Operating Manual

Digital Correlator

Correlux P2



Mess- und Ortungstechnik
Measuring and Locating Technologies

Elektrizitätsnetze
Power Networks

Kommunikationsnetze
Communication Networks

Rohrleitungsnetze
Water Networks

Leitungsortung
Line Locating

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Consultation with SebaKMT

The present system manual has been designed as an operating guide and for reference. It is meant to answer your questions and solve your problems in as fast and easy a way as possible. Please start with referring to this manual should any trouble occur.

In doing so, make use of the table of contents and read the relevant paragraph with great attention. Furthermore, check all terminals and connections of the instruments involved.

Should any question remain unanswered, please contact:

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1 Safety Advices

This manual contains basic advice for the installation and operation of the measuring system. It is essential to make this manual accessible to the authorized and skilled operator. He needs to read this manual closely. The manufacturer is not liable for damage to material or humans due to non-observance of the instructions and safety advices provided by this manual.

Locally applying regulations must be observed.

1.1 General Cautions

- Do not drop the components of the system or subject them to strong impacts or mechanical shocks.
- The limits described under Technical Data may not be exceeded.
- Do not operate the system with a voltage unequal to the specified operating voltage. Differing voltages may cause malfunction and damages of the components.
- The measuring system must be in a technically perfect condition for measurement.
- The indicated degree of protection of the correlator and the transmitters can only be ensured if plugs or the provided protection caps are put in all sockets.
- The plugs of the supplied connection cables are only compliant to the indicated degree of protection as long as they are plugged in. Plugs which are not connected or which are connected in a wrong way are not protected from water and dust ingress.
- If the O-ring seal of a socket is obviously damaged, it must be replaced in order to ensure the protection against water and dust ingress.
- Original accessories ensure safe operation of the equipment. It is not allowed and the warranty is lost if other accessories than the original ones are used with the equipment.
- Maintenance and repair must be carried out by SebaKMT or authorized service partners only.

1.2 Symbols Used in this Manual

Important instructions concerning the protection of staff and equipment as well as technical safety within this document are labelled with one of the following symbols:

Symbol	Description
 CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or material damage.
	Notes have important information and useful tips on the operation of your equipment. Non-observance may result in useless measurement results.

2 Short Manual

It is recommended to charge the accumulators of the correlator and the transmitters prior to every measurement for at least one hour, in order to ensure a trouble-free measurement.

2.1 Short Manual Transmitter (TX A / TX B)

Proceed in the following steps:

Step	Action	Control
1	Position transmitter A (orange) at place of installation 1 and fasten sensor to valve rod or hydrant.	
2	Switch on transmitter A.	
3	Position transmitter B (yellow) at place of installation 2 and fasten sensor to valve rod or hydrant.	
4	Switch on transmitter B.	

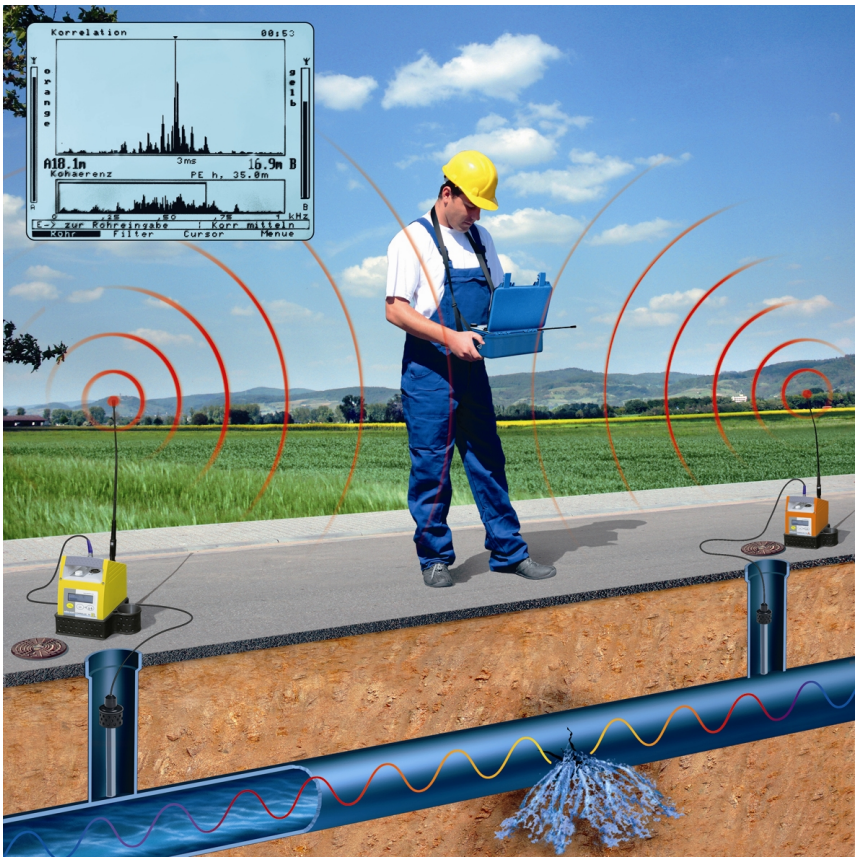
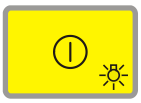
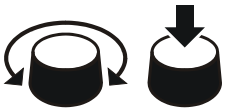
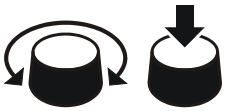


Fig 1 : **Positioning of the transmitters and fastening of the sensors**

For operation the antenna of each transmitter must be mounted.

2.2 Short Manual Correlator (DK P2)

Proceed in the following steps:

Step	Action	Control
1	Switch on.	
2	Start correlation by pressing rotary selector (ENTER).	
3	Select desired pipe material with rotary selector and confirm with ENTER.	
4	Select desired pipe diameter with rotary selector and confirm with ENTER.	
5	Enter pipe length and confirm with ENTER. Exit section menu by pressing the rotary selector once more.	
6	start of correlation	
7	Read leakage distance (it might take some minutes before a clear correlation becomes visible.)	

3 Design of the Transmitters

3.1 Controls

The transmitters TX A and TX B provide the following indicating and switching elements:

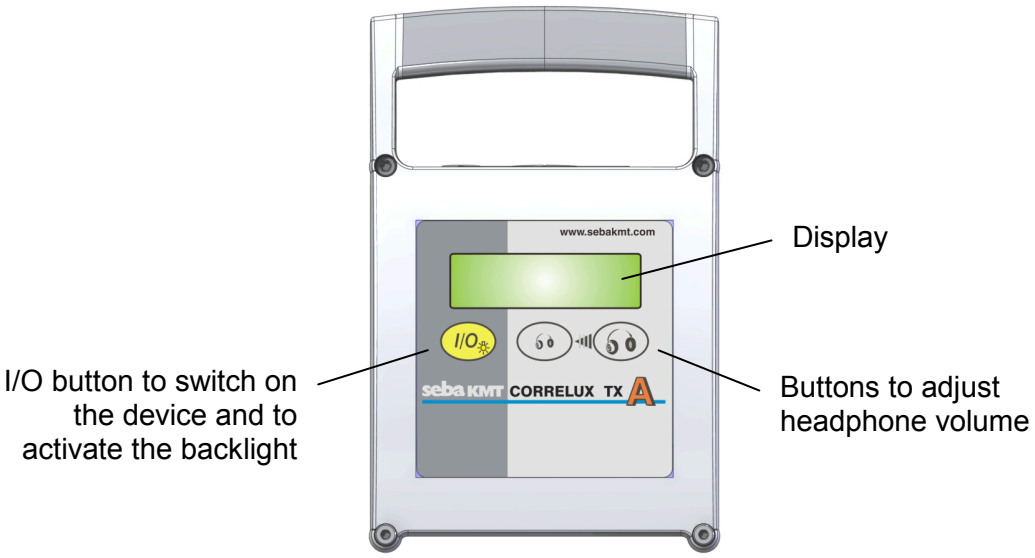


Fig 2 : Front of transmitter TX A

3.2 Connector Sockets

The transmitters provide the following connector sockets:

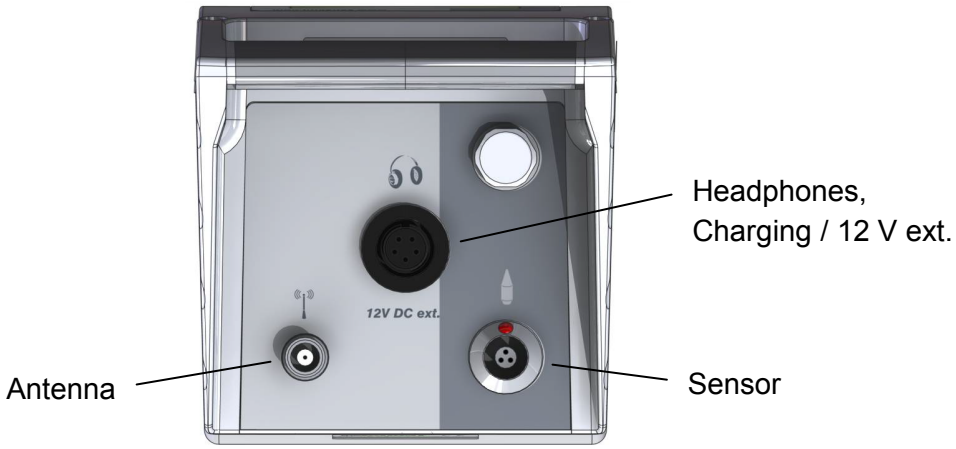


Fig 3 : Connector sockets of transmitter TX A / B

3.3 Operation

Positioning the transmitters

Position transmitter A (orange) at place of installation 1 and fasten sensor to valve mechanism or hydrant.

Position transmitter B (yellow) at place of installation 2 and fasten sensor to valve mechanism or hydrant (see Fig 1).

Switching the transmitters on

Switch on transmitter via the yellow I/O button. After activation, you first see a message about the software version and the battery capacitance. This message will disappear after approx. 3 seconds. Now the transmitter is ready for operation.

After every keystroke, the background illumination of the display will be activated for approx. 1 minute and automatically turn off afterwards.

The transmitter will automatically turn off altogether after an operation time of 2 hours.

Listening to the leak noise / Reading the displayed value

You can listen to the leak noise via the headphone jacks on both transmitters, A and B. This way, an evaluation is possible before correlation and the operator can decide whether the recorded noise can be attributed to a water leakage or some other source of noise (pump, etc.).

If necessary, the headphone volume can be adjusted using the keys on the transmitter's front panel.

In 'Auto' mode, neither the signal level transmitted by radio nor the sensitivity of the level display are influenced by the change in headphone volume.

In the transmitter's display a bar graph and a numerical value are shown:

- The bar graph represents the current noise level (Current value, dimensionless).
- The numerical value represents the lowest measured noise level since the transmitter has been switched on (Minimum value, in percent), so that simple level comparison is possible at different testing points.

4 Design of the Correlator

4.1 User Interface and Connector Sockets

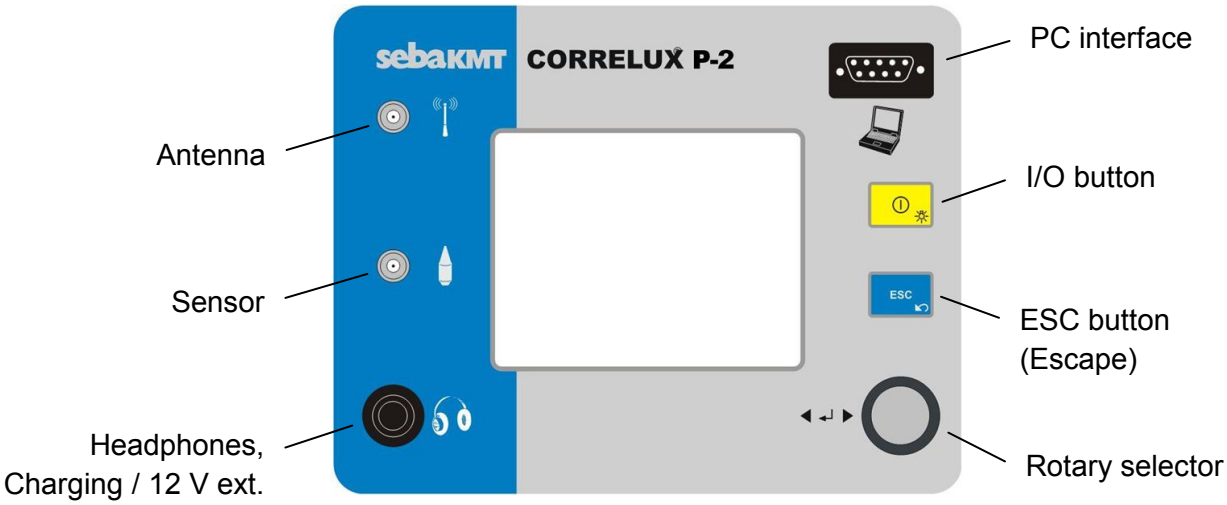
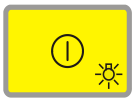


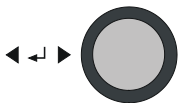
Fig 4 : User interface correlator



With the **I/O button**, the unit can be turned on / off and the background illumination is activated (stays active for 1 minute).



With the **ESC button**, (Escape) you can exit a menu or restart measurement.



By turning the **rotary selector**, the individual menu items can be selected.

By pushing the **rotary selector**, the selection is confirmed.

In the following sections of this manual pushing the rotary selector is referred to as **ENTER function**.

4.2 Operation

Switch on the correlator via the I/O button.

After activation, the welcome screen (Fig 5) appears. Various information on the sensor configuration, system configuration (date, time), battery status, software version, etc. will be displayed.

Now you can select the desired menu (turning the rotary selector) and confirm your selection (pressing the rotary selector).

After switching on, you can also adjust, if necessary, the display contrast with the rotary selector while pressing the ESC key.

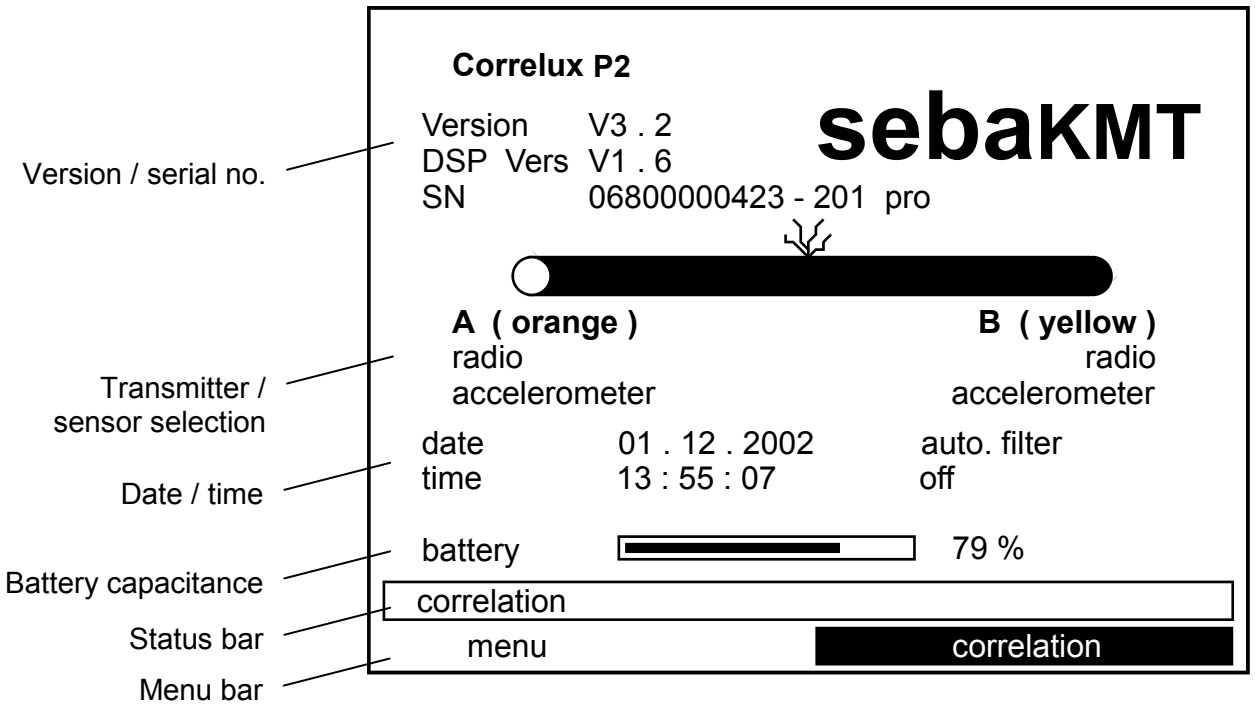


Fig 5 : Welcome screen

5 Conducting Correlation

Select the **Correlation** option from the menu bar of the welcome screen. The material selection screen appears.

Enter the pipe data as described in the following sections.

5.1 Pipe Material Selection

Select the desired pipe material from the list.

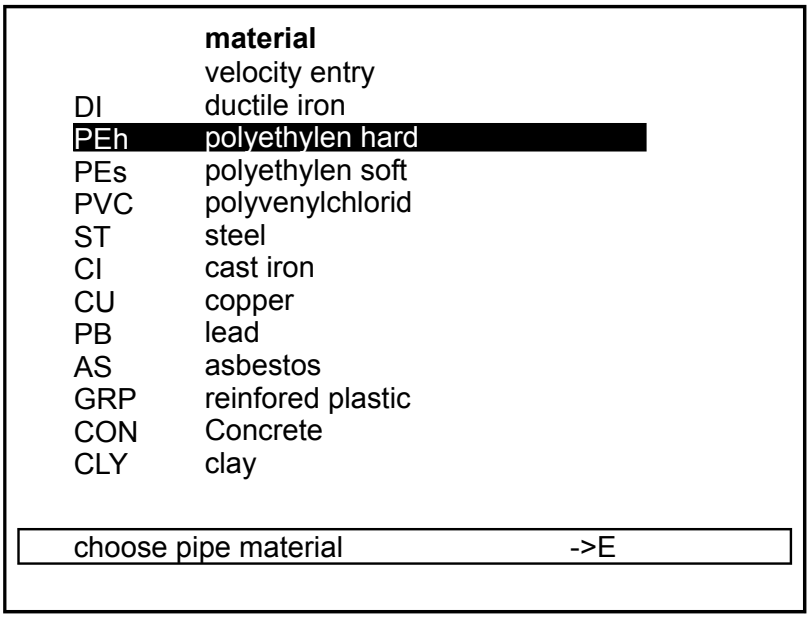


Fig 6 : Pipe material selection

Confirm your choice by pressing the rotary selector. The next selection screen appears.

When selecting the menu item **velocity entry**, you get directly to the pipe entry screen, where the sound velocity and the line length have to be entered (see Fig 8).

5.2 Pipe Diameter Selection

Select the desired pipe diameter from the list.

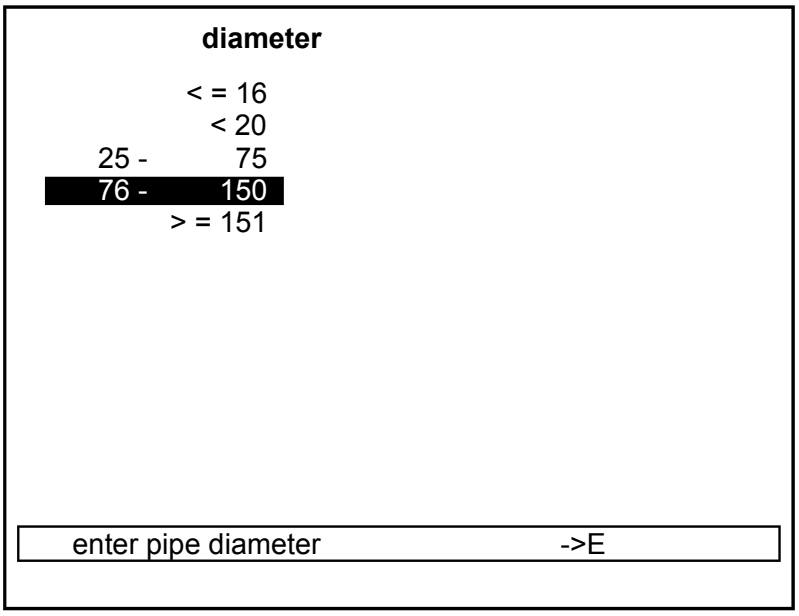


Fig 7 : Pipe diameter selection

Confirm your choice by pressing the rotary selector. The next selection screen appears.

5.3 Pipe Length Entry

Enter the length of the first pipe section by using the rotary selector.

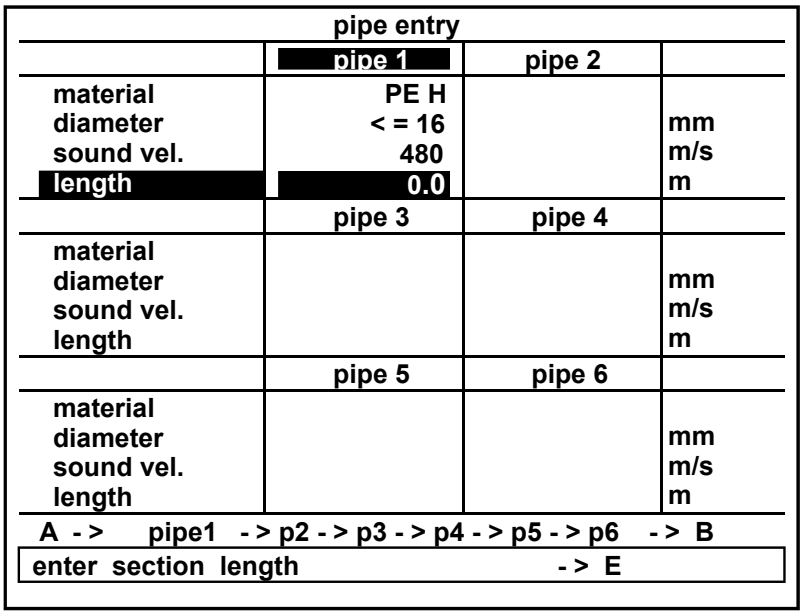


Fig 8 : Pipe entry screen with one section only

Up to 6 different pipe sections can be specified. After having entered all pipe data of one section (material, diameter, length), move on to the next field with the rotary selector in order to enter the data of the next pipe section.

In order to delete the data of a section, select the respective field and press the ESC button.

In order to finish the pipe data entry, select **Ready** from the menu bar. Correlation starts and the correlation screen is shown.

When entering mixed cable sections, always start with the section commencing with sensor A for pipe 1.

6 Correlation Screen

If a correlation is in progress, the following screen is displayed on the correlator:

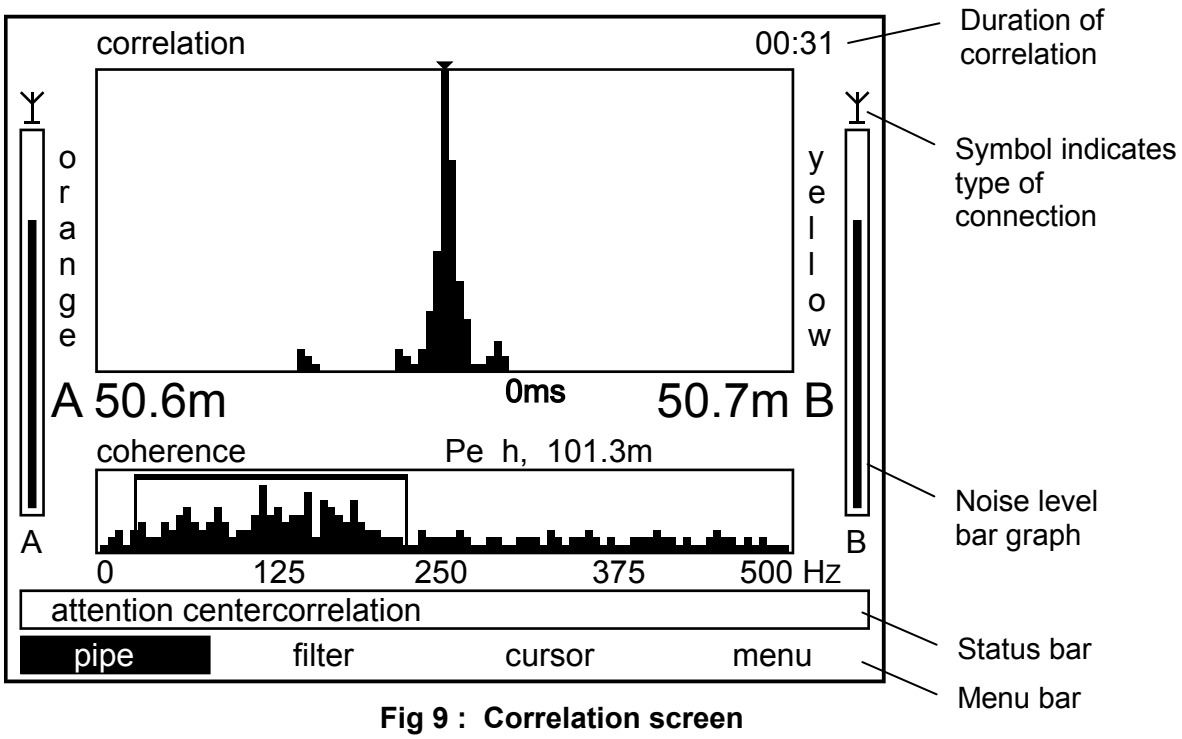


Fig 9 : Correlation screen

The following data can be read from the correlation screen:

correlation type	… correlation / auto-correlation
correlation status	… active / duration
connection symbol	… = radio = direct sensor
noise level	… transmitter A / B
radio reception	… transmitter A / B … (if 'X', then no radio reception!)
upper chart	… correlation graph
pipe data	… material / total length
	… leakage distance to transmitter A
	… leakage distance to transmitter B
lower chart	… coherence / filter selection
status bar	… informative texts
menu bar	… pipe / filter / cursor / menu

6.1 Correlation Type

Under **menu ➔ autocorrelation** you can select the type of correlation. Choose between standard **correlation** (cross correlation) and **auto-correlation**.

6.2 Correlation Status

After having started correlation by confirming the pipe length, the measurement will be activated. If the correlation is interrupted due to the activation of the rotary selector, the measurement will remain as it is. In order to restart the measurement without changing the existing test parameters (material and filter), press the ESC button. Besides the correlation status **active**, the measurement duration will be displayed.

6.3 Noise Level

You can read the noise intensity of channels A and B from the vertical bar graphs on the left and right edge of the screen.

6.4 Radio Reception

Radio reception is indicated underneath the vertical noise level bar graphs. If an **A** or a **B** is displayed, radio is active. If an **X** is displayed, radio of the corresponding channel is interrupted.

6.5 Correlogram

The upper chart shows the correlation graph. A definite maximum constant during the entire test period usually indicates a definite correlation and therefore a reliable test result. Several peaks might either be caused by several leaks or a doubtful correlation result. This happens especially when both channels transmit independent noises. If there is a leakage and if the leak noise is received by both sensors, usually there is a definite maximum peak in the correlation.

With plastic pipes, it might be necessary to wait several minutes in order to get a definite correlation result. The correlator will keep averaging the results and you can practically see the correlation maximum ‘grow’ from the graph.

With metallic pipes, you can expect a good correlation result faster due to the better transmission of the sound wave generated in the pipe by the leakage.

6.6 Pipe Data

Underneath the correlation graph, the pipe data (material and length) as well as the leak position and the delay time are displayed. With mixed pipe types, there is only the note **mix**. In order to see the parameters of the individual sections, you must select **pipe** from the menu bar.

6.7 Coherence

The display of the coherence spectrum mainly serves the effective adjustment of the filters. Coherence will be large where mutual spectral components can be found on both channels. These are spectral components contributing significantly to the correlation. Therefore the filters will be adjusted so that only the spectral components with a high level will be within the filter limits. If, for example, a sensor then records some noise, it will be filtered out and not included in the correlation calculation. In the first place, the Correlux P2 automatically sets the filters depending on the pipe material. However, if a satisfactory test result is not obtained, you should select the filter limits according to the coherence graph. Here you may be allowed to experiment somewhat.

6.8 Correlation Status Bar

The current measuring status is given in the status bar. During the correlation, the following messages may be displayed:

‘attention: correlation doubtful’

The value of the correlation maximum keeps jumping during the measurement, the correlation information is very uncertain.

‘attention: possible centre correlation’

If, for example, only one channel is received or if the same disturbing signal interferes with the leakage noise on both receivers, a correlation peak is shown in the middle between both sensors. This does not necessarily mean that there is a leakage. In this case, the system must be checked in detail. If there is no disorder, the leakage is in fact in the middle.

‘attention: leak possibly outside of field’

If there is a leakage outside of the section between sensor A and B, a correlation peak is indicated at the sensor closest to the leakage. In this case, it is not possible to say whether the leakage is directly on the sensor’s position (i.e. a defective valve) or outside. In this case, you leave the installed sensor and change the position of the second sensor (passing over the first one).

6.9 Menu Bar

On the menu bar, the following options can be selected:

pipe … section selection

filter … filter selection

cursor … place cursor

menu … return to menu screen

A / B … listen to channel A / B

These menu positions are selected by the rotary selector in a kind of loop. The cursor jumps to the above mentioned positions in circling order.

6.9.1 Pipe Option

By confirming with ENTER, you return to the pipe selection menu (see section 5.1) where you can change the pipe data (material, diameter, length). After confirmation of the pipe length, the measurement starts again.

6.9.2 Filter Option

The filters can be set in the coherence window. The filter area set during the measurement will be marked by a frame in the coherence window. All spectral components outside of this window will not be included in the calculation of the correlation.

After pressing ENTER, activate the lower cut-off frequency. Now you can select the desired position by using the rotary selector and confirm by pressing ENTER once more.

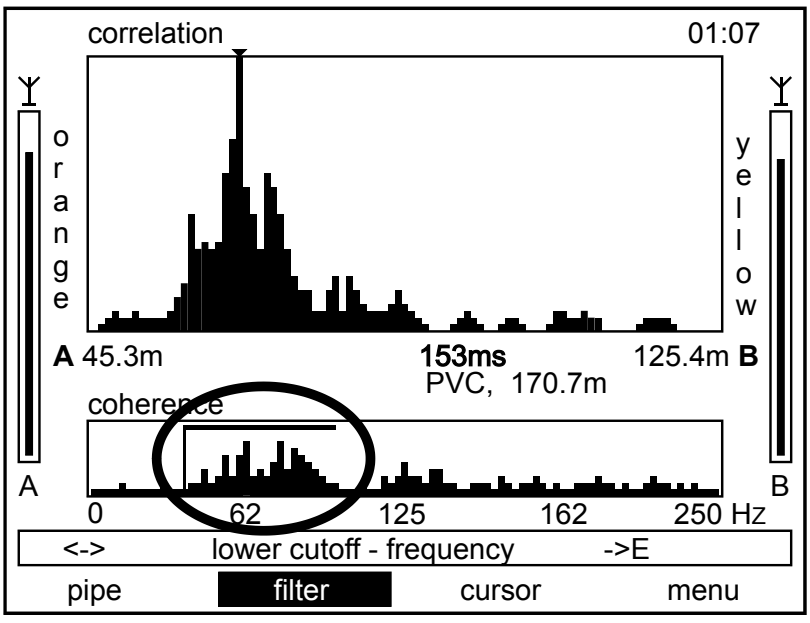


Fig 10 : Left filter

Then, the cursor for the upper cut-off frequency is activated. With the rotary selector, position the upper cut-off frequency at the desired place and confirm with ENTER. Correlation starts again.

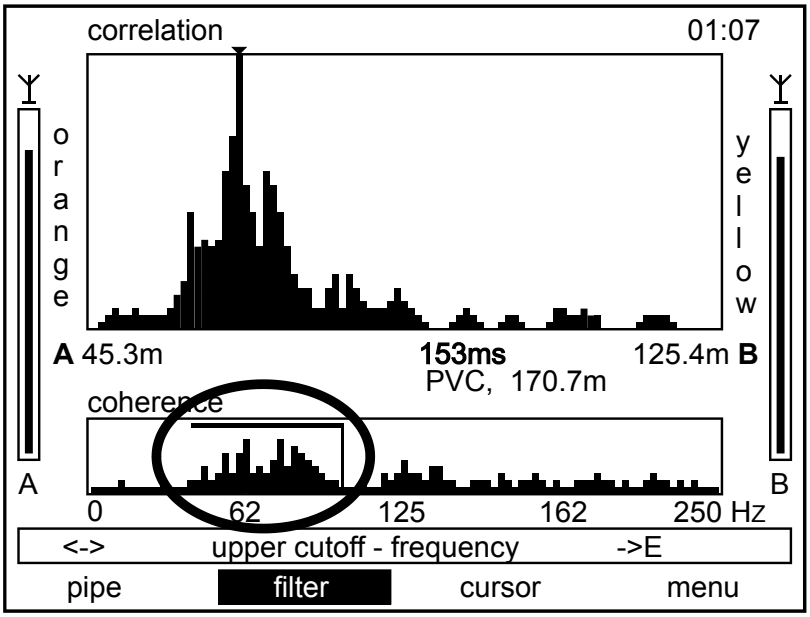


Fig 11 : Right filter

6.9.3 Cursor Option

Here, you can move the automatic cursor manually (rotary selector) in order to analyse the correlation graph. The line underneath the correlation window shows the change of the leak position distances of transmitters A and B and the delay time. Correlation continues when the new cursor position has been confirmed.

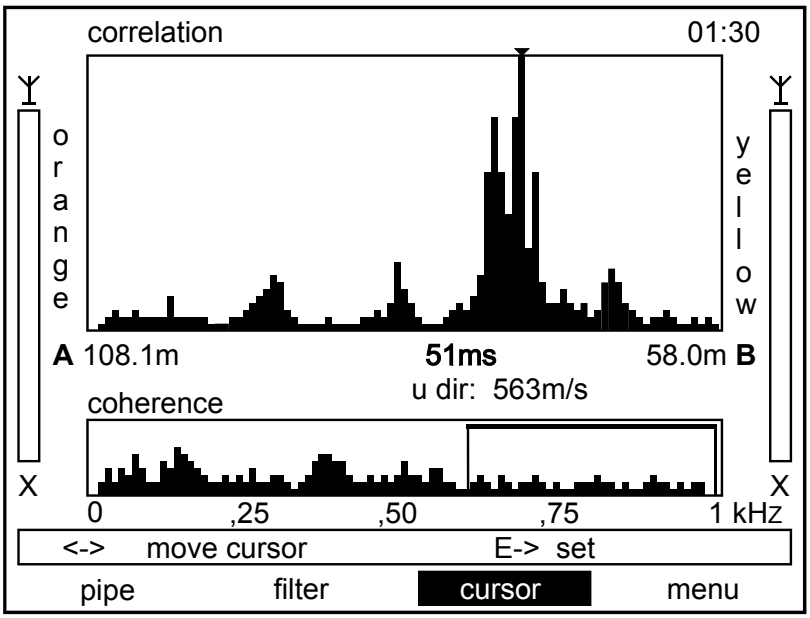


Fig 12 : Cursor position

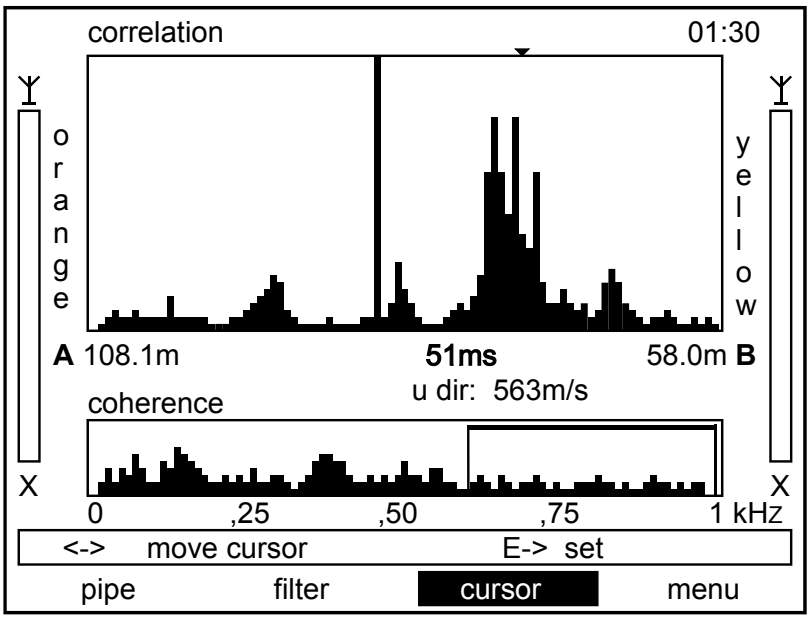


Fig 13 : Change cursor position

6.9.4 Menu Option

Here you get back to the main menu.

6.9.5 Listening to Channel A / B

In order to listen to the different transmitters, connect the headphone and select **A** or **B** with the rotary selector. Via ENTER, the selected transmitter is marked in black. Now you receive only this channel as a mono-signal on both ear-pieces and the volume can be adjusted with the rotary selector. By pressing ENTER once more, both channels can be heard again. The selected volume works for both channels.

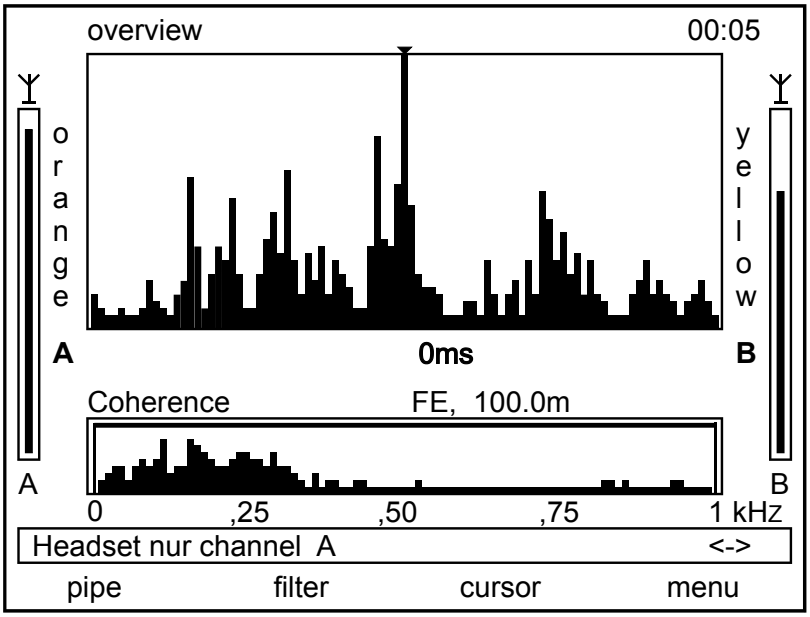


Fig 14 : Listening to channel A

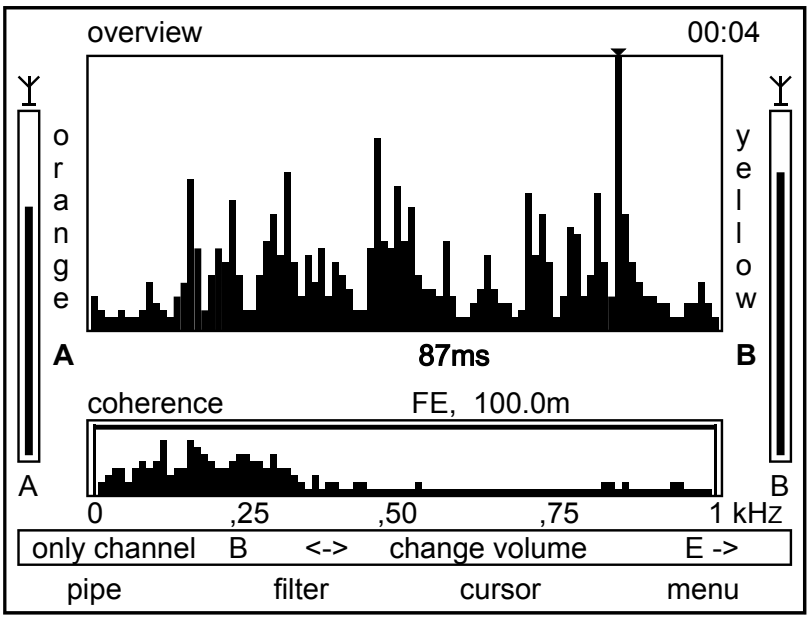


Fig 15 : Listening to channel B

7 Main Menu

If you select **menu** from the menu bar of the welcome screen, you get access to the **main menu** of the correlator.

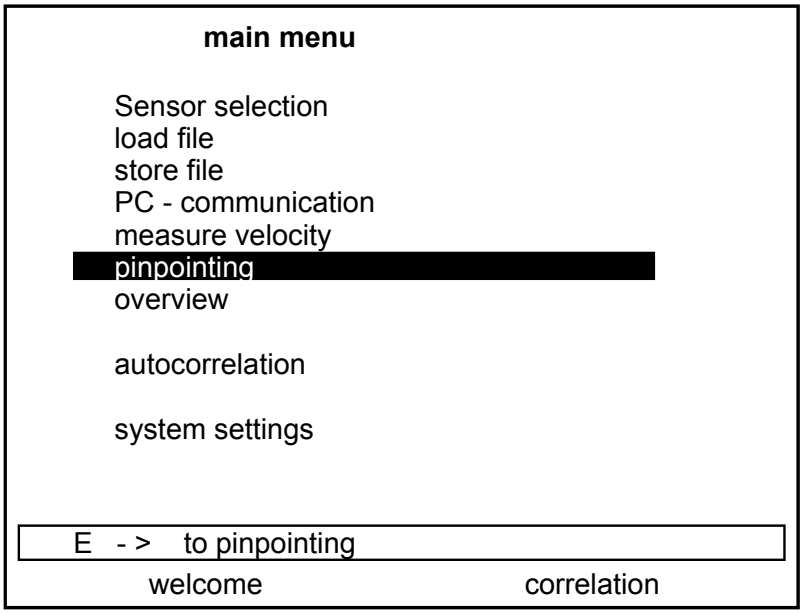


Fig 16 : Main menu screen

The following options can be selected in the **main menu**:

sensor selection … selecting sensor and type of connection
load file … displaying a stored graph
store file … storing a measurement
PC communication … transmitting all stored graphs to a PC
measure velocity … determining sound velocity by measurement
pinpointing … listening to leak noise using a ground microphone
overview … checking for leakage in the recorded area
autocorrelation … selecting manual or automatic correlation
system settings … adjusting date, time, auto-shut-off time etc.

7.1 Selecting Sensor / Type of Connection

Select **sensor selection** from the menu. The following options are available:

- correlation with two radio transmitters (both on ‘radio’)
- one radio channel and one sensor connected to the direct input of the correlator (one channel on ‘radio’, the other one on ‘direct’)

Connection variants:

	Channel A (orange)	Channel B (yellow)
Option 1	Radio	Radio
Option 2	Radio	Direct
Option 3	Direct	Radio

Select and confirm the desired combination using the rotary selector.

Either standard sensors (accelerometer) or hydrophones may be used.

Hydrophones allow direct contact between the sensor and the water outlet.

Advantage: Improved correlation performance in case of bad sound propagation, e.g. with long plastic pipes or with low operating pressure.

Disadvantage: Measurement only possible on hydrants or in places with direct access to the water outlet.

Sensor variants:

	Channel A (orange)	Channel B (yellow)
Option 1	Sensor	Sensor
Option 2	Sensor	Hydrophone
Option 3	Hydrophone	Sensor
Option 4	Hydrophone	Hydrophone

Select and confirm the desired combination using the rotary selector.

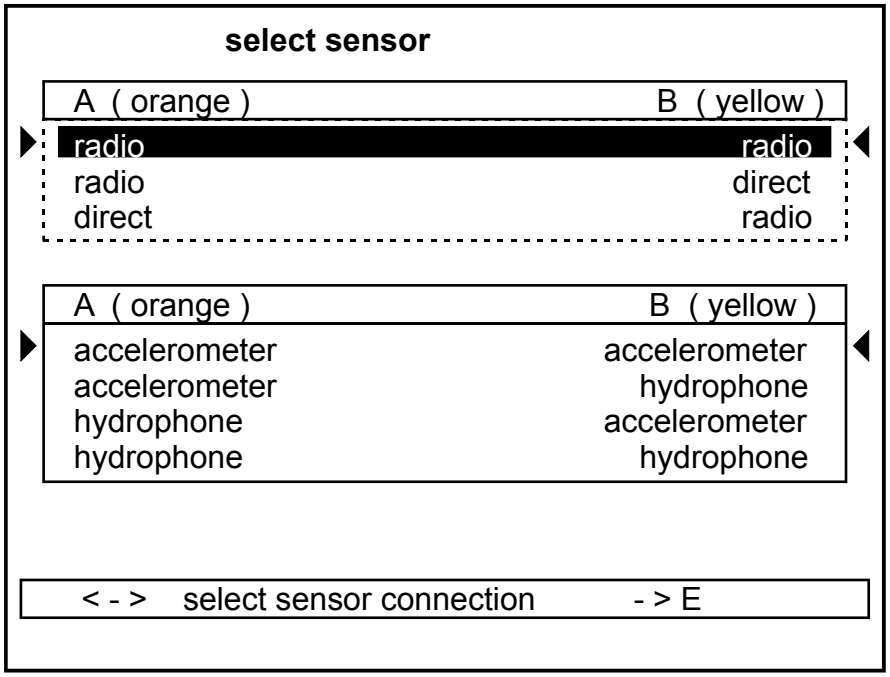


Fig 17 : Connection selection

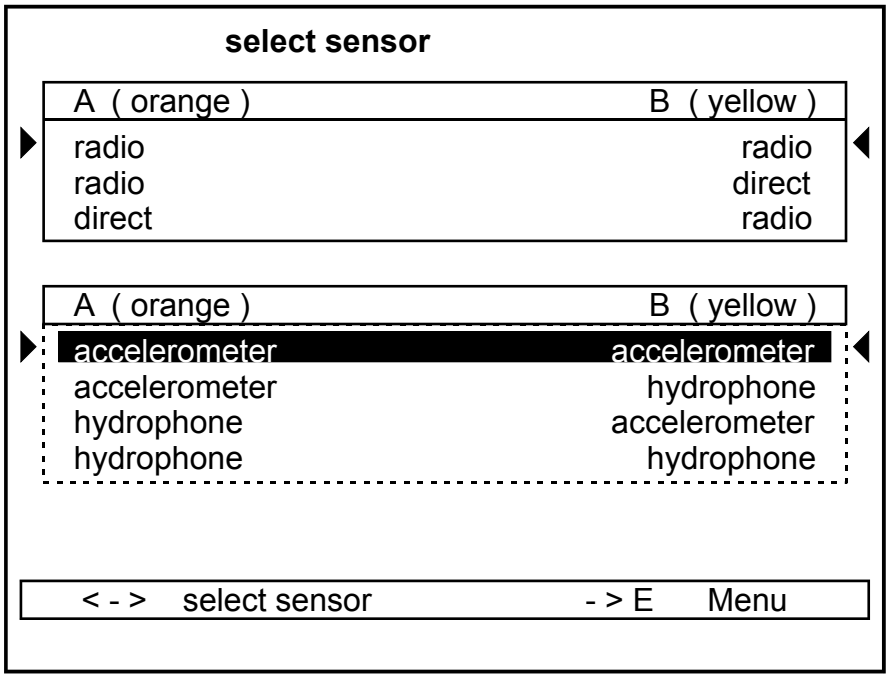


Fig 18 : Sensor selection

The current selection can be read on the welcome screen.

7.2 Loading / Saving a Graph

These functions are only available in the ‘Standard’ and ‘Pro’ version.

7.2.1 Load File Option

Select **load file** from the menu. Here you can load one out of up to ten stored graphs in order to re-analyse a measurement or compare it with the current measurement.

Measuring parameters such as pipe data and filter settings are saved together with the graph. After having stored the graph, you get to the pipe selection menu by pressing ENTER where you can make a new measurement with the same parameters via **ready**.

7.2.2 Store File Option

Select **store file** from the menu. Up to ten measurements including all data and comments of up to 32 characters can be saved here.

Confirm with ENTER, select the desired characters for your comment from the displayed font, and press ESC to finish the comment input. Then select the location (M1 to M10), where the recorded graph shall be stored. The status bar will show the note **storing data**. As soon as this information will have disappeared, you can continue the operation.

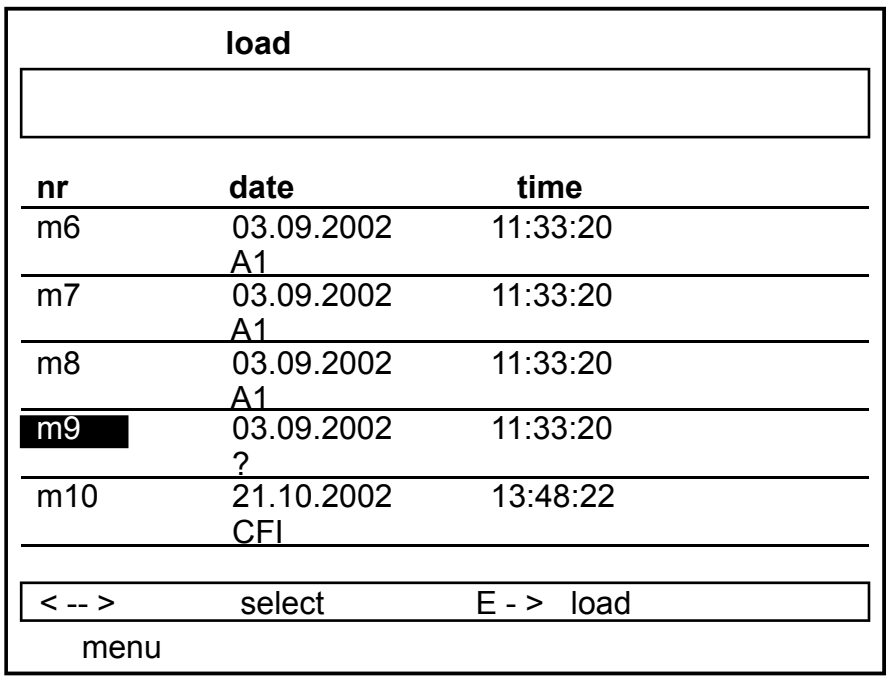


Fig 19 : Loading a graph

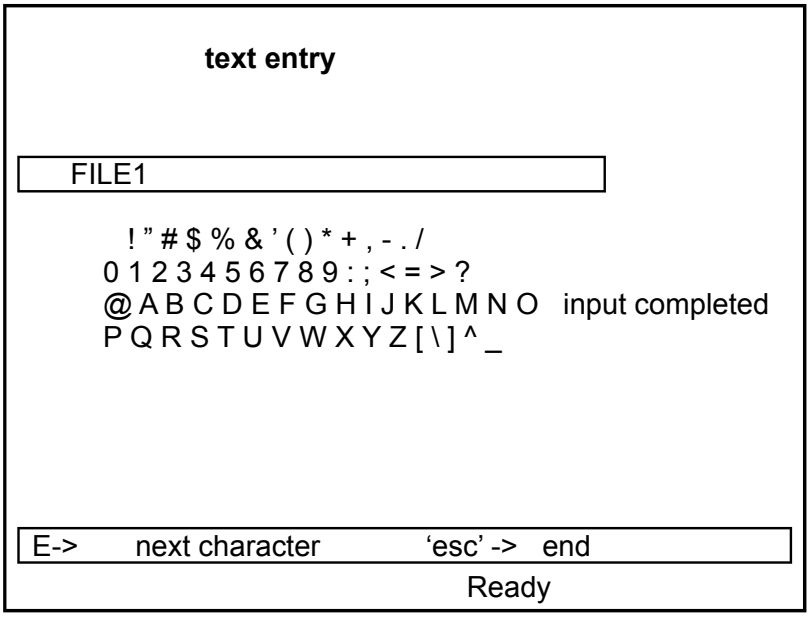


Fig 20 : Storing a graph

7.3 Transfering Measurement Data to a PC

These functions are only available in the 'Standard' and 'Pro' version.

Here you can transmit the stored data to a PC via the serial interface. The software 'CorreluxView' (included in the versions 'Standard' and 'Pro') enables you to catalogue, edit and print your measurements.

First connect the correlator to your PC via the serial cable. Then set your PC to the used interface under **Configuration**.

Select **data transfer** from the menu of your PC. Then you are asked to start the data transfer on the correlator.

In the correlator main menu, select **PC communication**. The **Send** option appears on the menu bar. Select it and confirm with ENTER. The correlator display then shows all graphs one by one. At the same time, a status bar appears on the PC screen. The transfer takes only a few seconds. The transferred data can be edited on the PC immediately. The data will remain in the correlator after the transfer.

7.4 Determining Sound Velocity of a Pipe

Especially when dealing with pipes of unknown material and characteristics, velocity measurements are essential for an exact correlation result.

In order to measure the velocity, an ‘artificial leakage’ has to be created either inside or outside of a pipe section, e.g., above a hydrant. If the distance between the sensors and the leakage is known, the correlator automatically calculates the sound velocity. This value will be used for the subsequent leak location correlation.

Place both sensors on suitable measuring points and open the ‘artificial leakage’.

On the correlator, select **measure velocity** from the menu. Then select whether the noise source is inside or outside the sensors and enter the corresponding distances.

Noise source outside of sensors

Enter the distance between the two sensors and confirm with ENTER. Measurement will start.

Noise source between the sensors

Enter the distance from sensor A to the noise source and the total length between sensors A and B and confirm with ENTER. Measurement will start.

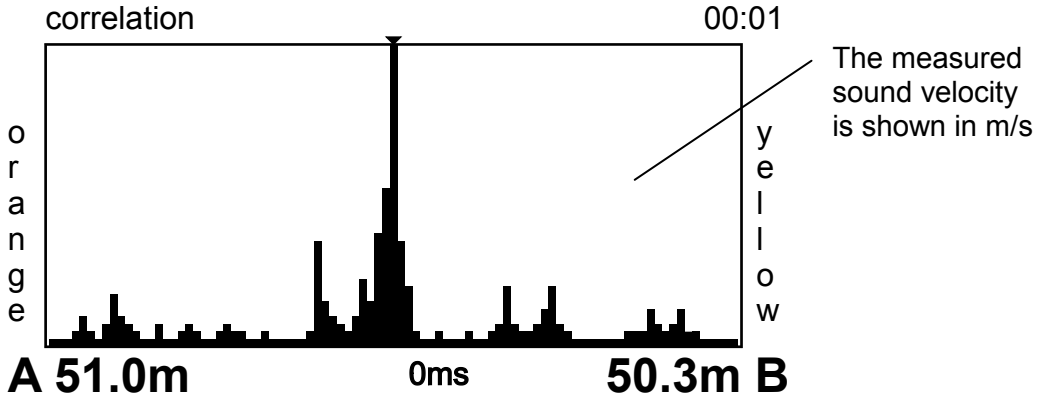


Fig 21 : Sound velocity measurement

The sound velocity value obtained is automatically transferred to the **pipe menu** by pressing ENTER.

7.5 Pinpointing

This function is only available in the ‘Pro’ version.

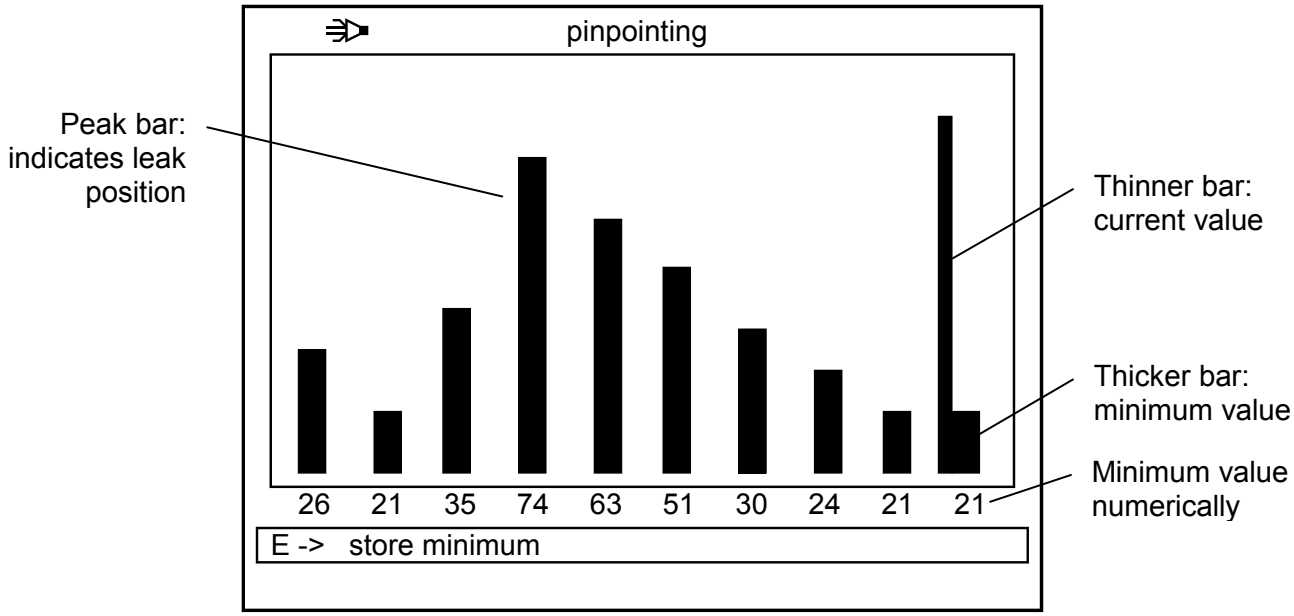


Fig 22 : Pinpointing

‘Pinpointing’ enables you to find leaks already located by correlation and to pinpoint them along the pipe path. This way you use the Corrrelux P2 like a simple leak detector. Of course, you will not carry out pinpointing along the entire path, but only in the area around the leakage established via correlation.

Place the sensor on the ground microphone adapter provided for that purpose and plug the cable into the sensor socket of the correlator.

In the menu, select **pinpointing** and confirm with ENTER.

The correlator automatically switches to the direct sensor input and shows the menu item **pinpointing**. In order to avoid unpleasant noises when placing the microphone, the headphone is still in a mute position (the display shows a flashing loudspeaker symbol with an X).

Place the microphone on the first measuring point of the pipe path and press ENTER.

Now you can hear the recorded noise on the headphone. The volume can be adjusted by using the rotary selector. However, this setting does not influence the level display.

Two vertical bars and a numerical figure appear. The slimmer bar on the left shows the current noise level, the thicker one on the right shows the lowest noise level of the current measurement (minimum value). This minimum value will also be shown as a numerical value beneath the bar.

As it can be assumed that leaks cause constant noise (base level) and that all other interfering noises will be superimposed, only the lowest level at a measuring point is relevant for leakage location. Therefore the minimum value is of vital importance: you do not have to remember the lowest level at a given time without any interfering noise (traffic, etc.) – the correlator will do that for you.

Now, press ENTER again and move the microphone approx. 1 m further along the pipe path. After having placed the microphone on the ground, press ENTER once more. The next bar appears and the minimum value will be calculated again. Wait again for a certain time until the minimum value has settled. Then move the microphone again, etc.

Should a maximum of the minimum reading appear in the course of the measurements along the pipe path, the measuring point would mark the leakage right there.

Standardising to ground level

In order to obtain optimum resolution in the case of high ground noise level (traffic, wind, etc.), the display can be standardised to the ground level. When starting to measure far from the assumed position of leakage, but with a high ground noise level, simply press the rotary selector for more than two seconds during measurement. The minimum value measured at this point will be deducted from all following measurements. This will give you a bigger display range - and therefore a better resolution - for the remaining level array above the ground noise level.

7.6 Performing an Overview Measurement

When carrying out pipe network controls, the overview measurement serves to get a quick overview of the connected pipe network section. The purpose of the overview measurement is not an exact calibration of the leakage, but just to establish if there is a leakage at all. The procedure is similar to normal correlation, but the distance between the sensors only has to be entered approximately.

If the overview measurement shows a clear maximum, normal correlation has to be carried out in this pipe section to locate the fault.

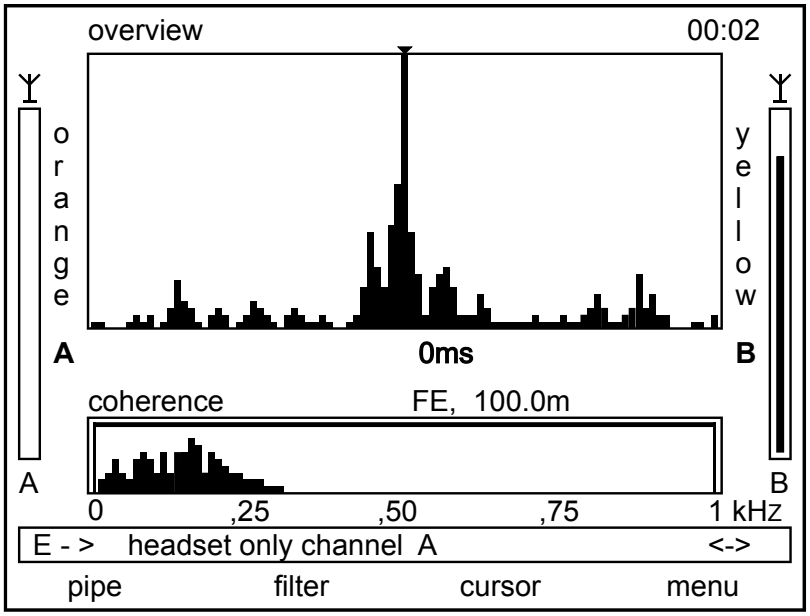


Fig 23 : Overview measurement

The distance to the cursor position is not indicated during overview measurement. From the position of the correlation you can see whether the leak is closer to transmitter A or B.

7.7 Selecting Type of Correlation

Select **autocorrelation** from the menu. Here you have the chance to deactivate the 'normal' correlation (cross correlation) and activate **auto-correlation** instead.

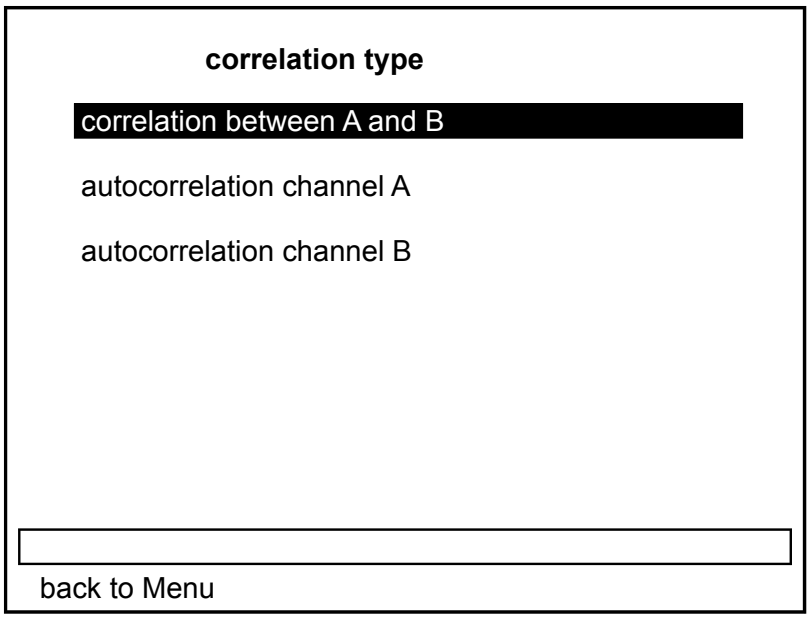


Fig 24 : Correlation type selection

Normal correlation always provides best results, but in the case of a pipe with only one point of connection (dead end, etc.) you can still take a measure by means of auto-correlation if the leakage is between the point of connection and the end of the pipe. In this case the leakage noise is reflected straight to the sensor and in addition from the end of the pipe to the sensor with a time delay. This 'echo' also allows to correlate the distance to the leakage.

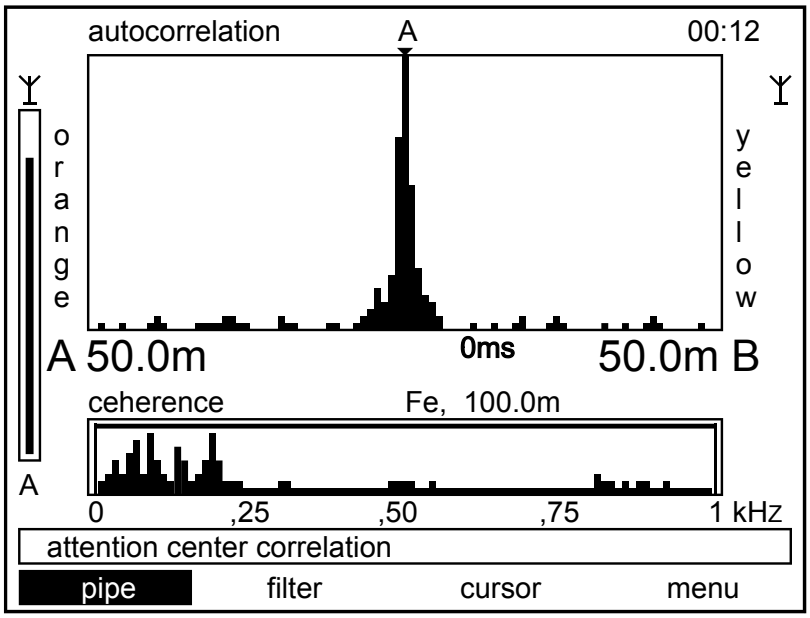


Fig 25 : Auto-correlation

8 System Settings Menu

In order to get access to the system settings menu of the correlator, select **menu** from the menu bar of the welcome screen and then **system settings** from the main menu list.

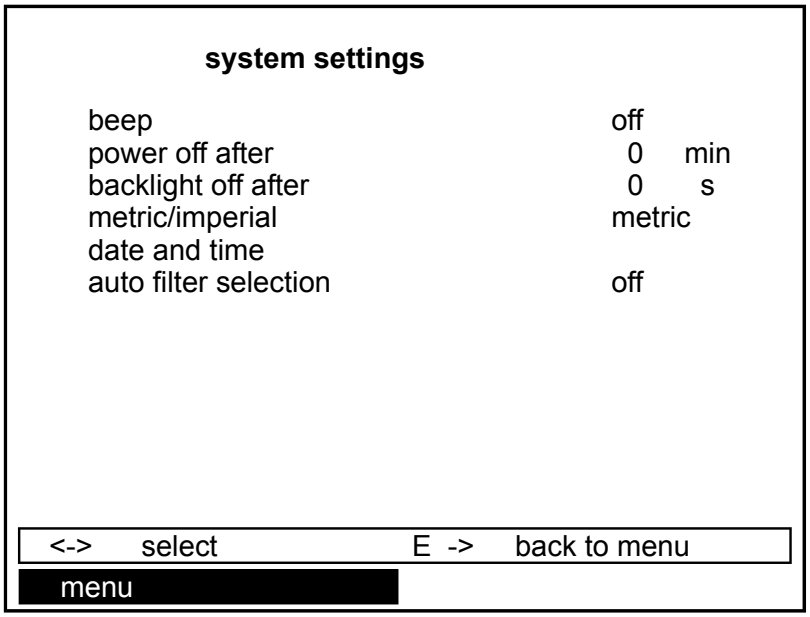


Fig 26 : System settings screen

The following options are available under **system settings**:

beep … switching beep sound on / off

power off after … adjusting time till automatic switch-off

backlight off after … adjusting duration of illumination

metric / imperial … changing the units

date and time … adjusting system date and time

auto filter selection … switching the automatic filter selection on / off

8.1 Enable / Disable Beep Sound

Select **beep** from the menu. Here you can switch the beep sound on / off which sounds after each entry.

8.2 Automatic Switch Off

Select **power of after** from the menu. Select and confirm the time after which the correlator shall switch off automatically. If you select **0**, the correlator does not shut off automatically.

8.3 Adjusting Backlight Duration

Select **backlight off after** from the menu. Select the duration (in seconds) the display shall stay illuminated after the last entry. When set to **0**, the illumination stays on permanently.

8.4 Selecting Type of Units

Select **metric / imperial** from the menu. Select and confirm if metric or imperial units shall be used.

8.5 Adjusting System Date / Time

Select **date and time** from the menu. Set the system date and time. Both are shown on the welcome display and recorded together with the stored measurements.

8.6 Selecting Type of Filter Selection

Select **auto filter selection** from the menu. You can choose between manual and automatic filter selection.

Normally the automatic selection is used. With mixed pipe sections, the full band width is automatically selected.

9 Troubleshooting

Possible failure:

The correlator may freeze during operation and may not be operable anymore.

Solution:

Press the rotary selector, the ESC button and, finally, the I/O button at the same time. As a result the correlator is reset. If now the bootloader menu appears on the display, the I/O button has to be pressed again in order to restart the unit. Afterwards, the correlator should work properly again.

Possible failure:

After the correlator has been reset, the operating language has changed from the language lastly set to English.

Solution:

Switch the device off. During the next restart keep the rotary selector pressed.

Possible failure:

A reset of the correlator cannot be performed.

Solution:

Charge the correlator's batteries for at least one hour. Then the reset should be possible.

10 Charging

The whole system can be charged while the correlator and the transmitters are stored in the closed transport case via AC mains adapter or car adapter (‘Standard’ and ‘Pro’ version only).

The single units can also be charged and operated connected to an external 12 V source via their headphone sockets (see Fig 4 and Fig 3).

The batteries cannot be overcharged as long as the supplied charger is used.

The batteries will perform best after they have been fully charge and discharge a few times.

It is normal for batteries to gradually wear down and require longer charging times. If you notice a change in your battery life, it is probably time to purchase a new battery.

New batteries or batteries stored for a long time may take more time to charge. Leaving them in a low charge condition, will also cause unnecessary ageing.

11 Technical Data

11.1 Correlator

The correlator (DK P2) is specified by the following technical parameters:

Processor:	RISC Processor for user interface DSP Processor for signal processing
Display:	320x240 Pixel, ¼-VGA monochrome
Data input:	Rotary selector with ENTER function
Memory:	10 measurements (incl. comments)
Power supply:	internal: rechargeable NiMH batteries, external: 12 V DC (power supply or car adapter)
Operating time:	>18 h
Charging time:	< 3 h
Interfaces:	RS232 (updates, data transfer, printing using the PC software)
Connections:	Sensor / hydrophone, antenna, headphone / charger
Degree of protection:	IP 67 (as long as plugs or protection caps are put in all sockets)
Operating temperature:	-20°C to +50°C
Dimensions:	270 x 130 x 240 mm
Weight:	3.3 kg

11.2 Transmitters

The transmitters (TX A / TX B) are specified by the following technical parameters:

Display:	LCD, 2 x 16 characters
Indication:	Battery status, noise level, device status
Buttons:	On / Off, illumination, volume adjustment
Radio frequency:	433 MHz
Transmitter power:	<500 mW **Note:** **Please observe the radio regulations of the respective country for operation.**
Operating time:	>15 h
Charging time:	< 3 h
Power supply:	internal: rechargeable NiMH batteries; external: 12 V DC (power supply or car adapter)
Interfaces:	Sensor / hydrophone, antenna, headphone / charger
Degree of protection:	IP 67 (as long as plugs or protection caps are put in all sockets)
Operating temperature:	-20°C to +50°C
Dimensions:	115 x 115 x 180 mm (without antenna)
Weight:	ca. 0.8 kg

11.3 Sensors

The sensors (PAM CORR) are specified by the following technical parameters:

Sensors:	Piezo sensor with active amplifier
Connecting cable:	Highly flexible silicon cable
Adapter:	Magnetic adapter
Operating temperature:	-20°C bis +50°C
Dimensions:	38 x 78 mm
Weight:	0.4 kg

12 Scope of Delivery

Depending on the equipment version the following components and accessories are included in the scope of delivery:

Correlux		P2 Basic	P2 Standard	P2 Pro
Correlator	DK P-1	✓	✓	✓
Transmitter	TR A	✓	✓	✓
Transmitter	TR B	Option	✓	✓
Piezo sensor	PAM Corr	2x	2x	2x
Headphone	KR 22-5	✓	✓	✓
Battery charger	LG P-1	✓	✓	✓
Transport case	CPK 1	Option	✓	✓
Hydrophone	PAM Hydro	Option	Option	Option
Car adapter	LK 13	✓	✓	✓
Adapter cable Battery charger	LK 15	✓	✓	✓
Ground microphone adapter	PAM Corr-A	--	--	✓
Valve adapter	AD S-20	Option	Option	✓
Valve adapter	AD S-42	Option	Option	✓
Extension rod	VST T-1	Option	Option	✓
PC software	CorreluxView		✓	✓
Serial cable	502-02-6105		✓	✓
Manual		✓	✓	✓

The three equipment versions provide the following additional functions:

Expanded Functions	P1 Basic	P1 Standard	P1 Pro
Listening	✓	✓	✓
Graph storage		✓	✓
Pinpointing			✓

13 ‘CorreluxView‘ PC Software

On the following pages, the software package ‘CorreluxView’ belonging to the correlator Correlux P2 is explained to you. This software only works together with the Correlux versions ‘Standard’ and ‘Pro’, but not with the ‘Basic’ version.

13.1 Installation

Start the ‘setup.exe’ file on the installation CD and follow the instructions. The program will then be installed on your computer.

13.2 Program Start

Either double click on the ‘CorreluxView’ icon on your desktop or start via

Start ➔ Programs ➔ Correlux ➔ CorreluxView.

The help file can be reached under **Start ➔ Programs ➔ Correlux ➔ CorreluxHlp.pdf**.

After the program start, the following screen appears:

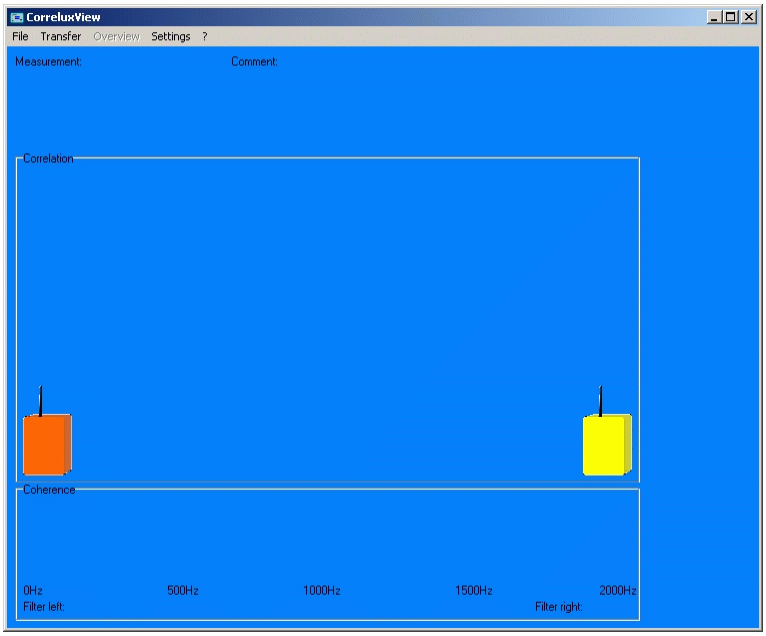


Fig 27 : Initial screen CorreluxView

13.3 Settings

In order to use the software together with the correlator, you have to connect the correlator to an empty serial port of your PC using the supplied cable and then select the used port under the menu item **Settings**.

13.4 Operating Language

The operating language can be set in the initial screen. The setting will be stored for the next program start.

13.5 Data Transfer from Correlator to PC

Click on the menu item **Data Transfer**. The following window appears:



Fig 28 : Data transfer window

On the correlator, select **Menu** and the menu item **PC Communication**. Then select **Send** and confirm once again with ENTER.

The data transfer starts automatically and the status bar shows the progress of the transfer in the above illustrated transfer window. As a rule, all of the 10 graphs stored in the correlator are transferred. If the status bar is not visible, the connection between the PC and the correlator might not be correct or the wrong port might have been selected. When the transfer is complete, the first graph appears on the screen.

13.6 The Main Screen

The main screen is divided as follows:

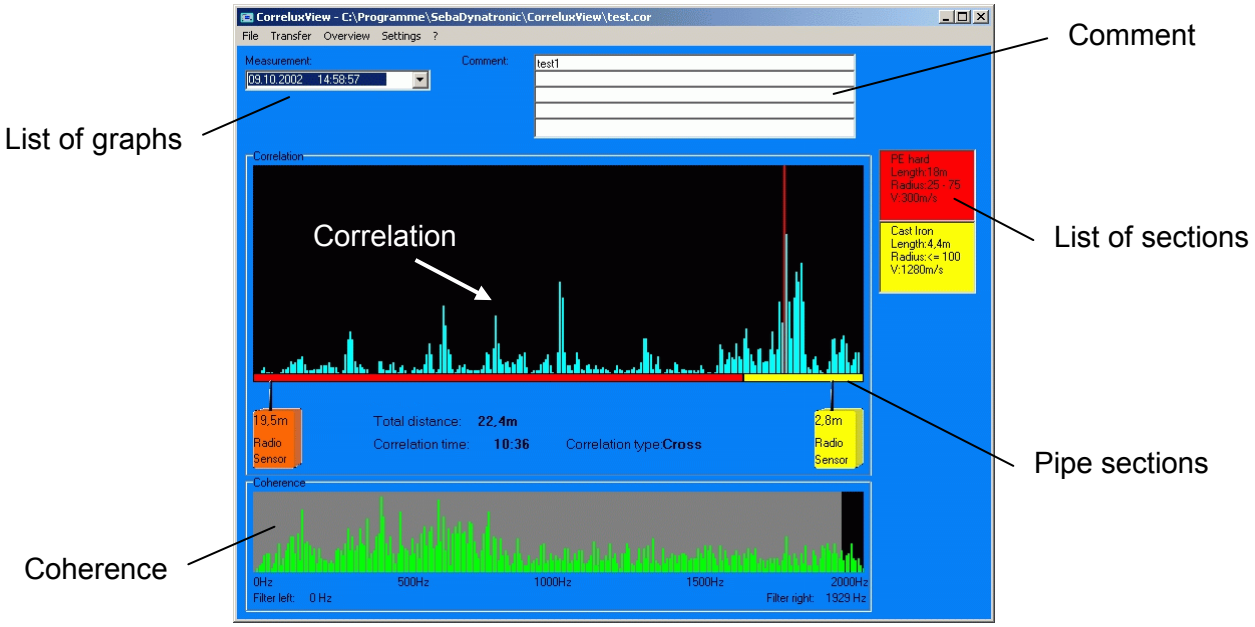


Fig 29 : Main screen

List of graphs:

By clicking on the arrow on the right side, a drop-down-menu with a list of all of the 10 graphs opens. The order corresponds to the storage places in the correlator. Date and time of the stored graphs are shown.

Correlation:

Display of the correlation graph. By clicking in the window, the cursor line can be shifted. This causes a change of the position data in the two ‘transmitters‘ beneath the correlation window.

Coherence:

Display of the coherence spectrum. The surface marked in light gray shows the selected filter area.

Pipe sections:

With mixed pipe types, the individual pipe sections are marked beneath the correlation window. In the list of sections, the corresponding sectional information is displayed.

Comment:

In the top line of the comment fields, the comment entered in the correlator is displayed. In this field, just like in the other comment fields, any comments may be entered. These will be stored together with the data record and also appear on the printout.

13.7 Storing the Data on the PC

In order to store the transferred data record, simply select **File ➔ Store** and store the data record under a corresponding file name. The stored graphs can be loaded again with **File ➔ Load**.

13.8 Overview of the Graphs

In order to obtain a graphical overview of the stored graphs, select the menu item **Overview**. The following window appears:



Fig 30 : Overview of the graphs

You see all 10 correlation graphs of the current data record with date, time and contents of the first comment line. When clicking on one of the graphs, this graph will be displayed in the main window with all data.

13.9 Configuring the Printout

If the name and the logo of your company shall appear on each printout, select **Settings ➔ User**. The following window appears:



Fig 31 : Adaptation of the printout

Enter the company's name into the **User Name** field.

Click on the **Change** button in order to import an image file of your company's logo to the software.

Confirm the changes with **OK**.

13.10 Printout

Select **File ➔ Print** in order to print the current correlation graph.

The print preview is displayed on the screen.

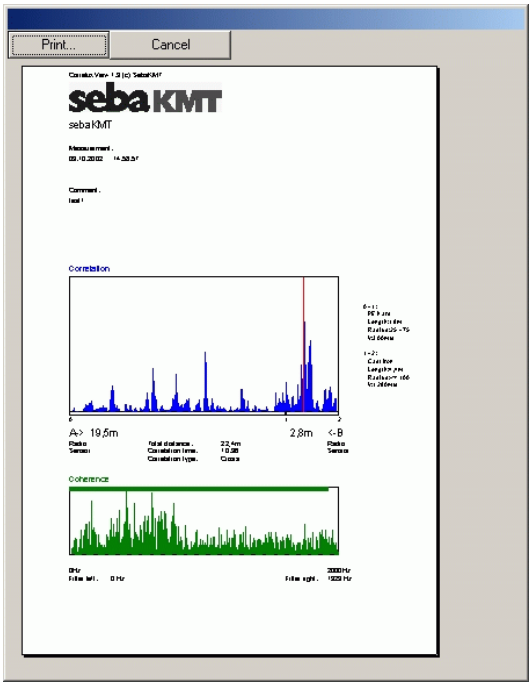


Fig 32 : Print preview



Tento symbol indikuje, že výrobek nesoucí takovéto označení nelze likvidovat společně s běžným domovním odpadem. Jelikož se jedná o produkt obchodovaný mezi podnikatelskými subjekty (B2B), nelze jej likvidovat ani ve veřejných sběrných dvorech. Pokud se potřebujete tohoto výrobku zbavit, obraťte se na organizaci specializující se na likvidaci starých elektrických spotřebičů v blízkosti svého působiště.



Dit symbool duidt aan dat het product met dit symbool niet verwijderd mag worden als gewoon huishoudelijk afval. Dit is een product voor industrieel gebruik, wat betekent dat het ook niet afgeleverd mag worden aan afvalcentra voor huishoudelijk afval. Als u dit product wilt verwijderen, gelieve dit op de juiste manier te doen en het naar een nabij gelegen organisatie te brengen gespecialiseerd in de verwijdering van oud elektrisch materiaal.



This symbol indicates that the product which is marked in this way should not be disposed of as normal household waste. As it is a B2B product, it may also not be disposed of at civic disposal centres. If you wish to dispose of this product, please do so properly by taking it to an organisation specialising in the disposal of old electrical equipment near you.



Този знак означава, че продуктът, обозначен по този начин, не трябва да се изхвърля като битов отпадък. Тъй като е B2B продукт, не бива да се изхърля и в градски пунктове за отпадъци. Ако желаете да извърлите продукта, го занесете в пункт, специализиран в изхвърлянето на старо електрическо оборудване.



Dette symbol viser, at det produkt, der er markeret på denne måde, ikke må kasseres som almindeligt husholdningsaffald. Eftersom det er et B2B produkt, må det heller ikke bortskaffes på offentlige genbrugsstationer. Skal dette produkt kasseres, skal det gøres ordentligt ved at bringe det til en nærliggende organisation, der er specialiseret i at bortskaffe gammelt el-udstyr.



Sellise sümboliga tähistatud toodet ei tohi käidelda tavalise olmejäätmena. Kuna tegemist on B2B-klassi kuuluva tootega, siis ei tohi seda viia kohalikku jäätmekäitluspunkti. Kui soovite selle toote ära visata, siis viige see lähimasse vanade elektriseadmete käitlemisele spetsialiseerunud ettevõttesse.



Tällä merkinnällä ilmoitetaan, että kyseisellä merkinnällä varustettua tuotetta ei saa hävittää tavallisen kotitalousjätteen seassa. Koska kyseessä on yritysten välisen kaupan tuote, sitä ei saa myöskään viedä kuluttajien käyttöön tarkoitettuihin keräyspisteisiin. Jos haluatte hävittää tämän tuotteen, ottakaa yhteys lähimpään vanhojen sähkölaitteiden hävittämiseen erikoistuneeseen organisaatioon.



Ce symbole indique que le produit sur lequel il figure ne peut pas être éliminé comme un déchet ménager ordinaire. Comme il s'agit d'un produit B2B, il ne peut pas non plus être déposé dans une déchetterie municipale. Pour éliminer ce produit, amenez-le à l'organisation spécialisée dans l'élimination d'anciens équipements électriques la plus proche de chez vous.



Cuireann an siombail seo in iúl nár cheart an táirgeadh atá marcáilte sa tslí seo a dhiúscairt sa chóras fuíoll teaghlaigh. Os rud é gur táirgeadh ghnó le gnó (B2B) é, ní féidir é a dhiúscairt ach oiread in ionaid dhiúscartha phobail. Más mian leat an táirgeadh seo a dhiúscairt, déan é a thógáil ag eagraíocht gar duit a sainfheidhmíonn i ndiúscairt sean-fhearas leictrigh.



Dieses Symbol zeigt an, dass das damit gekennzeichnete Produkt nicht als normaler Haushaltsabfall entsorgt werden soll. Da es sich um ein B2B-Gerät handelt, darf es auch nicht bei kommunalen Wertstoffhöfen abgegeben werden. Wenn Sie dieses Gerät entsorgen möchten, bringen Sie es bitte sachgemäß zu einem Entsorger für Elektroaltgeräte in Ihrer Nähe.



Αυτό το σύμβολο υποδεικνύει ότι το προϊόν που φέρει τη σήμανση αυτή δεν πρέπει να απορρίπτεται μαζί με τα οικιακά απορρίμματα. Καθώς πρόκειται για προϊόν B2B, δεν πρέπει να απορρίπτεται σε δημοτικά σημεία απόρριψης. Εάν θέλετε να απορρίψετε το προϊόν αυτό, παρακαλούμε όπως να το παραδώσετε σε μία υπηρεσία συλλογής ηλεκτρικού εξοπλισμού της περιοχής σας.



Ez a jelzés azt jelenti, hogy az ilyen jelzéssel ellátott terméket tilos a háztartási hulladékokkal együtt kidobni. Mivel ez vállalati felhasználású termék, tilos a lakosság számára fenntartott hulladékgyűjtőkbe dobni.Ha a terméket ki szeretné dobni, akkor vigye azt el a lakóhelyéhez közel működő, elhasznált elektromos berendezések begyűjtésével foglalkozó hulladékkezelő központhoz.



Questo simbolo indica che il prodotto non deve essere smaltito come un normale rifiuto domestico. In quanto prodotto B2B, può anche non essere smaltito in centri di smaltimento cittadino. Se si desidera smaltire il prodotto, consegnarlo a un organismo specializzato in smaltimento di apparecchiature elettriche vecchie.



Šī zīme norāda, ka iztrādājumu, uz kura tā atrodas, nedrīkst izmest kopā ar parastiem mājsaimniecības atkritumiem. Tā kā tas ir izstrādājums, ko cits citam pārdod un lieto tikai uzņēmumi, tad to nedrīkst arī izmest atkritumos tādās izgāztuvēs un atkritumu savāktuvēs, kas paredzētas vietējiem iedzīvotājiem. Ja būs vajadzīgs šo izstrādājumu izmest atkritumos, tad rīkojieties pēc noteikumiem un nogādājiet to tuvākajā vietā, kur īpaši nodarbojas ar vecu elektrisku ierīču savākšanu.



Šis simbolis rodo, kad juo paženklinto gaminio negalima išmesti kaip paprastų buitinių atliekų. Kadangi tai B2B (verslas verslui) produktas, jo negalima atiduoti ir buitinių atliekų tvarkymo įmonėms. Jei norite išmesti šį gaminį, atlikite tai tinkamai, atiduodami jį arti jūsų esančiai specializuotai senos elektrinės įrangos utilizavimo organizacijai.



Dan is-simbolu jindika li l-prodott li huwa mmarkat b'dan il-mod m'għandux jintrema bħal skart normali tad-djar. Minħabba li huwa prodott B2B , ma jistax jintrema wkoll f'ċentri ċiviċi għar-rimi ta' l-iskart. Jekk tkun tixtieq tarmi dan il-prodott, jekk jogħġbok għamel dan kif suppost billi tieħdu għand organizzazzjoni fil-qrib li tispeċjalizza fir-rimi ta' tagħmir qadim ta' l-elettriku.



Dette symbolet indikerer at produktet som er merket på denne måten ikke skal kastes som vanlig husholdningsavfall. Siden dette er et bedriftsprodukt, kan det heller ikke kastes ved en vanlig miljøstasjon. Hvis du ønsker å kaste dette produktet, er den riktige måten å gi det til en organisasjon i nærheten som spesialiserer seg på kassering av gammelt elektrisk utstyr.



Ten symbol oznacza, że produktu nim opatrzonego nie należy usuwać z typowymi odpadami z gospodarstwa domowego. Jest to produkt typu B2B, nie należy go więc przekazywać na komunalne składowiska odpadów. Aby we właściwy sposób usunąć ten produkt, należy przekazać go do najbliższej placówki specjalizującej się w usuwaniu starych urządzeń elektrycznych.



Este símbolo indica que o produto com esta marcação não deve ser deitado fora juntamente com o lixo doméstico normal. Como se trata de um produto B2B, também não pode ser deitado fora em centros cívicos de recolha de lixo. Se quiser desfazer-se deste produto, faça-o correctamente entregando-o a uma organização especializada na eliminação de equipamento eléctrico antigo, próxima de si.



Acest simbol indică faptul că produsul marcat în acest fel nu trebuie aruncat ca şi un gunoi menajer obişnuit. Deoarece acesta este un produs B2B, el nu trebuie aruncat nici la centrele de colectare urbane. Dacă vreţi să aruncaţi acest produs, vă rugăm s-o faceţi într-un mod adecvat, ducând-ul la cea mai apropiată firmă specializată în colectarea echipamentelor electrice uzate.



Tento symbol znamená, že takto označený výrobok sa nesmie likvidovať ako bežný komunálny odpad.Keďže sa jedná o výrobok triedy B2B, nesmie sa likvidovať ani na mestských skládkach odpadu. Ak chcete tento výrobok likvidovať, odneste ho do najbližšej organizácie, ktorá sa špecializuje na likvidáciu starých elektrických zariadení.



Ta simbol pomeni, da izdelka, ki je z njim označen, ne smete zavreči kot običajne gospodinjske odpadke. Ker je to izdelek, namenjen za druge proizvajalce, ga ni dovoljeno odlagati v centrih za civilno odlaganje odpadkov. Če želite izdelek zavreči, prosimo, da to storite v skladu s predpisi, tako da ga odpeljete v bližnjo organizacijo, ki je specializirana za odlaganje stare električne opreme.



Este símbolo indica que el producto así señalizado no debe desecharse como los residuos domésticos normales. Dado que es un producto de consumo profesional, tampoco debe llevarse a centros de recogida selectiva municipales. Si desea desechar este producto, hágalo debidamente acudiendo a una organización de su zona que esté especializada en el tratamiento de residuos de aparatos eléctricos usados.



Den här symbolen indikerar att produkten inte får blandas med normalt hushållsavfall då den är förbrukad. Eftersom produkten är en så kallad B2B-produkt är den inte avsedd för privata konsumenter, den får således inte avfallshanteras på allmänna miljö- eller återvinningsstationer då den är förbrukad. Om ni vill avfallshantera den här produkten på rätt sätt, ska ni lämna den till myndighet eller företag, specialiserad på avfallshantering av förbrukad elektrisk utrustning i ert närområde.