zero are not affected by cutoff.

FLOW FILTER and STEP RESPONSE

As described above, a linear filter just delays the flow reading and consequently the total but does not alter the final total.

If the step response is activated, a nonlinear term is added to the filter. The indicated flow will follow more closely the total flow, but the remaining deviation depends on the values for the filter and for step response, but also on the slope of the flow change and on the size of a step.

If the flow changes slowly or a jump is smaller than step response, the step response function will not be activated and remains linear all the time, producing the normal delay.

If the flow changes fast and the step is higher than step response, the filter will be made faster, the indicated flow follows more closely the actual flow and the delay will be smaller.

In ON-OFF operation with a fast rising and slowly falling flow a systematic positive error is to be expected. If the rising is slow and the falling fast, the error will be negative.

WARNING!

If step response is used (e.g. for good reaction to fast changing flow), checking the accuracy for the given application is strongly recommended!

4.3 Measuring mode

4.3.1 Function of the keys

In the measuring mode all pushbuttons have a fixed function:

P	Opens the Control Menu if pressed for about 3 seconds
Reset	Resets the batch counter to zero, if the function “KEY RESET” is enabled
Display	Toggles the display between the 2 preselected settings.
Info	Opens the info menu

4.3.2 Display selection

The KCE provides 2 presettable displays. Ex work display 1 shows the flow and the total value, display 2 shows density and temperature.

In the “fixed mode” the display selected by the user remains active until the other display is selected.

For changing from on display to the other just press the pushbutton “Display”.

In the “alternate mode” the unit toggles between display 1 and 2 every 5 seconds. In this mode the pushbutton “Display” is without function.

For changing the content of the 2 displays refer to chapter 4.5.4.

4.3.3 Resetting the batch value

For easy batching in local operation the KCE provides the possibility to reset the batch value by pressing the pushbutton “Reset”.

For protecting the unit against unintentional resetting of the batch value, this function can be disabled.

Ex work the function is disabled.

For changing the setting refer to chapter 4.5.7.4.

4.3.4 Error Menu

For easy debugging in case of a malfunction of the system, the KCE provides an info and error menu.

The content of the info and error menu is not of interest for normal operation and some information is only readable for trained personnel.

For entering the menu press the pushbutton “Info” for about 3 seconds.

The display shows “NO ERROR” or one or more of the following error messages:

Code	Error
1	Amplitude sensor A is out of range (too high or too low)
2	Amplitude sensor B is out of range (too high or too low)
3	Measured time delay is too high
4	Offset adjust procedure is in progress
5	Driver current is not stable
6	Temperature sensor is out of range. Typically indicated if the line is broken or has a short
7	Oscillating frequency too low
8	Oscillating frequency too high
9	Driver current too low

Tab. 2: Error Codes

Press “Info” a second time for getting 8 internal operating parameters:

Code	Value
SA	Sensor voltage A in mV
SB	Sensor voltage B in mV
DR	Driver current in mA
PT	Measured Temperature in °C
FRE	Oscillating frequency in Hz
DEN	Density
OFF	Actual offset value
RUN	Actual time shift

Tab. 3: List of service parameters

Press “Info” again for getting general information about the unit:

Code	Value
TYPR:	Sensor type (KCM*)
SER.:	Serial number
SW1:	SW version main board
SW2:	SW version display

Tab. 4: List of unit info

By pressing “Info” you can toggle between those 2 displays, for returning to the normal operation press “Display”.

4.4 Offset calibration

For best accuracy the C-Flow needs an in situ offset calibration. This calibration zeroes out the ambient effects and increases the measuring accuracy at low flow.

The offset calibration must be carried out with the medium to be measured and should be carried out at a temperature and pressure as close to the normal operation as possible.

Proceed as follows:

Operate the unit for a while under normal operating conditions for making sure that the actual temperature of the unit equals the normal operating temperature.

Switch off the flow. For best results use a valve in front and one behind the KCM. If the valves are not close to the KCM and / or only one valve is used, wait long enough for being sure that there is no more flow through the KCM.

> **NOTE:**
>
> If there is a residual flow through the KCM or the KCM is exposed to mechanical shocks during the offset procedure, the resulting value will be wrong.

Start the offset procedure as follows (see also chapter 4.5.3):

- Press “P” for about 3 seconds
- The display shows “ZERO OFFSET”
- Press “P”
- Change the indicated number with “up” to 2207 and confirm with “P”
- Press “SLOW” (recommended) or “FAST”
- The display shows “MAKE ZERO” for 10 to 30 s and counts down to “0”
- Confirm with “Info”

The offset procedure takes about 10 s (fast) or 25 – 30 s (slow). During the procedure the red LED will flash.

For an automatic offset calibration initiated by the central control unit, the control input can be configured as “initiate offset”. In that case the KCE starts an offset procedure each time a high level is applied to the input.

For configuring the input refer to chapter 4.5.7.4.

4.5 Control Mode

In the control mode the KCE8000 can be adapted to the individual application. As unintentional changes of the settings might cause problems, some submenus are password protected.

To enter the control mode proceed as follows:

Press “P” for about 3 seconds

The display shows:

With the keys “UP” and “DOWN” you can scroll through the main list.

Select the desired submenu and confirm with “P”.

4.5.1 Function of the keys

In the setup menu some pushbuttons have changing functions, indicated in the display above the pushbutton:

P	Confirms the selection in a list or any kind of inputs
Reset	Performs the indicated function
Display	Performs the indicated function.
Info	Performs the indicated function. In most cases exits the current menu point without altering the original value

4.5.2 Submenus in the Main Menu

In the Main Menu the following submenus are addressable:

ZERO OFFSET:
Performing the automatic offset procedure.
This submenu is password protected.

DISPLAY:
Presetting the display.
Changes made in this submenu have no influence on the general function as well on the accuracy of the unit.

SETUP:
Adjusting the KCE8000 and configuring the inputs and outputs.
This submenu is password protected.

I/O-TEST:
Setting the outputs to defined values and displaying the actual status of the control inputs for testing the electrical connections.
This submenu is password protected.

SERVICE:
Calibrating KCE8000.
This submenu is password protected.

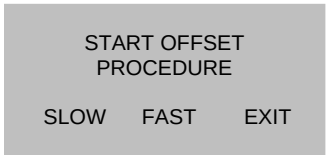
4.5.3 ZERO OFFSET Menu

Select in the main menu

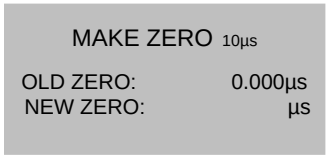
Press “P”. The display shows

Change the indicated number with “LEFT” and “UP” to 2207 and confirm with “P”.
If a wrong code is entered, the display shows “ERROR” for about 2s and then asks for a new input.

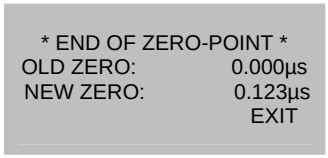
When the correct code is entered the display shows:



Press “SLOW” or “FAST”. The display shows



The time counter counts down to zero. The display shows:



Press “EXIT” to return to the measuring mode.

4.5.4 DISPLAY Menu

NOTE:

If the KRD8000 is used as a second display for a KCE8000 electronic, the display settings of both units except the flow filter will not influence each other.

Select in the main menu

Press “P”. The display shows

The following submenus are available:

FLOW DISPLAY:
Setting the flow units, the flow decimal point and a flow filter for the display.

TOTAL DISP:
Setting the total and batch units and the total and batch decimal point.

DENS DISP:
Setting the density units.

TEMP DISP:
Setting the temperature units.

DISP MODE:
Setting the content of the 2 screens, the mode (static or alternating) and the backlight.

4.5.4.1 FLOW DISPLAY menu

In the submenu “FLOW DISPLAY” the flow dimensions, the flow decimal point and the flow filter for the display can be set.

Use the keys “UP” and “DOWN” to select the desired submenu and confirm with “P” or skip with “EXIT”.

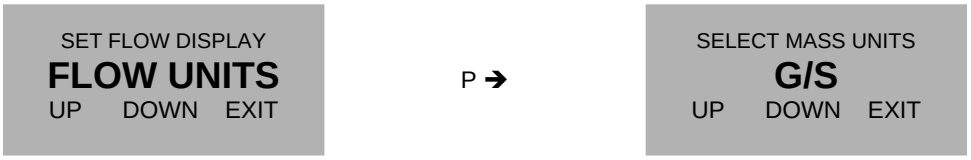
The following submenus are available:

FLOW UNITS:
Setting the flow units.

FLOW DP:
Setting the flow decimal point.

DISP FILTER:
Setting the display filter.

FLOW UNITS



Depending on the selected meter mode (mass flow meter or volume flow meter) the display says “SELECT MASS UNITS” or “SELECT VOLUME UNITS” and provides correspondingly only mass or volume units.

The meter mode can only be changed in the SETUP menu (see chapter 4.5.6.1)

The following units (volume or mass per time) can be selected:

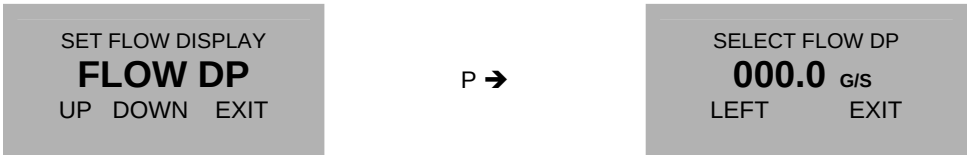
time-Unit	**Description**
S	second
MIN	minute
H	hour
D	day

Mass-Unit	**Description**
G	gram
KG	kilogram
LB	pound
OZ	dry ounce
T	metric ton
ST	stone

Volume-Unit	**Description**
CC	cubic centimeter
L	liter
m3	cubic meter
UGAL	US gallon
LOZ	fluid ounce
EGAL	English gallon
BBL	English barrel

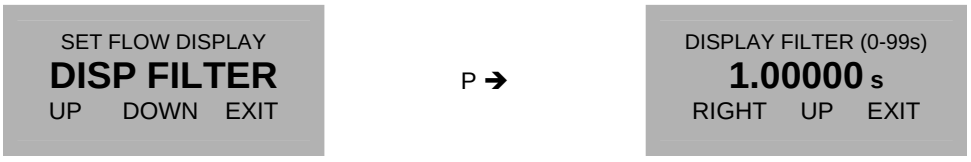
Use the keys “UP” and “DOWN” to select the engineering unit and confirm with “P” or skip with “EXIT”.

FLOW DP



Use the key “LEFT” to select the desired decimal point position and confirm with “P” or skip with “E”.

DISP FILTER



The time constant t is the time the displayed value needs after a jump from x to 0 to go to x/e = x/2.72.

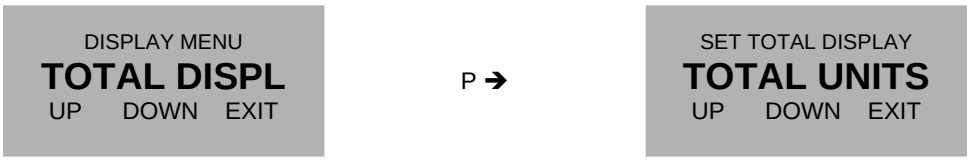
NOTE:

The display filter only filters the value in the display for providing a more stable reading. It has no influence on the outputs.
As the display filter is additional to the global filter, the display can never react faster than the outputs.

Use the keys “RIGHT” and “UP” to select the desired time constant and confirm with “P” or skip with “EXIT”.

4.5.4.2 TOTAL DISP menu

In the submenu “TOTAL DISPL” the total and batch dimensions and decimal point can be set.



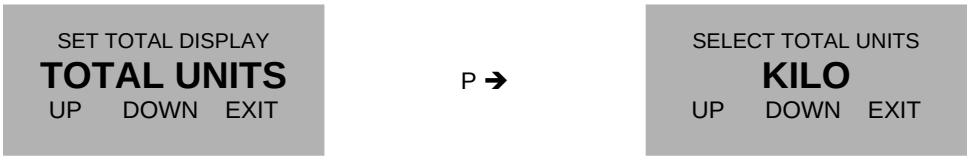
Use the keys “UP” and “DOWN” to select the desired submenu and confirm with “P” or skip with “EXIT”.

The following submenus are available:

TOTAL UNITS:
Setting the total units.

TOTAL DP:
Setting the total decimal point.

TOTAL UNITS



Depending on the selected meter mode (mass flow meter or volume flow meter) only mass or volume units can be selected.

The meter mode can only be changed in the SETUP menu (see chapter 4.5.6.1)

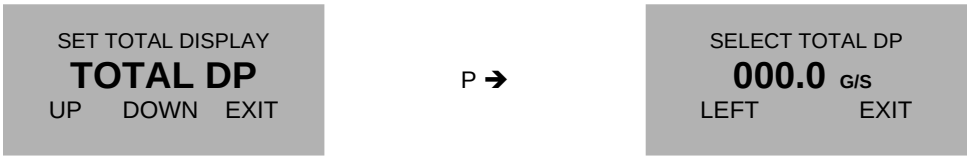
The following units can be selected:

Mass-Unit	Description
G	gram
KG	kilogram
LB	pound
OZ	dry ounce
T	metric ton
ST	stone

Volume-Unit	Description
CC	cubic centimeter
L	liter
m3	cubic meter
UGAL	US gallon
LOZ	fluid ounce
EGAL	English gallon
BBL	English barrel

Use the keys “UP” and “DOWN” to select the engineering unit and confirm with “P” or skip with “EXIT”.

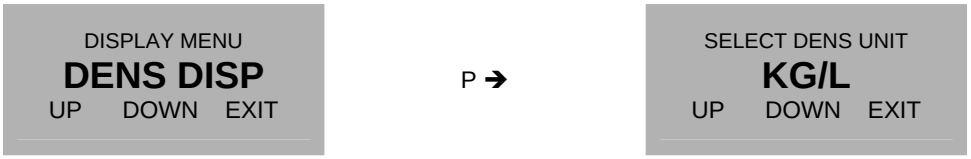
TOTAL DP



Use the key “LEFT” to select the desired decimal point position and confirm with “P” or skip with “E”.

4.5.4.3 DENS DISPLAY menu

In the submenu “DENS DISPLAY” the density dimension can be set.



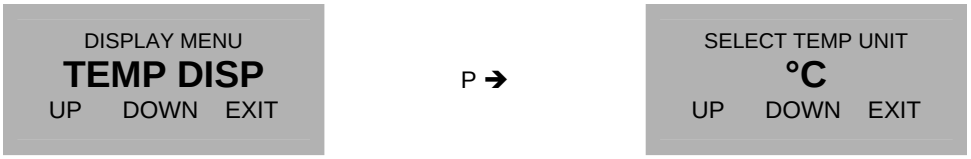
The following units (mass per volume) can be selected:

Unit	Description
G/CC	gram per cubic centimeter
G/L	gram per liter
KG/L	kilogram per liter
LB/FT3	pound per cubic feet
LB/GAL	pound per US gallon
KG/M3	kilogram per cubic meter
BRIX	Brix

Use the keys “UP” and “DOWN” to select the engineering unit and confirm with “P” or skip with “EXIT”.

4.5.4.4 TEMP DISP menu

In the submenu “TEMP DISP” the temperature engineering unit can be set.



The following units can be selected:

Unit	Description
°C	Centigrade
°F	Fahrenheit
KELVIN	Kelvin

Use the keys “UP” and “DOWN” to select the engineering unit and confirm with “P” or skip with “EXIT”.

4.5.4.5 DISP MODE menu

In the submenu “DISP MODE” the display mode can be set.

Use the keys “UP” and “DOWN” to select the desired submenu and confirm with “P” or skip with “EXIT”.

The following submenus are available:

DISPLAY 1:
Setting the content of display 1.

DISPLAY 2:
Setting the content of display 2.

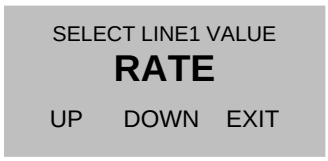
BACKLIGHT:
Switching on and off the backlight.

TIME MODE:
Setting fixed or alternating display.

DISPLAY 1

Use the keys “UP” and “DOWN” to select dual line or single line and confirm with “P” or skip with “EXIT”.

The display shows



The following values can be selected:

Unit	Description
RATE	Actual flow
BATCH	Batch count
DENS:	Density
TEMP.	Temperature
TOTAL	Total count
F-OUT	Actual frequency at the frequency output
CURR-1	Actual currant at the analog output 1
CURR-2	Actual currant at the analog output 2

Use the keys “UP” and “DOWN” to select the desired value and confirm with “P” or skip with “EXIT”.

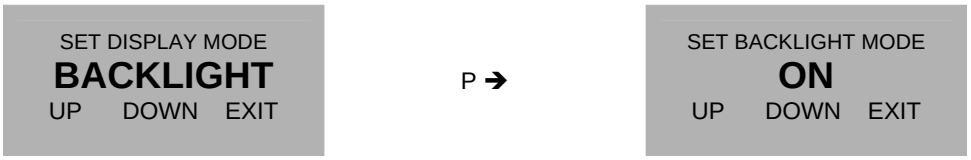
The display shows

Use the keys “UP” and “DOWN” to select the desired value and confirm with “P” or skip with “EXIT”.

The unit returns to the display mode menu.

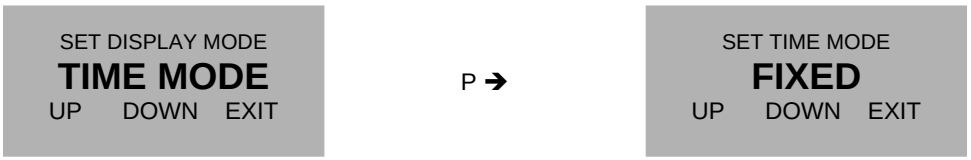
DISPLAY 2
See DISPLAY 1

BACKLIGHT



Use the keys “UP” and “DOWN” to switch on or off the backlight and confirm with “P” or skip with “EXIT”.

TIME MODE



In the fixed mode the display shows constantly the defined display 1 or 2. With the pushbutton “Display” it is possible to switch over between display 1 or 2.

In the alternate mode the display switches over every 7 seconds between display 1 and 2.

Use the keys “UP” and “DOWN” to select the desired mode and confirm with “P” or skip with “EXIT”.

4.5.5 SETUP Menu

In the SETUP menu all settings can be made to adapt the meter to the individual requirements.

Select in the main menu

Press “P”. The display shows

Change the indicated number with “LEFT” and “UP” to 2207 and confirm with “P”.

If a wrong code is entered, the display shows “ERROR” for about 2s and then asks for a new input.

When the correct code is entered the display shows:

The following submenus are available:

PARAMETER:

METER MODE	Selecting mass or volume meter mode
FLOW FILTER	Setting the filter time constant
CUT OFF	Setting the cutoff value
STEP RESP:	Adjusting the settings for fast changing flow
RESET KEY	Enable / disable the key “Reset”
FLOW-DIREC	Setting up the unit for reverse flow
K-FACTOR	Fine scaling the meter
FAULT TIME	Setting the error response time
LANGUAGE	Selecting the display language

IN/OUTPUTS:

FREQ OUT	Configuring the frequency output
CTRL OUT	Configuring the control output
ANALOG OUT	Configuring the analog output
CTRL IN	Configuring the control input
INTERFACE	Configuring the interface

DATA CONFIG:

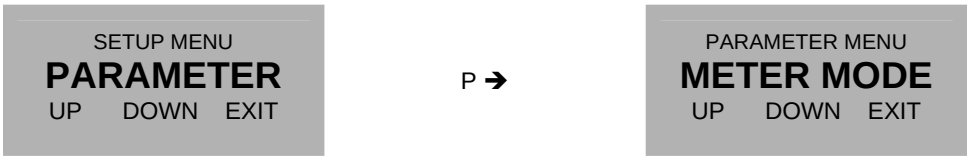
SAVE DATA	Saving the actual settings as backup
RECALL DATA	recalling the last settings from the backup

RESET TOTAL:
Resets the total count to zero.

Use the keys “UP” and “DOWN” to select the desired submenu and confirm with “P” or skip with “E”.

4.5.6 SETUP PARAMETER menu

In the submenu SETUP / PARAMETER all user settable internal parameter can be set for adjusting the unit for a given application.

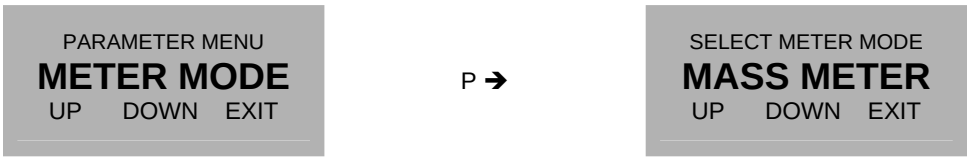


Use the keys “UP” and “DOWN” to select the desired submenu and confirm with “P” or skip with “E”.

4.5.6.1 METER MODE menu

In the submenu “METER MODE” can be set, if the flow meter shall be used as a mass flow meter or a volume flow meter.

If “mass flow meter” is selected, no volume units can be displayed and vice versa.



Use the keys “UP” and “DOWN” to select the desired submenu and confirm with “P” or skip with “E”.

If the mode is changed, the display shows:

Then the following message scrolls through the display:

WARNING! CHANGING THE METER MODE WILL RESET ALL UNITS AND THE TOTAL COUNTER. DO YOU WANT TO PROCEED?

Confirm with “YES” or skip with “NO”.

The display returns to the setup parameter menu.

4.5.6.2 FLOW-FILTER menu

In the submenu “FLOW-FILTER” the time constant for the flow filter can be set.

The time constant is the time the output needs after a jump from x to 0 to go to x/e = x/2.72.

A rough relation between the time and the filtered flow value after a jump is

Elapsed time	Remaining error (% of the step)
1 * t	30
2 * t	10
3 * t	3
4 * t	1

Use the keys “RIGHT” and “UP” to select the desired value and confirm with “P” or skip with “EXIT”.

The display returns to the setup parameter menu.

4.5.6.3 CUT OFF menu

In the submenu “CUT-OFF” the cutoff in percent of the full scale flow range can be set.

If the absolute value of the measured and filtered flow is below the cutoff value, the calculated flow is “0” and consequently all outputs show zero flow and the total and batch value remain unchanged.

Use the keys “RIGHT” and “UP” to select the desired value and confirm with “P” or skip with “EXIT”.

The display returns to the setup parameter menu.

4.5.6.4 RESP STEP menu

In the submenu “RESP STEP” the reaction to fast changing flows can be set.

If the difference between the measured flow and the filtered flow is smaller than the step response value, the flow filter remains active. If the difference is higher than step response, the filter is cleared and filled with the new value.

The recommended value for constant or slowly changing flow is 99% (the default value ex work). If the unit has to react to fast changing flow, the optimum value depends on the individual situation. For ON / OFF operation a value of half the ON flow is recommended, if this is less than the default 10%.

NOTE:

A too low value will lead to noisy measurement whereas a too high value with fast changing flow (ON /OFF operation) will lead to a too slow reaction of the meter.

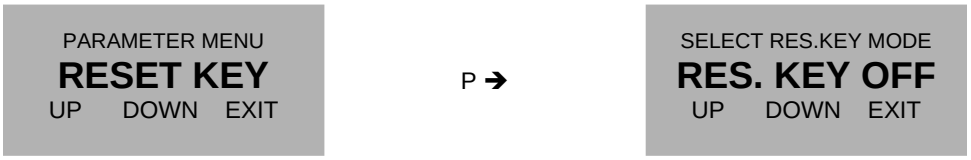
Use the keys “RIGHT” and “UP” to select the desired value and confirm with “P” or skip with “EXIT”.

The display returns to the setup parameter menu.

4.5.6.5 RESET KEY menu

In the submenu “RESET-KEY” the pushbutton “Reset” can be enabled or disabled.

If the pushbutton Reset is active, it can be used to reset the batch counter.



Use the keys “UP” and “DOWN” to enable or disable the key and confirm with “P” or skip with “EXIT”.

The display returns to the setup menu

4.5.6.6 FLOW DIRECTION menu

In the submenu “FLOW-DIREC” the positive direction of the flow can be set.

If flow direction is “forward” (default setting), a flow through the meter in direction of the arrow on the meter will be displayed positive, the opposite flow negative.

If for technical reasons the meter must be mounted in that way, that the normal flow is against the direction of the arrow, the sign of the flow can be inverted by setting flow direction to “reverse”.

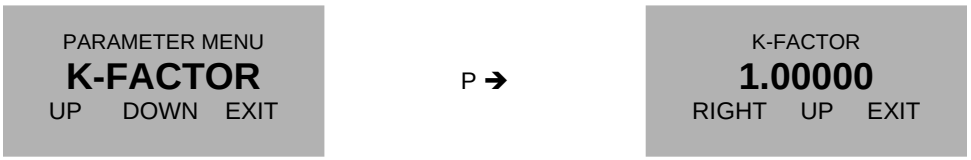
Use the keys “UP” and “DOWN” to select the positive flow direction and confirm with “P” or skip with “EXIT”.

The display returns to the setup menu

4.5.6.7 K-FACTOR menu

In the submenu “K-FACTOR” the k- factor for fine tuning of the flow calculation can be set.

Ex work the unit is calibrated with a k- factor of “1”. If for any reasons the flow measured by the mass flow meter differs slightly from a flow measured with other means, the value calculated by the KCM8000 can be adjusted by changing the k- factor.



Use the keys “RIGHT” and “UP” to select the desired value and confirm with “P” or skip with “EXIT”.

The display returns to the setup parameter menu.

4.5.6.8 FAULT TIME menu

In the submenu “FAULT TIME” the reaction time of the KCE8000 in case of an error can be defined.

The fault on delay time is the time an error must be present, until the red LED lights up and the error output signal is activated.

The fault off delay time is the time an error signal persists on the red LED and on the control output, after the error disappeared.

Use the keys “LEFT” and “UP” to select the desired value and confirm with “P” or skip with “E”.

The display shows

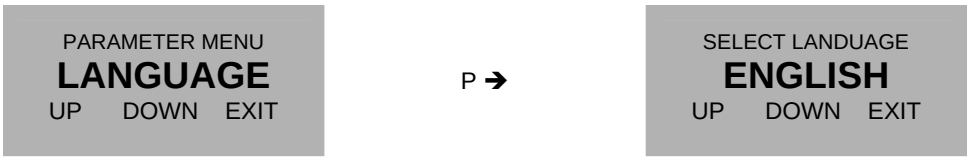
Use the keys “LEFT” and “UP” to select the desired value and confirm with “P” or skip with “E”.

The display returns to the setup menu.

4.5.6.9 LANGUAGE menu

In the submenu “LANGUAGE” the language used in the display can be selected.

At the time being English and Russian can be selected. If Russian is selected, only the main menu is in Russian language, the control menu remains in English.



Use the keys “UP” and “DOWN” to select the language and confirm with “P” or skip with “E”.

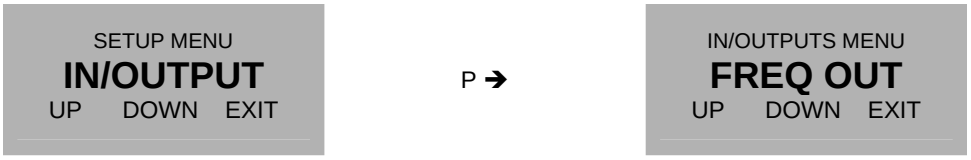
The display returns to the setup menu.

In case you cannot read the display the menu can be accessed by:

3s P/Display/Display/P/Display/P/P/Reset/P

4.5.7 SETUP IN/OUTPUS menu

In the submenu SETUP / IN/OUTPUTS the input and output ports of the KCE8000 can be configured.



Use the keys “UP” and “DOWN” to select the desired submenu and confirm with “P” or skip with “E”.

4.5.7.1 FREQ OUT menu

In the submenu “FREQ OUT” the frequency output can be configured.

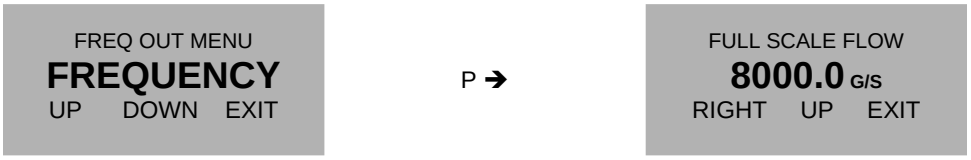
The frequency output has 2 operating modes:

FREQUENCY:
A frequency proportional to the actual flow is generated.
If a negative flow must be given out as well, the control output can be used as sign.
Frequencies between 2Hz and 10kHz can be generated in this mode.

TOTAL COUNT:
Each time the total increments by the selected total increment step, the output produces a pulse. For having a 50% duty cycle, the output changes its state each time after half the increment step.
If the flow is negative in between, no pulses are generated until the following positive flow compensates for the negative flow in between. Thus the medium will not be counted twice, if in between a flow backwards occur.
The maximum output frequency which can be generated in this mode is about 50Hz.

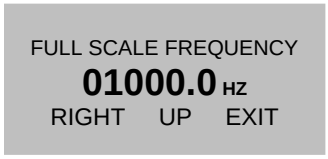
Use the keys “UP” and “DOWN” to select the desired mode and confirm with “P” or skip with “E”.

FREQUENCY



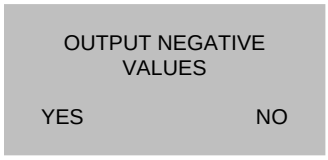
Use the keys “RIGHT” and “UP” to select the desired full scale value and confirm with “P” or skip with “EXIT”.

The display shows

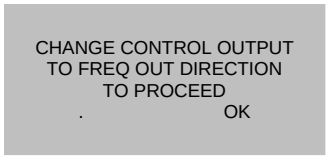


Use the keys “RIGHT” and “UP” to select the desired frequency and confirm with “P” or skip with “EXIT”.

The display shows

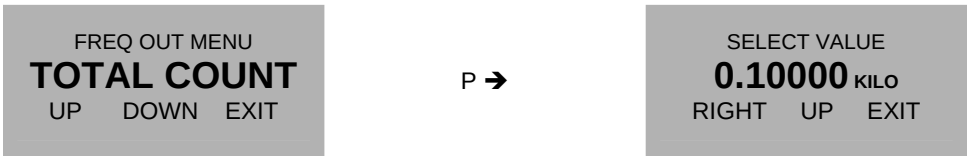


If “YES” is selected and the control output is not configured as sign output, the display shows



Confirm with “OK” and configure the control output correspondingly if required.

TOTAL COUNT



Use the keys “RIGHT” and “UP” to select the desired increment step and confirm with “P” or skip with “EXIT”.

4.5.7.2 CONTROL OUT menu

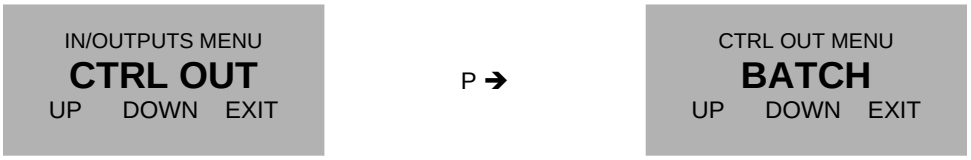
In the submenu “CTRL OUT” the control output can be configured.

The control output has 3 operating modes:

BATCH:
In the batch mode the KCE8000 operates as a batch counter. If the preset batch value is reached, the control output goes to the active state. With an active signal at the control input the batch counter can be reset to zero. For this mode the control input must be configured as “reset batch”.

FAULT:
In case of an error the control output goes high. For setting the on and off delay time refer to chapter 4.5.6.8.

FLOW DIREC:
The control output is low, if a positive flow is measured, and high, if a negative flow is measured.



Use the keys “UP” and “DOWN” to select the desired mode and confirm with “P” or skip with “E”.

If FAULT or FLOW DIREC was selected, the KCE changes the settings and returns to the IN/OUTPUT menu.

If BATCH was selected, the display shows

Use the keys “RIGHT” and “UP” to select the desired batch value and confirm with “P” or skip with “EXIT”.

The display shows

Use the keys “UP” and “DOWN” to select the desired value and confirm with “P” or skip with “E”.

4.5.7.3 ANALOG OUT menu

In the submenu “ANALOG OUT” the 4 – 20mA outputs can be configured.

When used with a KCE6000, only 1 analog output is available.

Each analog output can show one of the following 4 parameters:

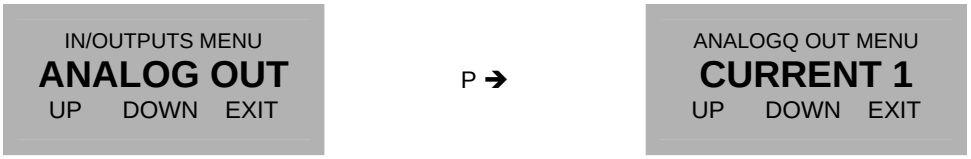
FLOW:
The output current is proportional to the actual flow.

DENSITY:
The output current is proportional to the actual density.

TEMPERATURE:
The output current is proportional to the actual temperature.

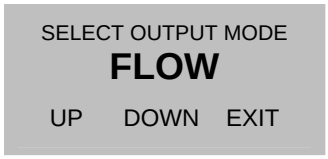
BATCH COUNT:
The output current is proportional to the actual batch value.
This mode is only possible, if the control input is configured as “RESET BATCH”

The value for 4mA as well as the value for 20mA can be freely selected. Thus it is possible to zoom in (e.g. temperatures from 20°C to 30°C) or to show negative values as well (e.g. flow from -10kg/min to +20kg/min).



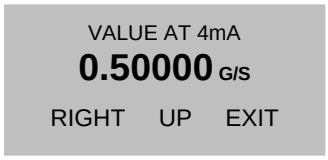
Use the keys “UP” and “DOWN” to select the desired output channel and confirm with “P” or skip with “E”.

The display shows



Use the keys “UP” and “DOWN” to select the desired output value and confirm with “P” or skip with “E”.

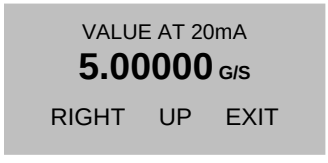
The display shows



The indicated engineering unit depends on the selected output value and the display setup.

Use the keys “RIGHT” and “UP” to select the desired value for 4 mA and confirm with “P” or skip with “EXIT”.

The display shows



Use the keys “RIGHT” and “UP” to select the desired value for 20 mA and confirm with “P” or skip with “EXIT”.

The display returns to the IN/OUTPUT menu.

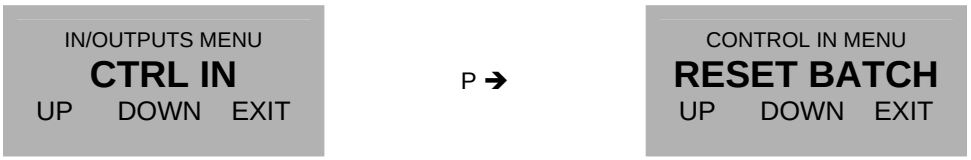
4.5.7.4 CONTROL IN menu

In the submenu “CTRL IN” the control input can be configured.

The control output has 2 operating modes:

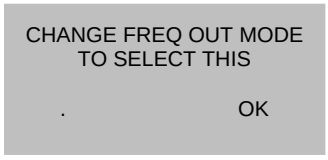
RESET BATCH:
If a high level is applied to the input, the batch counter is reset to 0.
This mode must be selected, if the control output is to be used as a batch output and / or if one of the analog outputs is to be used as batch output

EXTERNAL ZERO:
If a high level is applied to the input, the KCE8000 starts the zero offset procedure.



Use the keys “UP” and “DOWN” to select the desired mode and confirm with “P” or skip with “E”.

If “EXT: ZERO” is selected and one of the outputs is set to batch output, the display shows



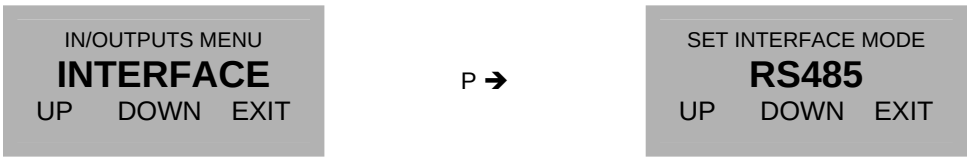
Confirm with “OK” and configure the output correspondingly if required.

4.5.7.5 INTERFACE menu

In the submenu “INTERFACE” the interface can be configured.

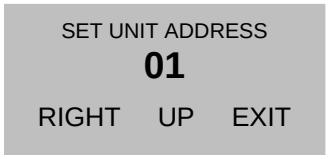
Depending on the configuration one or more of the following interfaces can be selected:

RS485
HART
Foundation Fieldbus



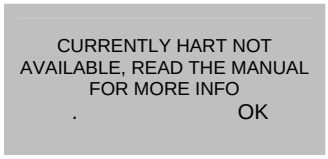
Use the keys “UP” and “DOWN” to select the desired mode and confirm with “P” or skip with “E”.

If “RS485” is selected, the display shows:



Use the keys “RIGHT” and “UP” to select the desired address and confirm with “P” or skip with “EXIT”.

If an interface not implemented is selected, the display shows



Confirm with “OK” and select an implemented interface.

4.5.8 SETUP DATA CONFIGURATION menu

In the submenu SETUP / DATA CONFIG the current setting can be stored to the backup memory and the stored settings can be recalled

Use the keys “UP” and “DOWN” to select the desired submenu and confirm with “P” or skip with “E”.

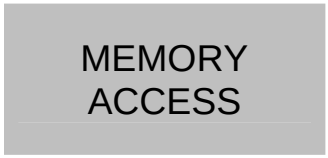
4.5.8.1 SAVE DATA menu

In the submenu “SAVE DATA” the current settings can be stored in the backup memory.

At each power on the KCE8000 compares the content of the setup memory and the backup memory. If the data in those 2 memories are different, the KCE8000 gives out a warning. For avoiding that warning it is recommended to make a backup as soon as the new settings are proven to be okay.

Start the backup process with “START” or skip with “EXIT”.

If “START” is pressed, the display shows for some seconds



After that for about 2 seconds

The display returns to the DATA CONFIG menu.

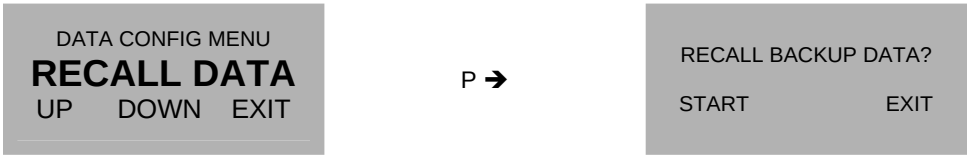
4.5.8.2 RECALL DATA menu

In the submenu “RECALL DATA” the old settings are reloaded from the backup memory.

Reloading the old settings is recommended if after bigger changes in the setup the unit does not work properly any more.

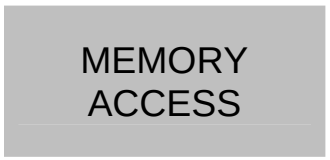
NOTE:

Backup data overwritten with “SAVE DATA” cannot be restored!



Start the recall process with “START” or skip with “EXIT”.

If “START” is pressed, the display shows for some seconds

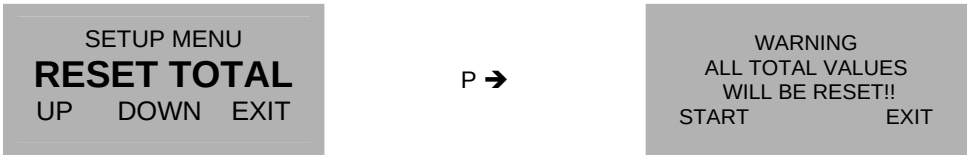


After that for about 2 seconds

The display returns to the DATA CONFIG menu.

4.5.9 SETUP RESET TOTAL menu

In the submenu SETUP / RESET TOTAL the total counter can be reset to zero



Reset the total with “START” or skip with “EXIT”.

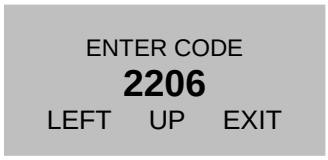
The display returns to the RESET TOTAL menu.

4.5.10 I/O-TEST Menu

In the I/O-TEST menu all inputs and outputs can be tested.

Select in the main menu

Press “P”. The display shows



Change the indicated number with “LEFT” and “UP” to 2207 and confirm with “P”.
If a wrong code is entered, the display shows “ERROR” for about 2s and then asks for a new input.

When the correct code is entered the display shows:

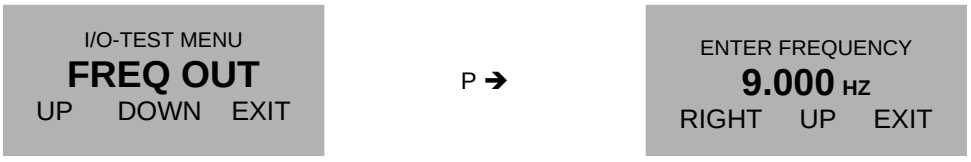
The following submenus are available:

FREQ OUT	A freely settable frequency can be applied to the output
CTRL OUT	The output level can be set
ANALOG OUT	A freely settable current can be applied to the outputs
CTRL IN:	The actual level at the input is indicated

When the I/O-TEST menu is left, all outputs return to normal operation.

4.5.10.1 FREQ OUT menu

In the submenu “FREQ OUT” a freely settable frequency between 1Hz and 9999Hz can be applied to the output.



Use the keys “RIGHT” and “UP” to select the desired value and confirm with “P” or skip with “EXIT”.

If “P” was pressed the frequency is applied to the output and the display shows

Press “YES” to enter a new value or “EXIT” to leave the menu.

If “EXIT” is pressed, the display returns to the I/O-TEST menu.

4.5.10.2 CTRL OUT menu

In the submenu “CTRL OUT” a low or high level can be applied to the output.

Use the keys “HIGH” and “LOW” to set the output value or leave the menu with “EXIT”.

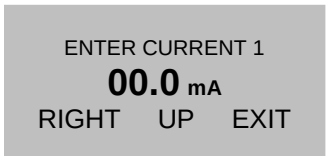
If “EXIT” is pressed, the display returns to the I/O-TEST menu.

4.5.10.3 ANALOG OUT menu

In the submenu “ANALOG OUT” a freely settable current between 2mA and 21mA can be applied to the output.

Use the keys “UP” and “DOWN” to select the desired output and confirm with “P” or skip with “E”.

The display shows



Use the keys “RIGHT” and “UP” to select the desired value and confirm with “P” or skip with “EXIT”.

If “P” was pressed the current is applied to the output and the display shows

Press “YES” to enter a new value or “EXIT” to leave the menu.

If “EXIT” is pressed, the display returns to the I/O-TEST menu.

4.5.10.4 CTRL IN menu

In the submenu “CTRL IN” the display shows level currently applied to the control input.

The display does not show the actual level at the input, but the level at the moment, when the CTRL IN menu was entered.

After evaluating the input press “EXIT” to return to the I/O-TEST menu.

4.5.11 SERVICE Menu

The “SERVICE” menu is used to calibrate the meter and to recall the original factory settings.

For a description of the menu refer to chapter **6.4**.

5 Remote operation

The KRD8001 does not have an interface for remote operation.

As the KRD8001 uses the RS485 interface of the KCE8000 electronics, it cannot be used, if any of the interfaces of the KCE8000 is used for remote control.

With the KCE6000 it is possible to connect the KRB8000 to the RS485 interface of the KCE6000 and to use simultaneously the USB interface of the KCE6000.

6 Service and Maintenance

6.1 Maintenance

The remote display KRD8000 does not require regular maintenance.

For any maintenance of the C-Flow meter refer to the corresponding manual.

6.2 Trouble shooting

In case the KRD8000 does not work properly, first check the following items:

No display, no LED lighting
All cables properly connected?
➔ Connect the missing cables
Power supply switched on?
➔ Switch on the power supply

For all other possible faults refer to the C-Flow manual.

6.3 Changing the fuses

The KRD8000 does not contain fuses.

For the fuses in the C-Flow refer to the corresponding manual.

6.4 Calibration

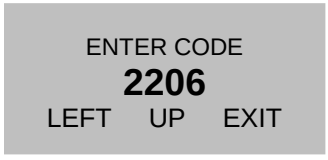
In the calibration menu the flow, density and temperature measurement of the KCE8000 can be calibrated.

Press “P” for about 3 seconds

The display shows:

Use the key “UP” or “DOWN” to select

Press “P”. The display shows



Change the indicated number with “LEFT” and “UP” to 2208 and confirm with “P”.

If a wrong code is entered, the display shows “ERROR” for about 2s and then asks for a new input.

When the correct code is entered the display shows:

Press “P”. The display shows

The following submenus are available:

TEMP CALIB.	Calibrating the temperature measurement
AIR CALIB.	Calibrating the density measurement at low density
WATER CALIB.	Calibrating the density measurement at high density
METER VAR.	Calibrating the flow measurement

6.4.1.1 Temperature Calibration

For calibrating the temperature reading of the KCE8000, the medium temperature must be well known.

Before starting the calibration make sure that the temperature reading has been stable for several minutes for making sure that the medium temperature and the temperature sensor temperature are the same.

Use the keys “RIGHT” and “UP” to set the actual medium temperature and confirm with “P” or skip with “E”.

The display returns to the CALIBRATION menu.

6.4.1.2 Air Density Calibration

NOTE

Make sure that the temperature reading is calibrated before starting the air calibration.

The low end calibration of the density measurement is normally done with empty tubes (filled with air).

In the automatic mode the unit performs an automatic calibration, assuming that the tubes are filled with normal air.

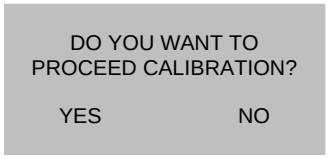
In the manual mode the three parameters temperature, tube frequency and reference density can be altered individually. This is necessary if the air calibration is performed with a gas with a density different than air. In that case make first the automatic calibration and then override in the manual calibration the density value by the density of the medium used for calibration.

Before starting an automatic calibration, make sure that the KCM is completely empty as any drop of a liquid inside will spoil the calibration result.

Use the keys “UP” and “DOWN” to select the mode and confirm with “P” or skip with “EXIT”.

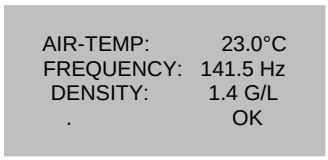
AUTOMATIC mode

Confirm with “OK”. The display shows



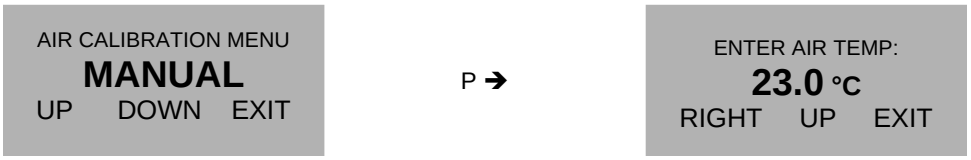
Start the calibration with “YES” or skip with “NO”.

When “YES” was pressed, the display shows

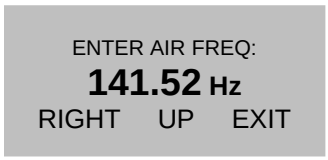


Confirm with “OK”. The display returns to the AIR CALIBRATION menu.

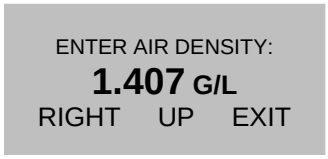
MANUAL MODE



Use the keys “RIGHT” and “UP” to set the reference temperature and confirm with “P” or skip with “EXIT”. The display shows



This value must only be altered, if you have the data from a calibration sheet of the KCM. Skip with “EXIT”. The display shows



Use the keys “RIGHT” and “UP” to set the reference density and confirm with “P” or skip with “EXIT”.

The display returns to the AIR CALIBRATION menu.

6.4.1.3 Water Density Calibration

NOTE

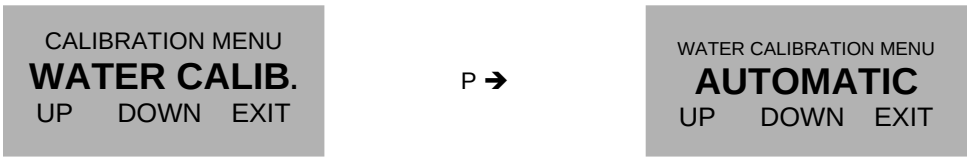
Make sure that the temperature reading is calibrated before starting the water calibration.

The high end calibration of the density measurement is normally done with tubes filled with water, but any other liquid with well-known density can be used as well.

In the automatic mode the unit performs an automatic calibration, assuming that the tubes are filled with water.

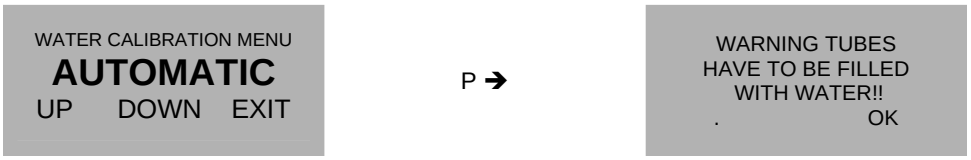
In the manual mode the three parameters temperature, tube frequency and reference density can be altered individually. This is necessary if the water calibration is performed with a liquid with a density different than water. In that case make first the automatic calibration and then override in the manual calibration the density value by the density of the medium used for calibration.

Before starting an automatic calibration, make sure that the KCM is completely filled with the test medium. Any pollution (air bubbles, solid particles or rests of other liquids) will spoil the calibration.

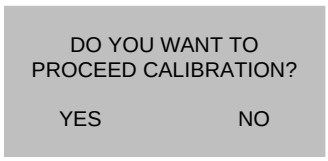


Use the keys “UP” and “DOWN” to select the mode and confirm with “P” or skip with “EXIT”.

AUTOMATIC mode

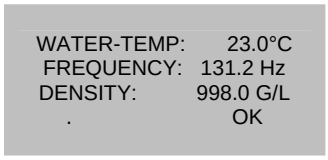


Confirm with “OK”. The display shows



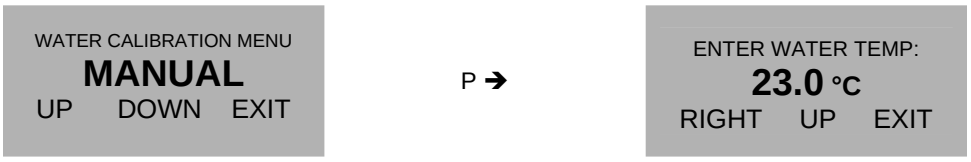
Start the calibration with “YES” or skip with “NO”

When “YES” was pressed, the display shows



Confirm with “OK”. The display returns to the WATER CALIBRATION menu.

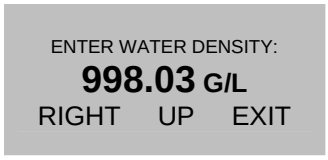
MANUAL MODE



Use the keys “RIGHT” and “UP” to set the reference temperature and confirm with “P” or skip with “EXIT”.

The display shows

This value must only be entered, if you have the data from a calibration sheet of the KCM. Skip with “EXIT”. The display shows



Use the keys “RIGHT” and “UP” to set the reference density and confirm with “P” or skip with “EXIT”.

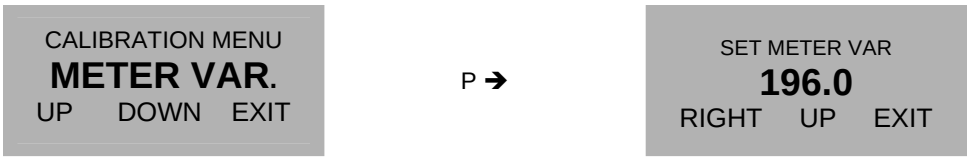
The display returns to the WATER CALIBRATION menu.

6.4.2 Flow Calibration

NOTE

Make sure that the temperature reading is calibrated before starting the flow calibration.

The flow can be calibrated by comparing the flow or batch reading of the KCE8000 to the reading of a more precise and calibrated reference meter.



The new meter variable can be calculated as:

METER_VARnew = METER_VARold * Reference_reading / KCE8000_reading

Use the keys “RIGHT” and “UP” to set the calculated meter variable and confirm with “P” or skip with “EXIT”.

The display returns to the CALIBRATION menu.

6.5 Service

The KCE8000 does not contain any user serviceable parts except the fuses.

In case of malfunction, please contact your nearest dealer or directly KEM.

For the addresses see chapter 7.7.

6.6 Reloading Factory Settings

In case the unit has been completely misadjusted for any reason, the unit can be reset to the original settings ex work.

Press “P” for about 3 seconds. The display shows:

Use the key “UP” or “DOWN” to select

Press “P”. The display shows

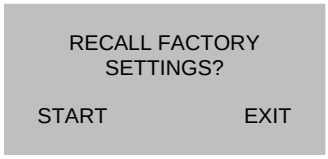
Change the indicated number with “LEFT” and “UP” to 2208 and confirm with “P”.
If a wrong code is entered, the display shows “ERROR” for about 2s and then asks for a new input.

When the correct code is entered the display shows:

Use the key “UP” or “DOWN” to select RECALL FACT. The display shows:

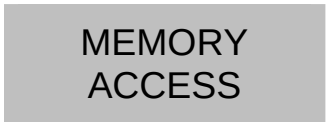
Select with “P” or skip with “EXIT”.

The display shows.



Start the recall process with “START” or skip with “EXIT”.

If “START” is pressed, the display shows for some seconds



After that for about 2 seconds.

The display returns to the RECALL FACT menu.

7 Listings

7.1 Warranty

KEM warrants material and production for a period of 12 months after installation and start up, max. 18 months from delivery date.

7.2 Certifications and compliances

Category	**Standards or description**	
EC Declaration of Conformity - EMC	Meets intent of Directive 2004 / 108 / EEC for Electromagnetic Compatibility. Compliance is given to the following specifications as listed in the Official Journal of the European Communities:	
	EN 61326 / 2006	EMC requirements for Class A electrical equipment for measurement, control and laboratory use, including Class A radiated and Conducted Emissions[1] and Immunity[1].
	IEC 61000-4-2 /2009	Electrostatic Discharge Immunity (Performance criterion B)
	IEC 61000-4-3 / 2008	Radiated RF Electromagnetic Field Immunity (Performance criterion B)
	IEC 61000-4-4 / A1-2009	Electrical Fast Transient / Burst Immunity (Performance criterion B)
	IEC 61000-4-5 / 2007[2]	Power Line Surge Immunity (Performance criterion B)
	IEC 61000-4-6 / 2009	Conducted RF Immunity (Performance criterion B)
	IEC 61000-4-11 / 2005[2]	Voltage Dips and Interruptions Immunity (Performance criterion B)
Australia / New Zealand Declaration of Conformity-EMC	Complies with the Radiocommunications Act and demonstrated per EMC Emission standard[1]	
	AS/NZS 2064	Industrial, Scientific, and Medical Equipment: 1992
FCC EMC Compliance	Emissions comply with the Clas A Limits of FCC Code of Federal Regulations 47, Part 15, Subpart B[1.]	

[1] Compliance demonstrated using high-quality shielded interface cables
[2] Applies only to units with AC mains supply instead of or additional to the SELV supply

Category	**Standards or description**	
EC Declaration of Conformity – Low Voltage	Compliance is given to the following specification as listed in the Official Journal of the European Communities: Low Voltage Directive 2006/95/EEC	
	EN 61010-1 / 2002	Safety requirements for electrical equipment for measurement control and laboratory use.
U.S. Nationally Recognized Testing Laboratory Listing	UL 61010-1 / 2004	Standard for electrical measuring and test equipment.
Canadian Certification	CAN/CSA C22.2 no. 61010-1-4 / 2008	Safety requirements for electrical equipment for measurement, control, and laboratory use.
Additional Compliance	IEC61010-1 / 2002	Safety requirements for electrical equipment for measurement, control, and laboratory use.
Equipment Type	Test and measuring	
Safety Class	Class 1 (as defined in IEC 61010-1, Annex H) – grounded product	
ATEX	**II 3G Ex nA IIC T4**	(Option)

7.3 Technical Data

7.3.1 Technical Data KCE 8000 Transmitter

General	
Display:	Graphic, 132 x 32 dot
Programming:	via front keyboard
Supply voltage:	24 VDC, ± 20%
Supply current:	< 30mA @ 24V
Interface:	RS 485, for connecting to the KCE electronics
EMC:	according to EN 50 081-2 and EN 50 082-2
Dimensions:	see drawing
Connections:	M12, B coded, male
Material:	Noryl
Protection class:	IP65
Weight:	approx. 500g
Temperature:	operation: 0 to 50°C storage and transport: -20 up to 70°C

7.3.2 Dimensional Drawings (mm)

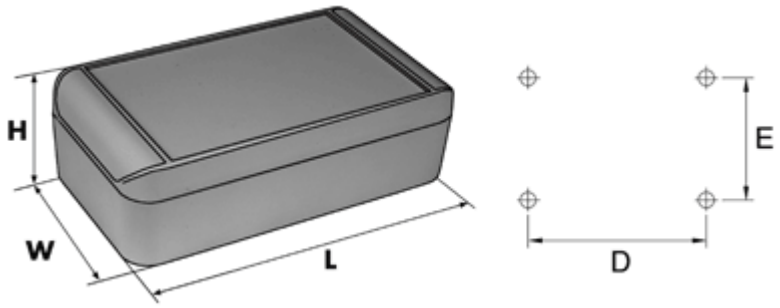


Fig. 3: Dimensions KRD8000

Dimensions

L	120mm
W	90mm
H	50mm

Mounting

D	99mm
E	34mm
Mounting Screw	3.0 – 4.5mm Ø
Screw Head Diameter	6.0 – 7.0mm Ø

7.4 WEEE and RoHS

The unit described herein is not subject to the WEEE directive and the corresponding national laws.

At the end of life forward the unit to a specialized recycling company and do not dispose it off as domestic waste.

The unit described herein fully complies with the RoHS directive.

7.5 List of figures

7.6 List of tables

7.7 Addresses

Headquarter

KEM
Küppers Elektromechanik GmbH
Liebigstraße 5
DE-85757 Karlsfeld
Germany

Tel.: +49 8131 593910
info@kem-kueppers.com
www.kem-kueppers.com

Contact

KEM Headquarter

Liebigstraße 5
85757 Karlsfeld
Germany

T. +49/8131/ 59 39 1-0
F. +49/8131/ 92 60 4

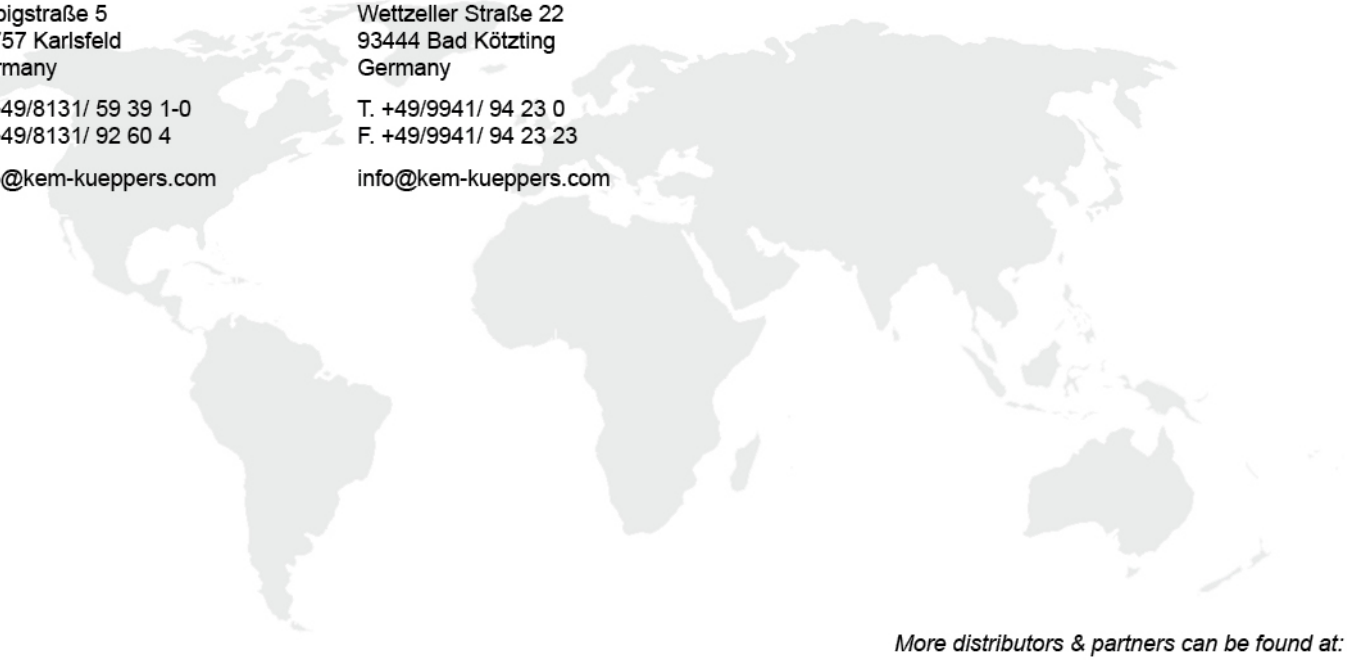
info@kem-kueppers.com

KEM Service & Repairs

Wettzeller Straße 22
93444 Bad Kötzting
Germany

T. +49/9941/ 94 23 0
F. +49/9941/ 94 23 23

info@kem-kueppers.com



More distributors & partners can be found at:
www.kem-kueppers.com

Your local partner:

www.kem-kueppers.com
info@kem-kueppers.com