

# microsonic

## LinkControl Version 8.0

Programming of ultrasonic sensors

Current version of the LinkControl software available under:  
[www.microsonic.de](http://www.microsonic.de)



EW-DO-021316 Rev. 12-814683

Subject to changes

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## Important notes



The purpose of these operating manual is to guide the user through the commissioning of the LinkControl software and the connection of the LCA-2 as well as to describe the parameterisation using LinkControl.

This document does not replace the operating instructions enclosed with the ultrasonic sensor. The safety instructions and descriptions on installation and commissioning contained in the operating manual must be observed.



The following note applies when using the sensors mic-...M30, lcs-.../R1, lpc-, ucs-:

**Possible damage to the system or machine parts as well as disruption of the process flow due to deactivated functions of the connected ultrasonic sensor!**

During parameterisation with LinkControl, the connected sensor does not perform any ultrasonic measurements and does not switch its outputs. If necessary, interrupt the running process during the parameterisation of the sensor to avoid damage to the system/machine.

## About the LinkControl software

With the LinkControl software, microsonic ultrasonic sensors can be parameterised and taught in under Windows®. Current measured values of the ultrasonic sensors can be displayed and recorded in different output graphics. Under LinkControl, extended setting options are available that are not available in the on-site operation.

The following sensor families support LinkControl:

- mic- /M
- mic+
- crm+
- hps+
- pico+
- lpc
- lpc+
- lcs
- lcs+
- ucs
- pms
- bks
- bks+
- dbk+
- esp
- esf
- cube
- nano

To set microsonic ultrasonic sensors with LinkControl, the LinkControl adapter LCA-2 is required. The LCA-2 has a USB interface for connection to a PC or laptop.

## Different displays depending on the sensor

The microsonic ultrasonic sensors offer a wide range of functions and setting options in various operating modes and applications. This operating manual describes all the input masks available under LinkControl and the corresponding setting options. As soon as a sensor has been connected via LCA-2 and recognised by LinkControl, only the input screens of the functions that the connected sensor also has are available. The displays of the input screens may differ for different sensors.

# Preparation

## Scope of delivery

The LinkControl Adapter is delivered separately or in a plastic case with the following contents:

- LCA-2
- Adaptor for sensors with cable connection (lcs) incl. cable clamps
- Adaptor for power supply incl. cable clamps
- Power supply 90-240 VAC/24 VDC, 625 mA, with 1,8 m cable
- four exchangeable AC-plugs for use in Europe, USA, Great Britain and Australia
- USB cable A-plug to B-plug
- USB-Stick with LinkControl software and documentation

## System requirements

- 1 Gigahertz (GHz) or higher, 1 GB main memory, 16 MB free space on hard disk drive
- Windows® 11, Windows® 10, Windows® 8, Windows® 7
- Graphic minimum resolution 800\*600, minimum 256 colours

## Installing the software

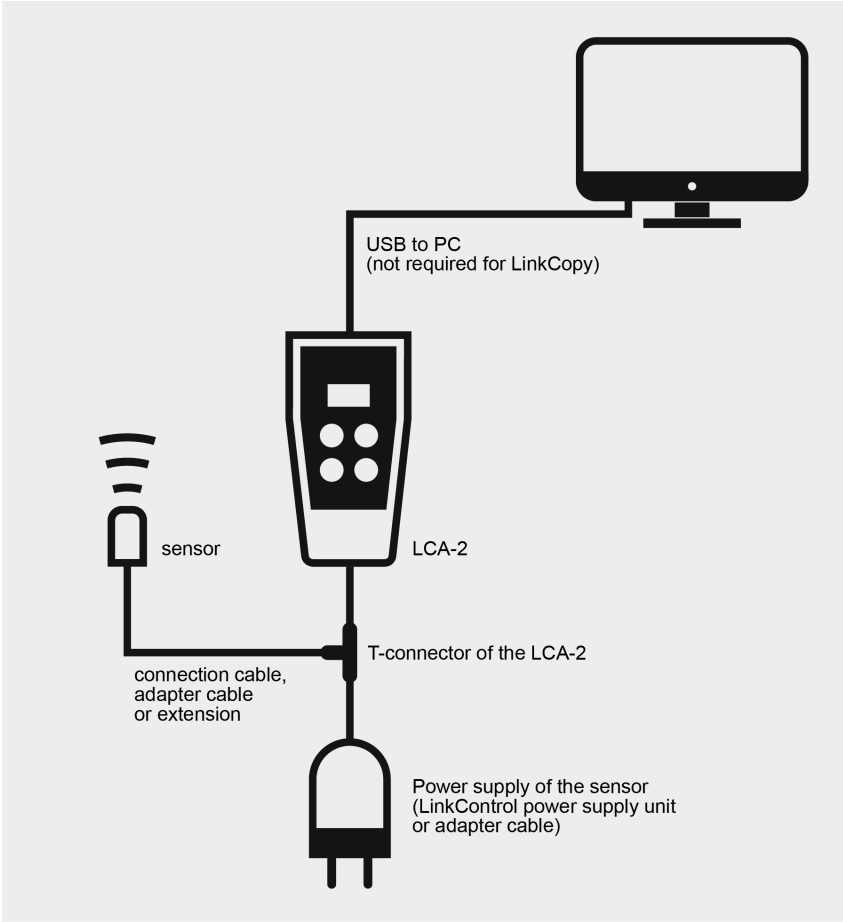
- ➔ Start the computer and wait until Windows® has started.
- ➔ Insert the installation USB stick.
- ➔ If the autostart function is active, the installation is carried out immediately, otherwise run »Start.EXE« on the USB stick,
- ➔ ...or download the latest LinkControl software from [microsonic.de](http://microsonic.de) and run »Setup.EXE«.
- ➔ Follow the instructions according to the installation procedure.

The following files/directories are copied into the installation directory:

- LinkControl.exe executable file
- Updater.exe is required by LinkControl for the Internet update
- LinkC\_E.chm English help file
- LinkC.ini Configuration file for LinkControl
- LinkC.lst List with the microsonic ultrasonic sensors
- Parameter Directory with the default parameter files of the microsonic ultrasonic sensors
- Driver Directory with the drivers for the LCA-2



# Connecting the LCA-2



For more information, see the LCA-2 Quick Start Guide, see <https://www.microsonic.de/en/accessories/programming-utilities/lca-2.htm>.

## Pin assignment/colour coding

To connect sensors with ready-made cables to the LCA-2, use the enclosed adapter cables.

Pin	Standard Colour coding	Alternative colour coding	sensors with 1 switching output	sensors with 2 switching outputs	sensors with analogue outputs	sensors with switching outputs and analogue outputs
1	brown	brown	+U <sub>B</sub>	+U <sub>B</sub>	+U <sub>B</sub>	+U <sub>B</sub>
2	white	white	-	output D1	analogue output	analogue output
3	blue	green	-U <sub>B</sub>	-U <sub>B</sub>	-U <sub>B</sub>	-U <sub>B</sub>
4	black	grey	output D	output D2	-	output D
5	grey	yellow	Communi- cation *	Communi- cation *	Communi- cation *	Communication *

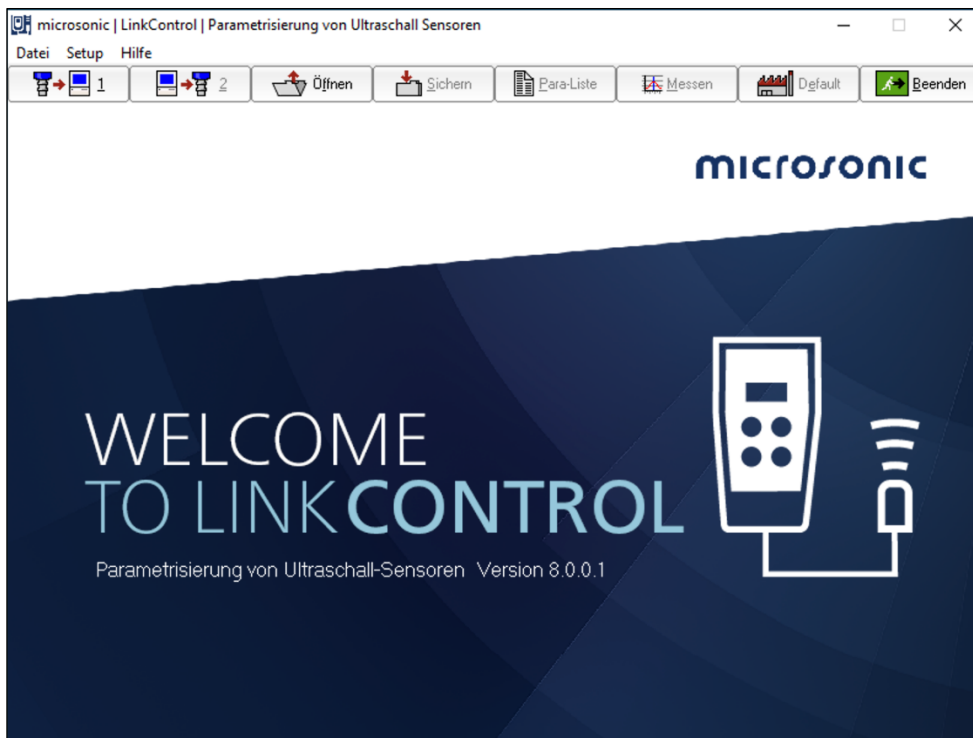
\* With the LCA-2, pin 5 is used for communication between the sensor and the LCA-2. In normal operation mode, pin 5 is used for synchronization or multiplex mode.

## Starting the LinkControl software

After starting the software...

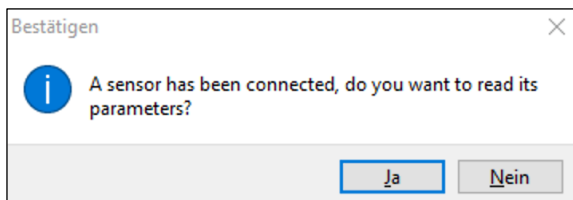


the start screen appears.



LinkControl checks whether a connected sensor is ready for communication.

This message appears when a sensor has been detected:



The current parameters can now be read out from the connected sensor.

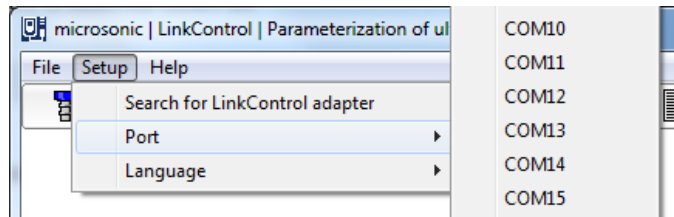
## Selecting the COM port

In order for the LCA-2 to communicate with the PC, the correct port must be selected in the LinkControl software.

### Direct selection of the COM port

If the COM port used is known, proceed as follows:

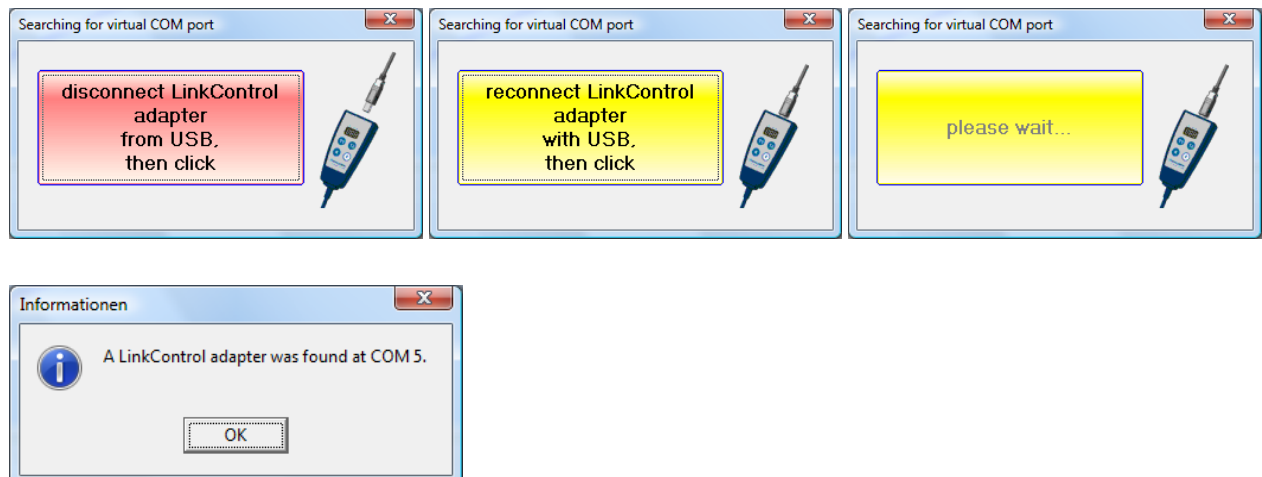
- ➔ Select the COM port 1...100 directly via the »Setup/Port« drop-down menu.



### Automatic search of the COM port

If the port is not known, the LinkControl software can detect the port used.

- ➔ Select »Setup/Search for LinkControl Adapter« and follow the instructions of the software.



## Read/Write parameters

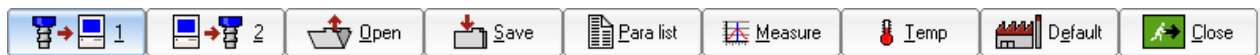



The following note applies when using the sensors mic-...M30, lcs-.../R1, lpc-, ucs-:

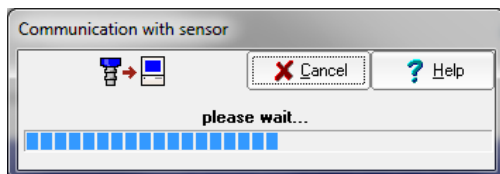
**Possible damage to the system or machine parts as well as disruption of the process flow due to deactivated functions of the connected ultrasonic sensor!**

**During parameterisation with LinkControl, the connected sensor does not perform any ultrasonic measurements and does not switch its outputs. If necessary, interrupt the running process during the parameterisation of the sensor to avoid damage to the system/machine.**

### Read parameters from sensor

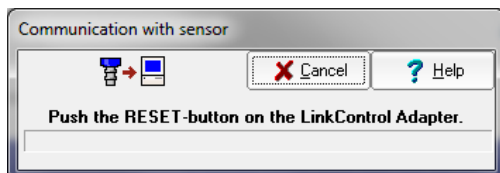


- Check the connection of the LCA-2 to the connected sensor and to the PC and ensure that the correct port is selected (COM1...COM100).
- Press button  to read out the parameters from the sensor and confirm the confirmation prompt,  
or
- switch on a sensor and confirm the security prompt.



All parameters are read out from the sensor and then transferred to the input mask.

If the following message appears,

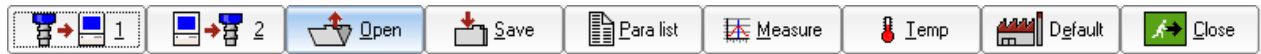



- press the reset button on the LCA-2.

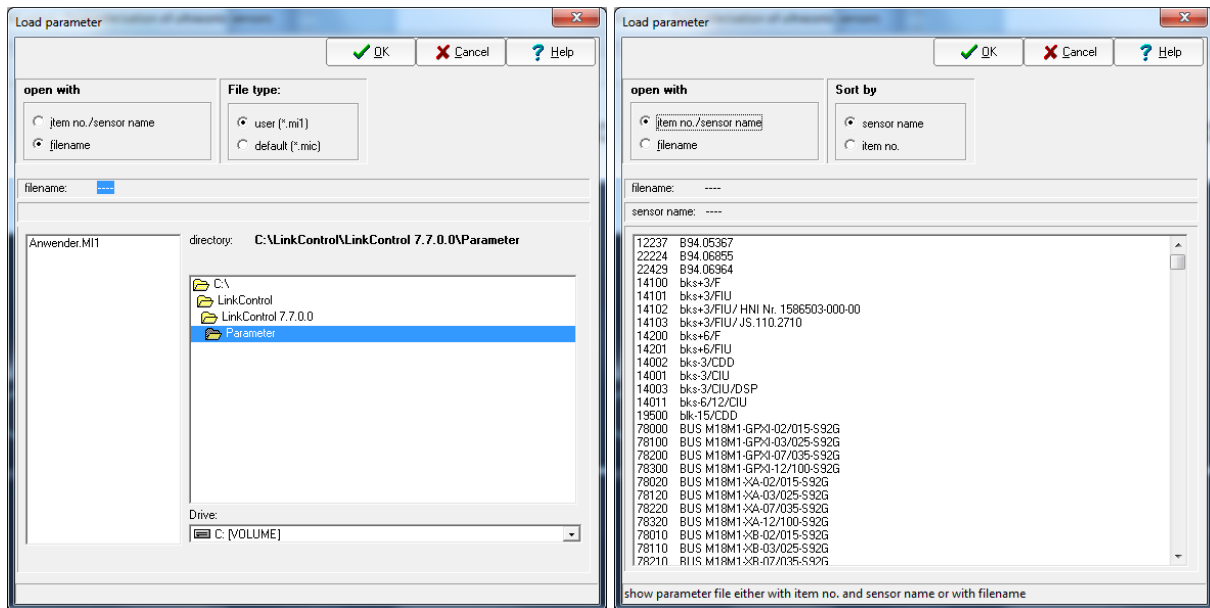
If still no parameters are read out, check whether

- a sensor capable for LinkControl is connected,
- the sensor is supplied with voltage via the LCA-2 (LEDs on the sensor must light up),
- the USB connection to the PC is correctly connected,
- the correct port has been selected in the LinkControl software.

## Read parameters from file



- ➔ Press button .
- ➔ Select whether the user parameters are to be loaded from a file ...
- ➔ or the default parameters of a specific sensor type with its sensor name and item number are to be loaded.

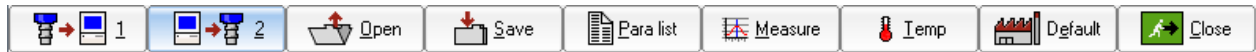


- ➔ Select the sensor type or the parameter file and confirm with OK.




Parameter files with the extension \*.MIC contain the parameters for the basic setting of the respective sensor. These files are created by microsonic. These basic settings can be changed and then saved under their own name with the file extension \*.MI1. The files with the basic settings are thus always retained.

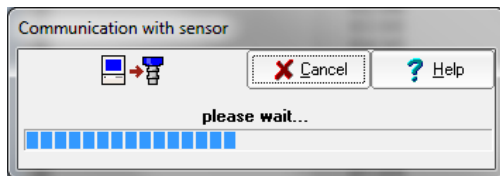
## Write parameters to sensor



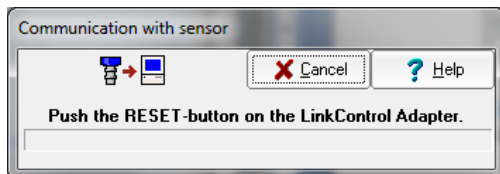
**Note: All changes made in the input mask are only temporarily saved and must then be transferred to the sensor.**

- Press button  to send parameters to the sensor.
- Confirm security prompt.

First, it is checked whether the connected sensor matches the sensor type selected in the input mask. Then the changes are transferred to the sensor.



If the following message appears,



- press the reset button on the LCA-2.

If still no parameters are read out, check whether

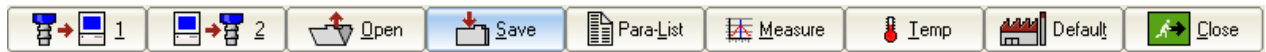
- a sensor capable for LinkControl is connected,
- the sensor is supplied with voltage via the LCA-2 (LEDs on the sensor must light up),
- the USB connection to the PC is correctly connected,
- the correct port has been selected in the LinkControl software.




See also »Read parameters from sensor« on page 13.

If the LinkControl software detects that the selected sensor type does not match the connected sensor type, the transmission of the parameters will not be started.

## Save parameter file



- Press button .
- Assign a file name and confirm with OK.



Info

When saving, only \*.MI1 is allowed as file name extension (user file) in order not to overwrite the default parameter files (\*.MIC).

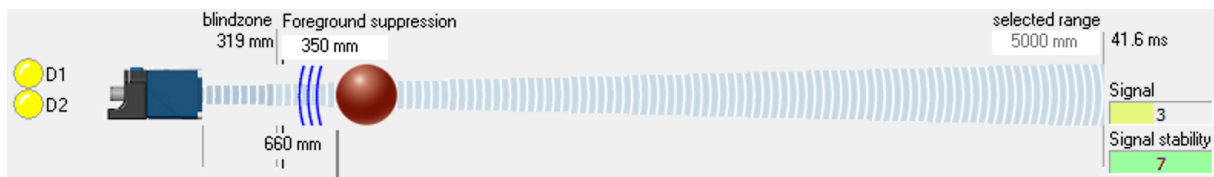


## Change parameters



All changes made in the input mask are only stored temporarily and must then be transferred to the sensor. The numerical distance values are always given in mm and can be entered via the keyboard. In addition, the values for foreground suppression, switching and hysteresis points as well as window limits can also be changed by clicking on the respective corner point and dragging with the mouse.

## Graphical representation of sensor and detection range



The graphic representation in the upper window area shows the sensor and a sketch of the detection area. An object detected by the sensor is symbolised by a red ball and shows the distance to the sensor with measured value in mm in real time.

## LED indicators of the outputs

It is displayed whether the corresponding LED on the sensor is lit or in which colour.



## Blindzone

Since the ultrasonic sensor first emits the transmission pulse via its ultrasonic transducer and then reads in the echo signals, echo signals can only be read in when the transmission pulse has completely decayed. This causes the blindzone typical for an ultrasonic sensor. The usable measuring range starts from the blindzone. The measuring distance must not become smaller than the blindzone, as this can lead to incorrect measurements. The size of the blindzone is sensor-specific and cannot be changed by the user.

## Foreground suppression

The foreground suppression is an artificial enlargement of the blindzone, i.e. the measuring range starts after the foreground suppression. All echo signals that lie between the sensor and the foreground suppression are ignored. This allows small interfering edges that lie in the foreground of the detection range to be blanked out.

## Selected range

The set selected range determines the maximum measuring range of the ultrasonic sensor. Factory-made, the selected range is set to the maximum range (= physically recommended maximum range of the sensor) of the sensor type.

The operating range specified in the technical data, on the other hand, indicates the typical range of the sensor at which the sensor operates with sufficient performance reserve even on critical reflectors.

The selected range set affects the measurement repetition rate (time in ms for an ultrasonic measurement, displayed next to the input field) of the sensor. Reducing the selected range increases the measurement repetition rate of the sensor. However, this setting should only be made by experienced users. In most cases, it is not necessary to change the selected range.

## Signal und Signal stability

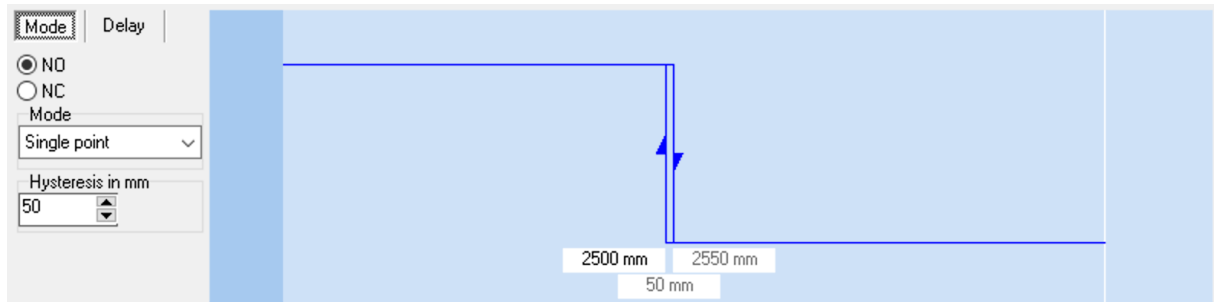
These two parameters are displayed with a dimensionless numerical value from 0 to 7.

The signal stands for the echo signal amplitude. The higher this value is, the stronger the echo signal is.

The signal stability describes the differences between individual ultrasound measurements. Large fluctuations correspond to a low signal stability.

## Switching outputs

microsonic ultrasonic sensors with switching outputs are available as PNP, NPN or Push-Pull outputs. The switching points of all switching outputs can be set independently of each other.



The graphic display shows the currently set switching mode of a switching output with the associated parameters. The following switching modes can be selected (depending on the connected sensor):

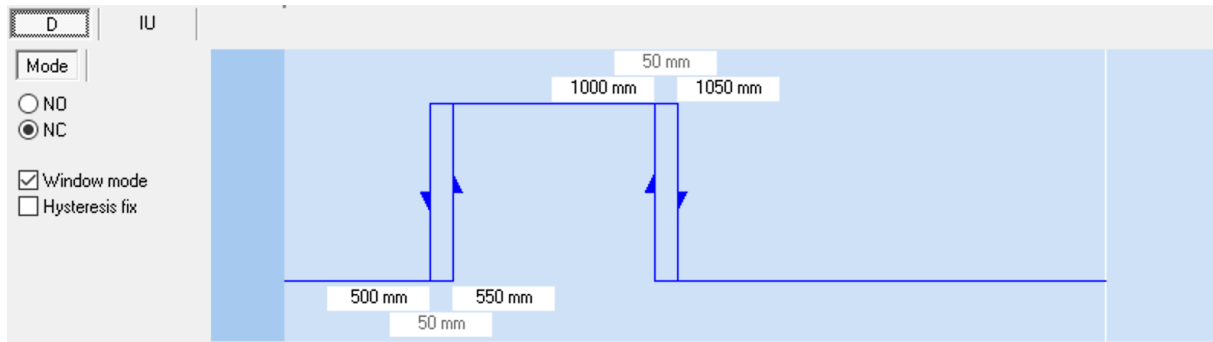
- off (deactivated)
- Single point
- Window
- Two point
- Single point + offset
- Window  $\pm$  offset

## NO contact/NC contact

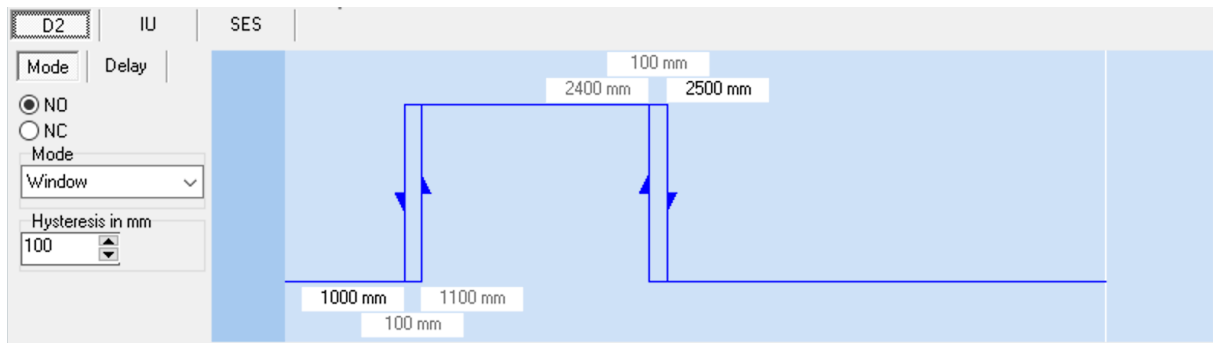
For each switching output, the output function normally open (NO) or normally closed (NC) can be set.

## Switching points and hysteresis

The switching points are subject to an adjustable hysteresis. Depending on the type of sensor connected, the hysteresis can be entered in different ways.



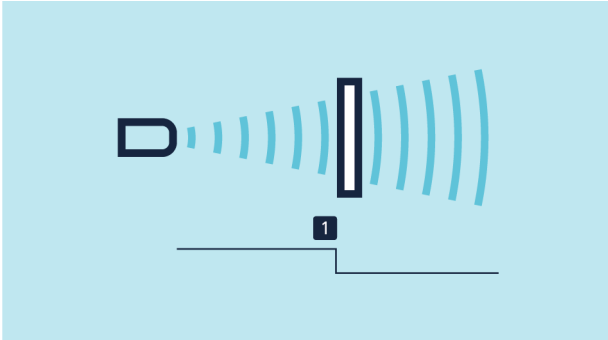
In this input mask, the values for the switching point close to the sensor and the hysteresis point close to the sensor as well as the switching point far from the sensor and the hysteresis point far from the sensor can be entered. This means that the hystereses can be different. If the »Hysteresis fixed« check mark is set, only the values for the near-sensor and far-sensor switching points can be entered.



In this input mask, the values for the near-sensor and far-sensor switching point can be entered. The hysteresis can be entered in mm in the »Hysteresis« input field and applies to both the near-sensor and far-sensor switching points.

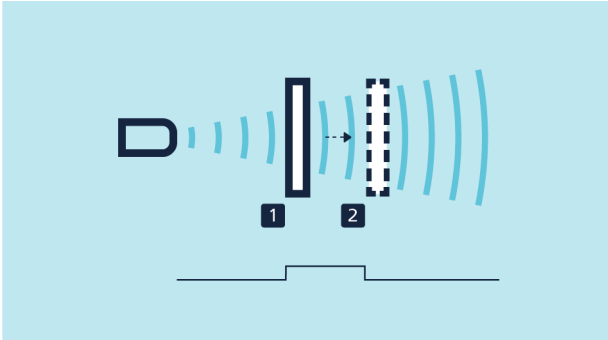
## Single point

The switching output is set if the distance measured to an object is smaller than the set switching point. In addition, the output function (NO/NC) and the hysteresis can be set.



## Window

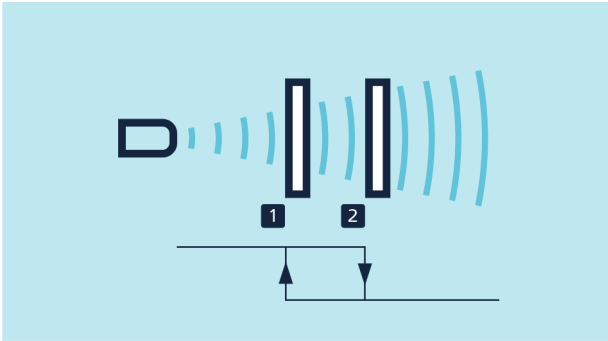
The switching output is set if the object is within a window defined by two window limits. In addition, the output function (NO/NC) and the hysteresis can be set.



## Two point

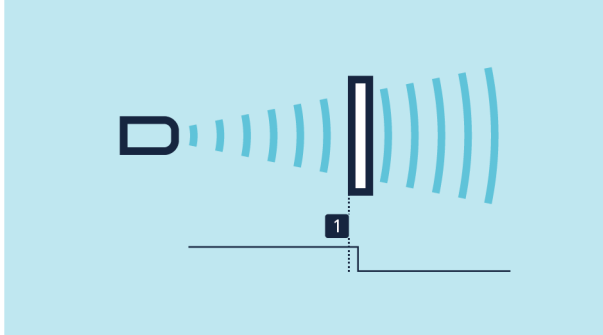
The state of the switching output changes when the object reaches switching point 1 and changes back to the previous state value when the object reaches switching point 2.

In addition, the output function (NO/NC) can be set. Two-point control can be realized with this operating mode.



## Single point + offset

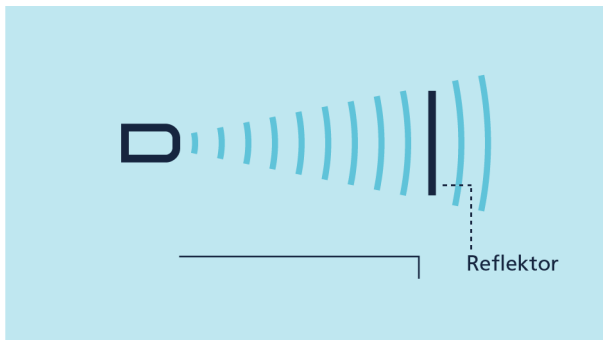
The switching output is set if the distance measured to an object is smaller than the set switching point plus an offset. In addition, the output function (NO/NC) and the hysteresis can be set. This method is recommended for objects that enter the sound field from the side.



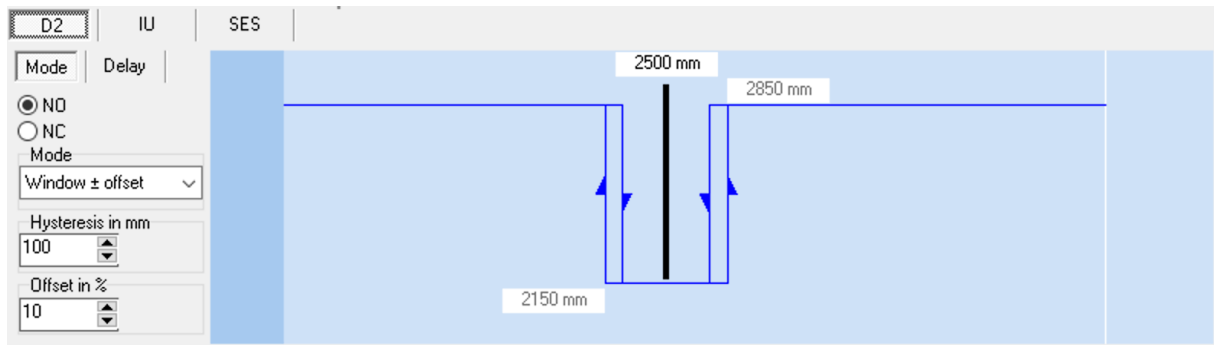
## Window ± offset

The output is set when the object is located between the sensor and a fixed reflector.

To this end, the ultrasonic sensor is set in window mode so that a fixed reflector lies inside the window. The switching output is changed as soon as an object is detected in front of the reflector. This operating mode is recommended for materials that are difficult to detect, such as foam, and for scanning objects with irregular surfaces.



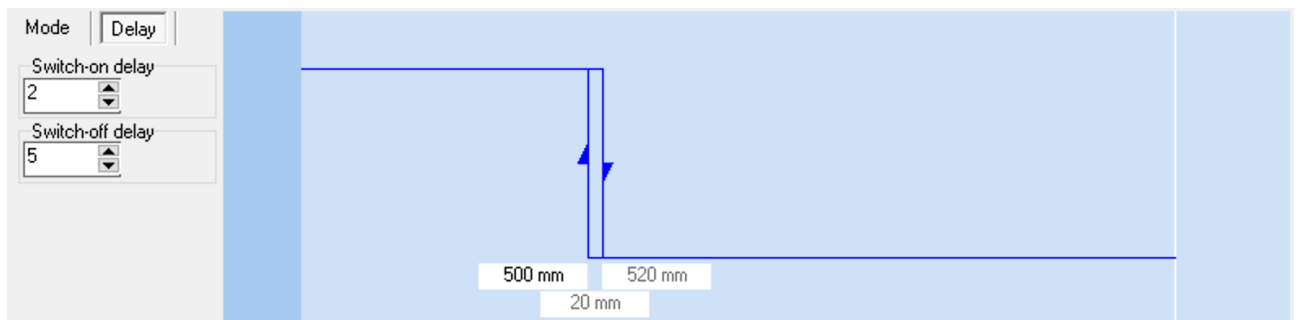
## Settings:



The values for the position of the reflector (black bar) and the hysteresis can be entered directly. The offset around the reflector can be set in the range of 2 to 20 %.

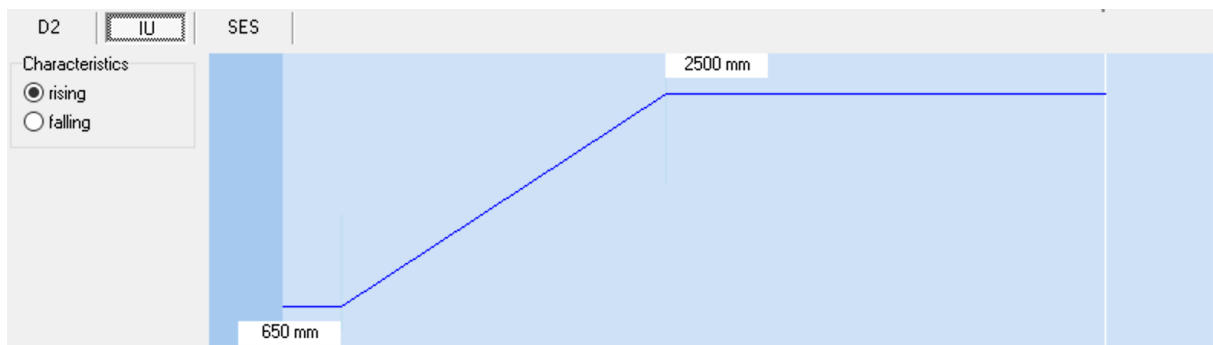
## Switch-on delay/Switch-off delay

The »Delay« button is used to call up the settings for the switch-on delay and the switch-off delay. The values can be set in the range from 0 to 25 seconds.



## Analogue output

The analogue output is called up via the »IU« button.



The ultrasonic sensors with analogue output transmit the measurement as a proportional voltage (0-10 V) or current (4-20 mA). For ultrasonic sensors with analogue output, the near and far window boundary of the analogue characteristic and also whether the characteristic is rising or falling can be configured. Depending on the sensor type and window width, resolution lies between 0.025 and 0.36 mm.

### Sensor near limit/Sensor far limit

The corner points of the output characteristic are set with the window limit close to the sensor and the window limit far from the sensor. Between the two corner points, the output characteristic runs linearly, rising or falling depending on the selected characteristic.

### Characteristics

With the selection rising/falling, the characteristic can be switched to rising (0 to 10 V or 4 to 20 mA) or falling (10 to 0 V or 20 to 4 mA).

### Output type

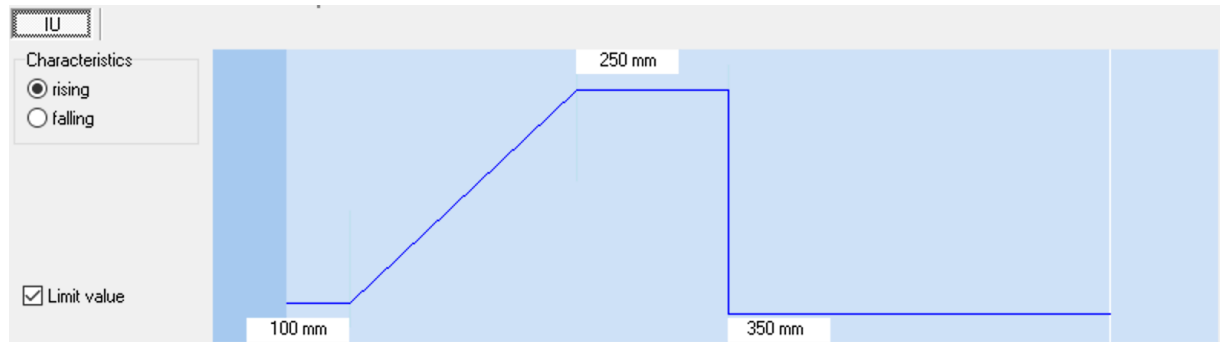
Ultrasonic sensors with automatic changing of voltage-/current output check the output load resistor and switch autonomously to current or voltage output mode depending on the result. Checking the output load take place every time when the device is powered up. If the load resistor is low impedance (< 500  $\Omega$ ), the analogue sensors switch to current output; if the load resistor is > 10 k $\Omega$ , they switch to voltage output.

The automatic changing of voltage-/current output can be switched off and the type of the output can be programmed as a fixed output type (voltage or current).



## Limit value

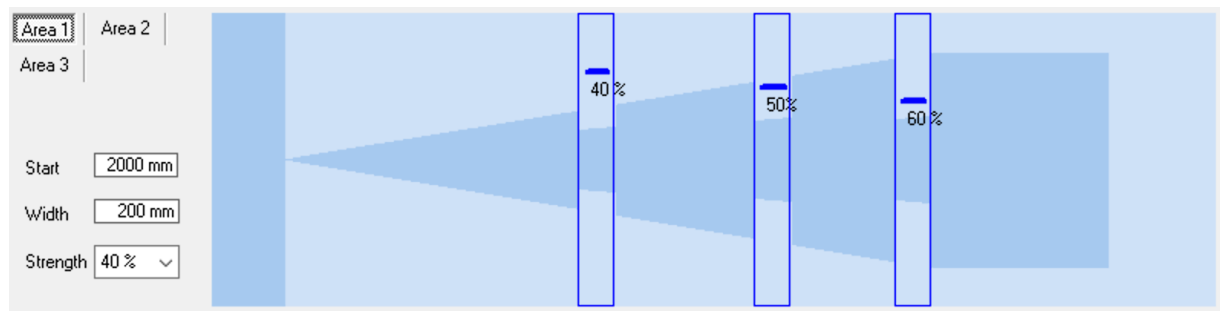
An additional break point can be inserted behind the window limit of the characteristic curve far from the sensor. Behind this break point, the output voltage/output current drops to 0 V/4 mA.



## Interference echo suppression (SES)

Unwanted echoes in the application can be suppressed in up to three selected areas using the interference echo suppression function. In doing so, time points (and corresponding distances) in the echo signal can be defined at which the sensitivity of the signal enhancement is significantly reduced. This is helpful, for example, for filling level applications in tanks with narrow openings or agitators but also in presence controls with installation-related interfering machine parts.

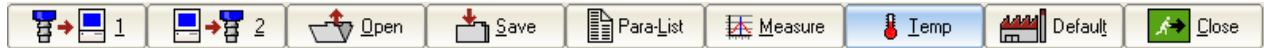
A starting point, a length and the strength of the sensitivity damping can be defined within the detection area of the sensor for every area of the interference echo suppression.



# Adjustment of temperature compensation



Only for mic+.../TC, mic-...M, lcs+ sensors as of 2004



For very precise measurements the temperature compensation can be adjusted. For that a sound-hard reflector is positioned in the exactly measured distance to the sensor and sends this distance information to the sensor.

1. Install the sensor at its installation site (as described in its operating manual) and switch on the operating voltage. Wait approx. 30 minutes until the sensor has reached his final operating temperature.

2. Position a sound-hard reflector (for example epoxy, metal or wood plate) within the detection range in front of the ultrasonic sensor. (recommended size: 100 mm of \* 100 mm, direction: exact 90 ° to the ultrasonic sensor. Position the plate approximately to the detection range of the sensor, if this is not possible to the maximally possible distance.

3. Measure the distance as exactly as possible with a tape measure between sensor membran and plate. Enter the just measured distance into the input field >real distance<

4. Push the button >Execute<. The internal temperature compensation of the sensor is optimally tuned by your real conditions of use. Pay attention, that the sensor due to his heat masses can not follow temperature changes inertness-free.

real distance  
2000 mm

Execute

- Mount the sensor at its future place of use according to the operating manual and switch on the operating voltage. Wait approx. 30 minutes until the sensor has reached its final operating temperature.
- Place a flat, soundproof plate with minimum dimensions of 100 x 100 mm perpendicular to the sensor in the sound field. Position the plate approximately within the operating range of the sensor, or if this is not possible, at the maximum possible distance.
- Measure the distance between the sensor membrane and the plate as accurately as possible with a tape measure and enter the determined value in »real distance«.



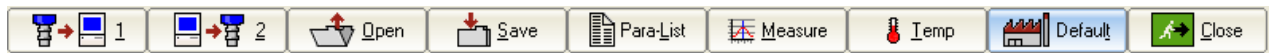
The following step cannot be undone. Make sure that steps 1 to 3 have been carried out correctly.


- Press button . The internal temperature compensation of the sensor is now optimally matched to its real operating condition.

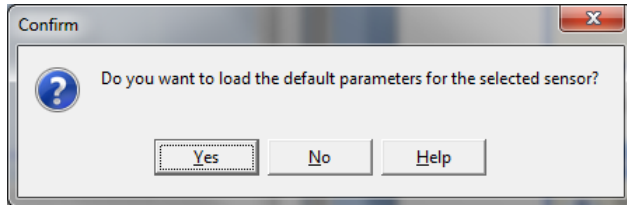


Due to its thermal masses, the sensor cannot follow temperature changes without inertia.

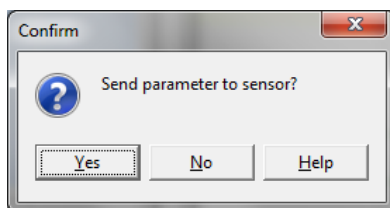
## Set sensor to default setting



→ Press button  .

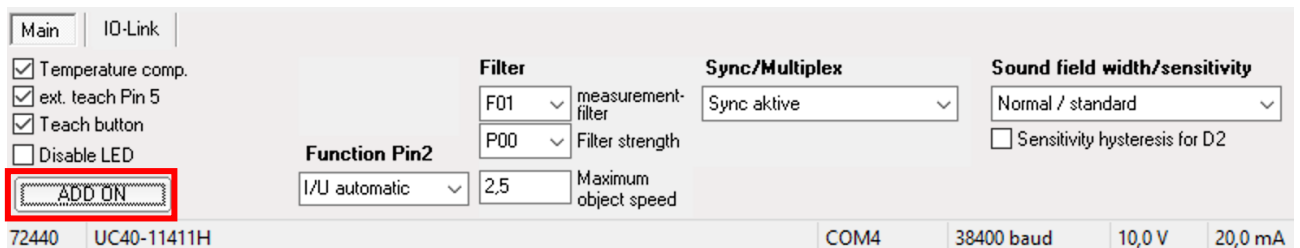


→ Confirm security prompt.



All changed parameters are set to their original values (factory setting). These are the values contained in the default parameter file (\*.MIC).

## Settings under »ADD ON«



The »ADD ON« button in the lower part of the window can be used to show or hide further setting options. The scope and display of the input fields and buttons can vary depending on the connected sensor.

## Temperature compensation

The velocity of sound in air is temperature dependent. The dependency can roughly be specified as 0,17 %/°C. To compensate this temperature influence, the temperature is internally measured, and a correction factor is calculated for the time-of-flight of echoes. The internal temperature compensation can be enabled/disabled by the check box »Temp. Comp.«.

## Ext. Teach

The external teaching of the sensor (depending on sensor type pin 4/pin 5) can be activated/deactivated.

## Teach button

Teach buttons as operating elements on the sensor can be activated/deactivated.

## Disable LED

The LEDs of the sensor can be activated/deactivated.

## TouchControl

The ultrasonic sensors of the mic+ family have a control panel with two buttons (TouchControl) for manual adjustment. If the mic+ sensors are only to be adjusted with the LCA-2, the control panel can be deactivated via the TouchControl marker field. This can be used, for example, to prevent subsequent manual adjustment of the sensors.

## Filter

The results of the cyclically performed measurements of the ultrasonic sensor are not sent directly to the output but pass through internal software filters that have the task of filtering out measured value outliers and smoothing and damping the course of measurement.

The following filter types are available for most sensors:

- **F00:** No filter activated, each distance value is output unfiltered (development mode, not recommended for industrial applications)
- **F01:** Standard filter: recommended filter setting for most applications
- **F02:** Mean value filter: arithmetic averaging over several measurements
- **F03:** Foreground filters: Special filters for special applications
- **F04:** Background filters: Special filters for special applications

Depending on the sensor type, further special filters can be selected. In addition, the filter strength can be set from P00 (weak filter effect) to P09 (strong filter effect).



**Changes to the filter settings require experience and are usually not necessary for standard applications. It is recommended to contact microsonic with any questions regarding filter settings.**



Most applications can be solved with the standard filter F01. For sensors with analogue output, the average filter F02 is switched on by default to get a smoothed output signal.

## Function Pin 2

This setting option is only available with the cube sensor. The function of the output on pin 2 can be set to analogue output I, analogue output U, analogue output with automatic detection or push-pull switching output.

## Sync/Multiplex

If the specified mounting distances between the sensors are not reached when operating several sensors, the integrated synchronization should be used.

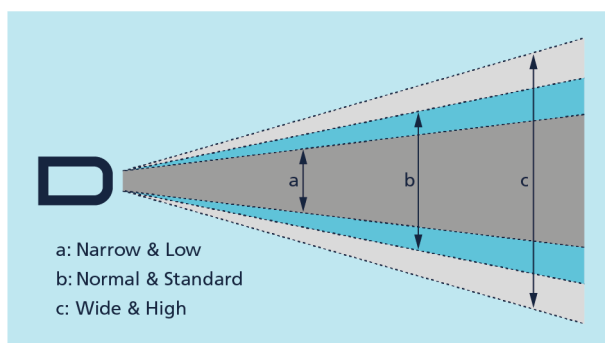
In multiplex mode, each sensor can be assigned an individual device address between 1 and 10. The sensors then alternate with their ultrasonic measurements during operation in ascending order of the device addresses. This completely avoids mutual interference.

The device address »0« is reserved for sync mode and deactivates multiplex mode. For sync mode, all sensors must have the device address »0«.

## Detection area width & sensitivity

Three sound field configurations can be selected for detection area width & sensitivity:

- Narrow/Low
- Normal/Standard
- Wide/High.



For most applications, the setting »Normal/Standard« can be used. The setting »Narrow/Low« may be necessary, for example, if objects in the edge area of the sound field have an undesired influence on the measured values.

With the »Sensitivity hysteresis for D2«, the sensitivity is increased at the moment an object is detected and the switching output switches. It is recommended to activate this function when objects enter the sound field from the side.

## Maximum object speed

A value for speed in m/s can be entered in the »Maximum object speed« input field. Objects that continuously move towards or away from the sensor at a speed deviating from this are ignored. This additional setting serves as a plausibility criterion for the ultrasonic distance measurement and only applies to filter selection F01 and F02.

## Display

This setting option is only available for mic+ sensors. The following settings can be selected:

- bright
- dimmed
- off

## Display mode

This setting option is only available for mic+ sensors. For sensors with analogue output, the display mode of the sensor display can be changed.

mm:	the measured distance value is displayed in mm or cm
0...100 %:	the measured distance value is displayed as a percentage value of the analogue characteristic curve, starting from the sensor-near up to the sensor-far folding point
100...0 %:	the measured distance value is indicated as percentage value of the analogous characteristic, starting from the sensor-far up to the sensor-near folding point

## Noise interference filter

This setting option is only available for lcs+ sensors. Interfering ultrasonic signals that are not generated by the sensor itself are suppressed by activating the noise filter.

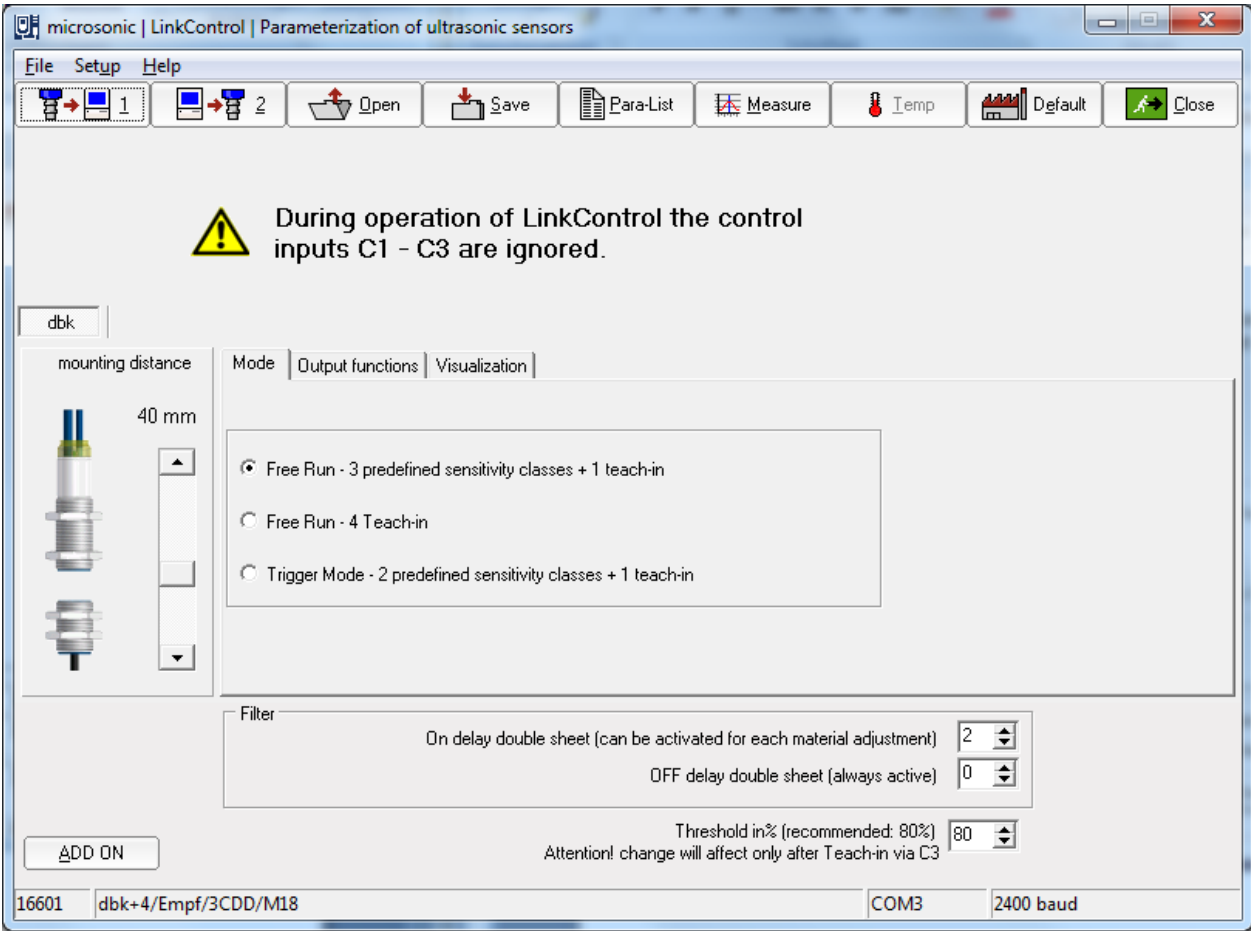


**Modifications to the noise filter require experience and are usually not necessary for standard applications. It is recommended to contact microsonic for questions regarding the noise filter.**

# Double sheet control

The function of the double sheet detection is to detect two or more sheets lying one on top of the other or to detect other laminary materials. The sensor system consists of a transmitter and a receiver complete with integrated evaluation electronics.

A high-frequency ultrasonic transmitter beams from the underside against the sheet material. The emitted ultrasonic pulse excites the sheet material into vibrations. The effect of these vibrations is for a very small sonic wave on the other side of the sheet to spread. This wave is received by the ultrasonic receiver located there. In the case of sheet one on top of the other (double sheet), the receiver detects the difference in signal and sets its outputs accordingly.



## Operating modes

The following operating modes are available:

- Free-Run-Mode with 3 predefined sensitivity classes and additional teach-in mode, e.g. for scanning wafers glued with a water film.
- Free-Run-Mode with 4 independent teach-in classes.
- Trigger-Mode with 2 predefined sensitivity classes and additional teach-in mode
- Level or edge triggered mode, e.g. for applications in the imbricated stream.

### Free run – 3 predefined sensitivity classes + 1 Teach-in

Mode | Output functions | Visualization

Free Run - 3 predefined sensitivity classes + 1 teach-in

Free Run - 4 Teach-in

Trigger Mode - 2 predefined sensitivity classes + 1 teach-in

Factory-made the dbk+4 operates in the free-run mode. In the free-run mode, the dbk+4 performs measurements cyclically.



If measurements are to be made in the imbricated stream, an external trigger signal can trigger each measurement individually. For this purpose, the trigger mode can be parameterised using the LinkControl adapter LCA-2 (available as an accessory) and the LinkControl software.

### Free Run – 4 Teach-in

If the free-run mode has been parameterised, up to 4 different materials can be taught in.

Mode | Output functions | Visualization

Free Run - 3 predefined sensitivity classes + 1 teach-in

Free Run - 4 Teach-in

Trigger Mode - 2 predefined sensitivity classes + 1 teach-in



The sensitivity classes »Standard«, »Thick«, »Thin« und »Teach-in« can be customized.

With the appropriate buttons the taught classes of materials can be brought back to the default.

Mode   Output functions   Visualization					
	Inputs			Material - ID	Factory setting
	C1	C2	C3		
teach in 1	0	0	0	V100S10I10	Standard
teach in 2	0	1	0	V200S12I15	thick
teach in 3	1	0	0	V20S8I7	thin
teach in 4	1	1	0	V100S10I10	

### Trigger Mode – 2 predefined sensitivity classes + 1 Teach-in

If the dbk+4 is parameterized in Trigger mode, you have to contact the external trigger signal to input C2.

Mode   Output functions   Visualization	
<input type="radio"/> Free Run - 3 predefined sensitivity classes + 1 teach-in <input type="radio"/> Free Run - 4 Teach-in <input checked="" type="radio"/> <b>Trigger Mode - 2 predefined sensitivity classes + 1 teach-in</b>	<b>Trigger Mode</b> <input checked="" type="radio"/> state change from 0 to 1 <input type="radio"/> state change from 1 to 0 <input type="radio"/> Logical status = 1 <input type="radio"/> Logical status = 0

In trigger mode the following sensitivity classes are available: »standard«, »thin« and »teach-in-value«.

Mode   Output functions   Visualization				
	Inputs			Material - ID
	C1	C2	C3	
standard	0		0	V100S10I10
thin	0		1	V20S8I7
teach in value	1		0	V100S10I10





## Output functions

The following settings can be made for the switching outputs D1 and D2:

Mode	Output functions	Visualization
Output D1		
<input checked="" type="radio"/> N.C. (Single sheet = closed, Missing sheet = open)		
<input type="radio"/> N.O. (Single sheet = open, Missing sheet = closed)		
<input type="radio"/> Override (N.C.)		
<input type="radio"/> Override (N.O.)		
Output D2		
<input checked="" type="radio"/> N.C. (Double-sheet = open)		
<input type="radio"/> N.O. (Double-sheet = closed)		

## Measuring value writer

The button »standard«, »thick«, »thin« and »teach in value« starts the measuring value writer. The dbk+ then temporarily works with these settings.

Mode	Output functions	Visualization	Inputs			Material - ID	on delay	Measure with settings of
			C1	C2	C3			
standard			0	0	0	V100S10I10	<input type="checkbox"/>	 standard
thick			0	1	0	V200S12I15	<input checked="" type="checkbox"/>	 thick
thin			1	0	0	V20S8I7	<input type="checkbox"/>	 thin
teach in value			1	1	0	V100S10I10	<input type="checkbox"/>	 teach in value

### Voltage level of the logic states at the control inputs

Logic state	Voltage level	
	pnp	nnp
0	-U <sub>B</sub>	+U <sub>B</sub>
1	+U <sub>B</sub>	-U <sub>B</sub>

### Mounting distance

Numeric input of the spacing between transmitter and receiver.

### Sensitivity classes

The fact that the dbk+4 control inputs are unconnected or on logic 0 points to pre-selection of the »Standard« sensitivity class where the range of sheet material weights from a typical 50 g/m<sup>2</sup> up to 800 g/m<sup>2</sup> can be scanned.

Via the three control inputs, the sensitivity classes can be selected according to the following table:

Mode	Output functions	Visualization			Material - ID
		Inputs			
		C1	C2	C3	
standard		0	0	0	V100S10I10
thick		0	1	0	V200S12I15
thin		1	0	0	V20S8I7
teach in value		1	1	0	V100S10I10

- The »thin« setting is to be selected for extremely thin materials, such as bible printing paper, with weight per unit areas of under 50 g/m<sup>2</sup>.
- The »thick« setting is available for sheet metals, thick plastic films, paperboard and finest corrugated card.
- Changes between sensitivity classes can be undertaken under on-going operations.
- Pre-selecting an over-low sensitivity class can result - even with a single sheet - in a double sheet signal appearing. In such an instance, the next-higher sensitivity class is to be pre-selected.
- Pre-selecting an over-high sensitivity class results - given a single sheet - in the double-sheet detection indicating override at the LEDs: one LED lights up green and the other green/red (orange blend). In such an instance, the next-lower sensitivity class is to be pre-selected.

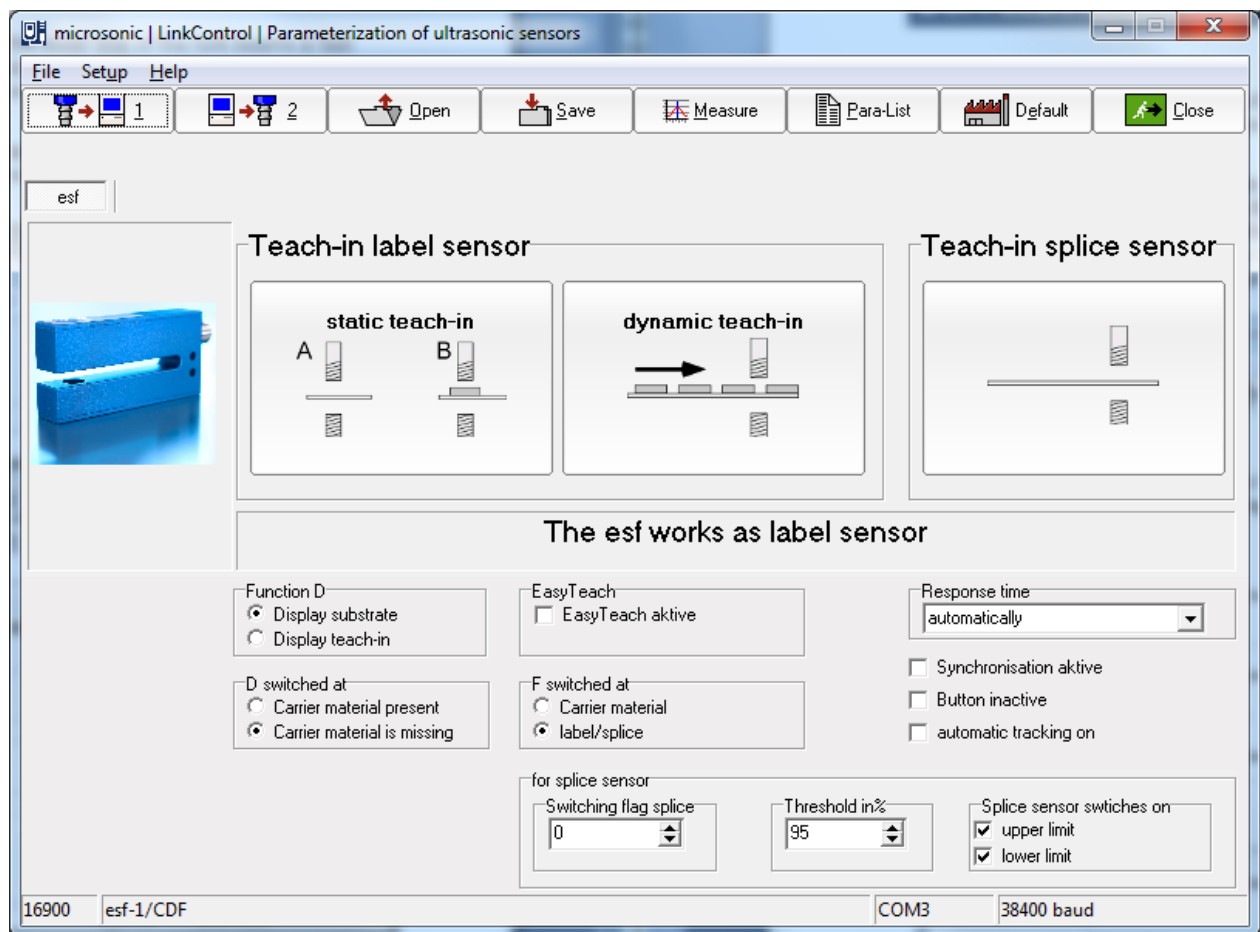


Usual D1 shows a missing sheet. If previously the switching output D1 was parameterised to the output function »override«, override is issued via D1.

## Label and splice sensors esp-4 and esf-1

Labels are guided through the fork. An ultrasonic transmitter in the lower leg of the fork beams a fast sequence of pulses through the backing material. The sound pulses cause the backing material to vibrate such that a greatly attenuated sound wave is beamed from the opposite side. The receiver in the upper leg of the fork receives this sound wave.

The backing material transmits a different signal level from the label. This signal difference is evaluated by the esf-1. The signal difference between the backing material and the label can be very slight. To ensure a reliable distinction, the esf-1 has to learn the label.



## Teach-in methods

The esf-1 can reliably detect high-transparency, reflective materials as well as metallised labels and labels of any colour. The measurement cycle time automatically self-adjusts to the sound power required. For thin labels and backing materials, the esf-1 can work at its maximum speed, with a response time of < 300 µs. To be able to detect special labels, for example labels with punches or perforations, there are three different teach-in methods available.

### A) Learn both backing material and label dynamically

During the teach-in process, the backing material and its labels are guided through the fork at a constant speed. The esf-1 sensor automatically learns the signal level for the labels and for the gaps between the labels. This is the standard teach-in for labels.

### B) Separate Teach-in for backing material and labels

The signal level difference for the backing material and labels might be very slight. In order to still scan labels with very little difference in signals, Teach-in for the signal levels is done separately: Teach-in is firstly done for the backing material and then for the label on it. The switching threshold then lies between these two signal levels.

### C) Learn web material only

Web material is generally processed from a roll. The splice to be detected is hidden somewhere in the roll. There is a separate Teach-in method available for this purpose, in which only the sheeting is learned. The esf-1 detects the level difference at the splice and sets its output.

## EasyTeach

With EasyTeach, you have a simplified Teach-in process that you have to activate once before initial commissioning. To use EasyTeach, you have to decide whether the sensor will act as a label or a splice detector. Once EasyTeach is activated, you can't switch between NCC/NOC any more.

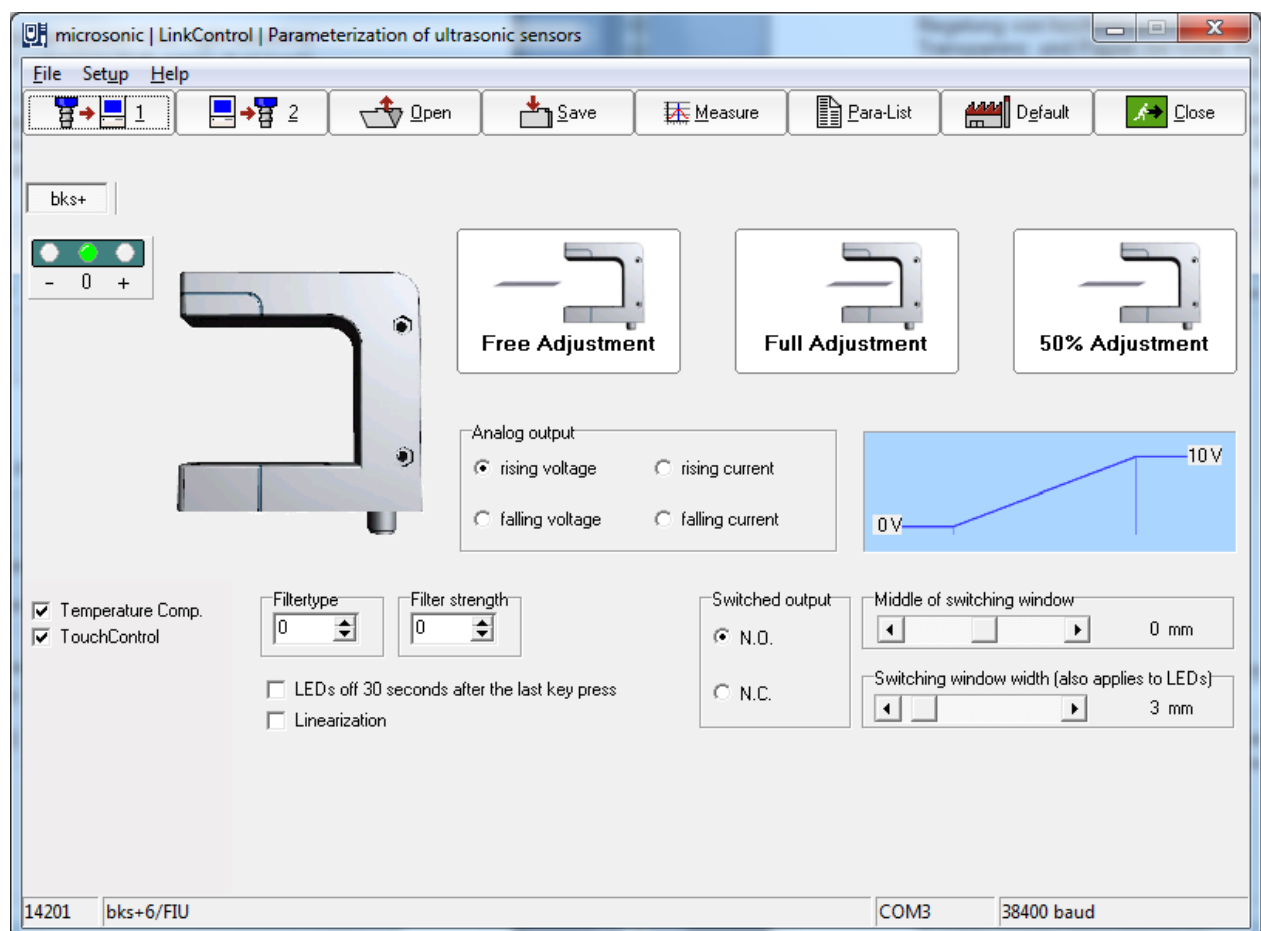
The EasyTeach functionality is available for sensors with lot numbers > 12xxxxx.

- ➔ Insert the web material into the fork and carry out one of the three standard Teach-in methods or EasyTeach.

## Web edge sensor bks+

The bks+ ultrasonic web edge sensor is a fork sensor for scanning the edges of sound-impermeable materials such as foil or paper. This is why the bks+ is ideally suited for the web control of high-transparency foils, light-sensitive materials, materials with greatly varying transparency and paper subject to high paper dust loads.



Both transducer and receiver are placed in a single, slim fork housing. The transducer in the lower leg emits short, cyclical sound pulses. These are detected by the ultrasonic receiver in the upper leg of the fork. A material embedded in the fork covers the sound gap and thereby dampens the receiving signal in depending on the coverage. This is analysed by internal electronics. An analogue signal is output depending of coverage




## Teach-in methods

To adjust the zero position of the edge to be controlled, the sensor can be calibrated with two options:

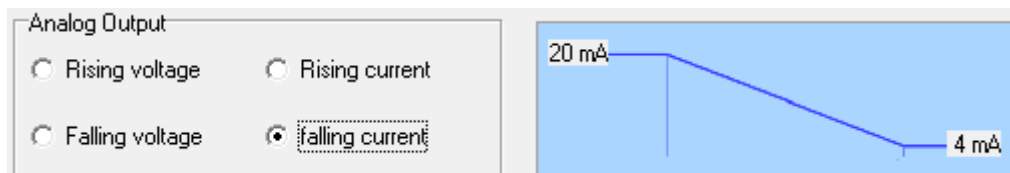
- Clear the fork completely of web material.

- Press button  then completely fill sensor fork and press button .

- Or align the web edge inside the fork with the two marks to ensure a 50 % coverage of the sound

- path, then press button  . Ready.

## Set analogue output

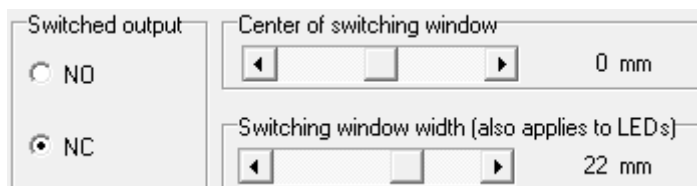


The analog output can be adjusted so that it supplies current or voltage. The characteristic can be selected as rising or falling.

Voltage/Current Increasing: voltage/current increases with higher coverage

Voltage/Current falling: voltage/current drops with higher coverage

## Set switched output



The switched output of the bks+../FIU or bks+../F can be used e.g. for monitoring purposes. It switches around the (adjustable) center in a (adjustable) window.

## Set filter



The following filter types are available:

- 0: filter off
- 1: moving average
- 2: median filter

The filter strength can be varied between 0 and 9 for each filter type.

## Further settings

### LEDs off 30 seconds after the last key press

If this feature is activated, the LEDs go out approx. 30 seconds after the last keystroke. This function may be necessary, for example, for light-sensitive materials.

### Linearization

The characteristic curve is linearised so that it has as straight a course as possible within its limits.

### Temperature compensation

See »Temperature compensation« on page 27.

### TouchControl

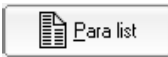
See »TouchControl« on page 28.

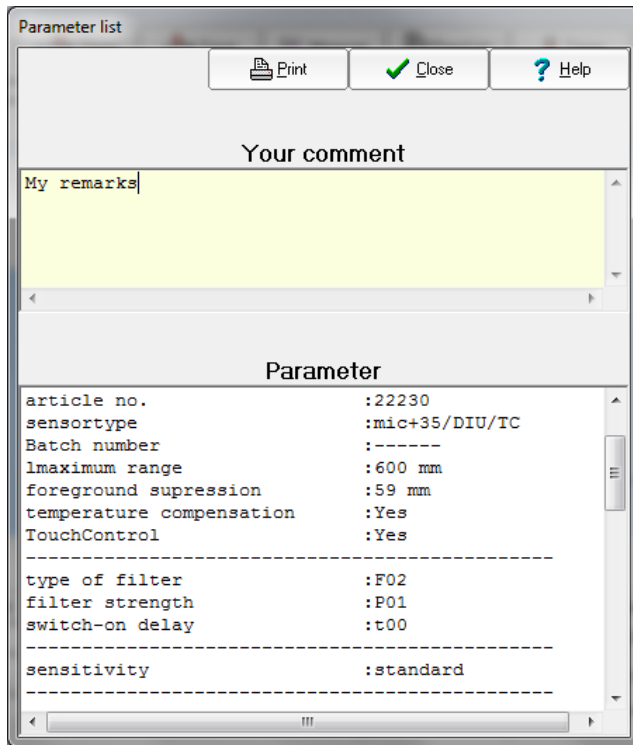


# Documentation of parameters

## Parameter list



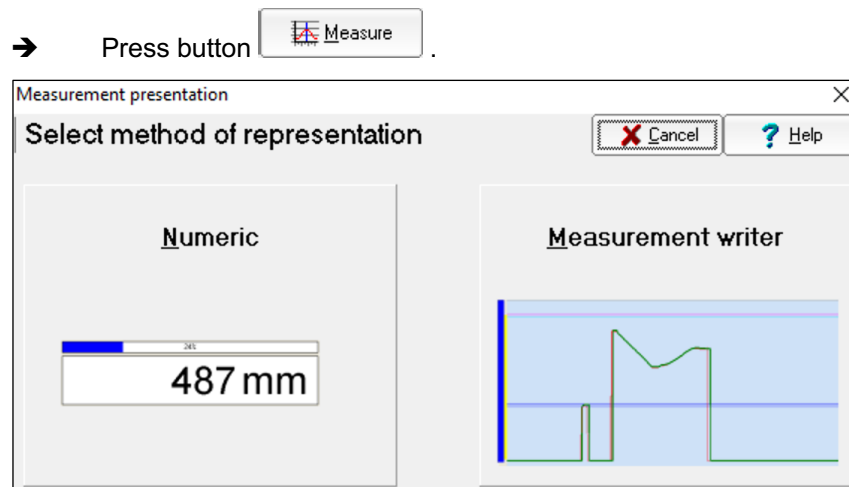
→ Press button  to get a list of the adjusted parameters.



This list documents the parameter settings of the sensor. Notes can be entered in the upper text field. All parameters of the sensor are listed in the lower text field. This list, including the comments, can be printed out for documentation purposes. The annotations are saved with the parameters when they are saved.

# Visualisation of measurements

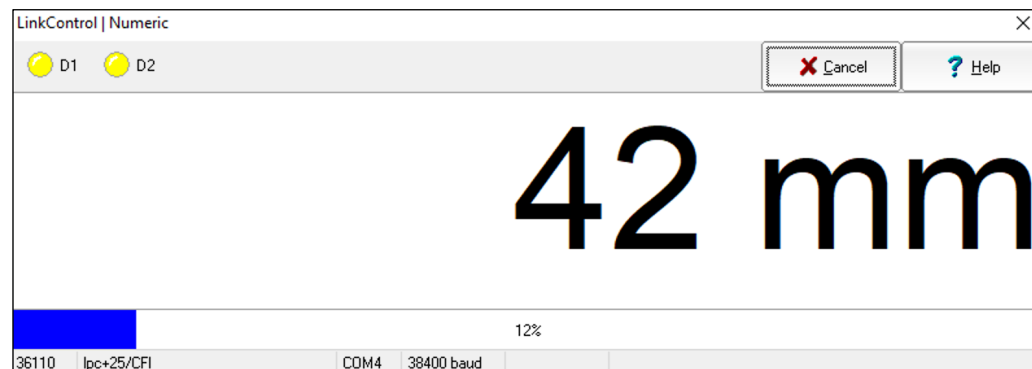
## Measurement presentation



The following measurement presentations can be selected:

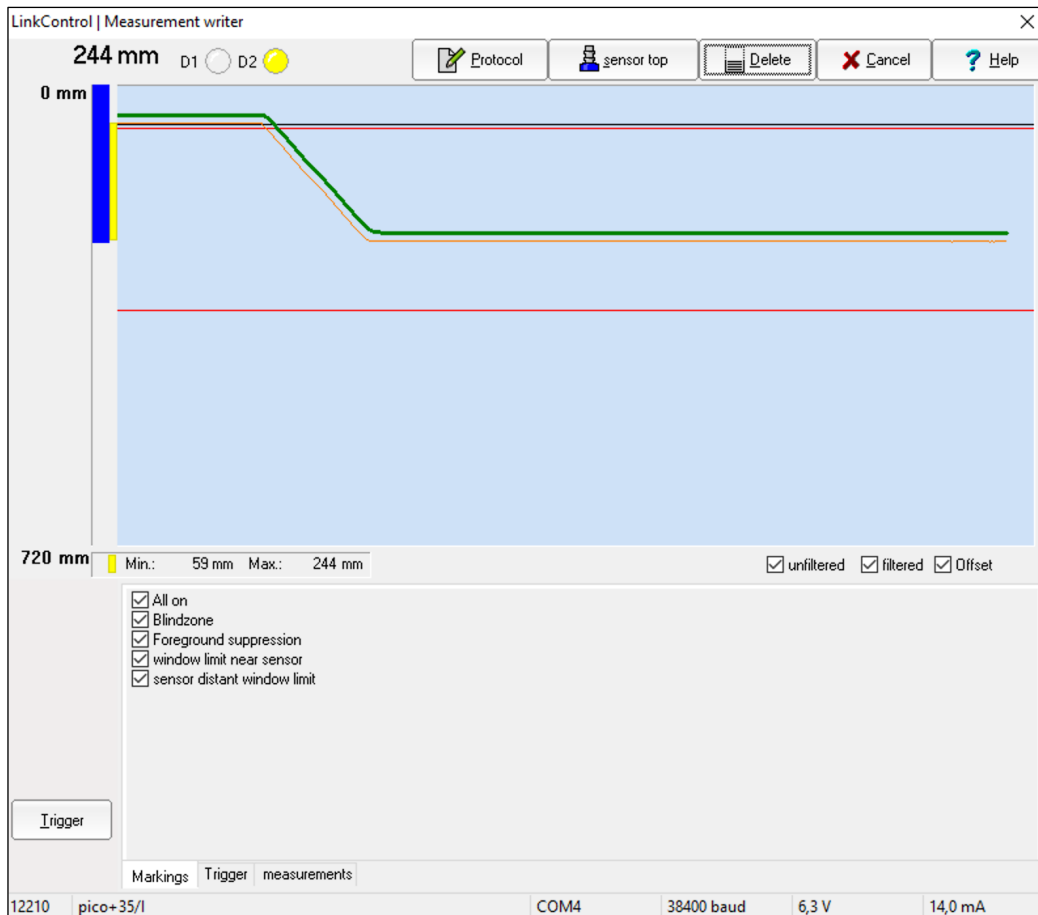
- Numeric
- Measurement writer

## Numeric presentation



The measured value is displayed numerically in mm and as a bar graph in percent. The set scanning range corresponds to 100 %. The LEDs D1 and D2 show the target state of the switching outputs S1 and S2 when the sensor is switching, or the target state of the analogue output when the sensor is analogue, provided that the parameters loaded in the input mask are identical to the parameters stored in the sensor.

## Measurement writer




Each measured value from the sensor is graphically displayed continuously over time as with an x-t-recorder. For sensors with analogue output, the target voltage and current are calculated based on the settings in the input mask and displayed in the lower part of the window. They should match the actual analogue signal available at the sensor output within the specified accuracy, provided that the parameters loaded in the input mask are identical to the parameters stored in the sensor.

The LEDs D1 and D2 show the target state of the switching outputs S1 and S2 when the sensor is switching, or the target state of the analogue output when the sensor is analogue, provided that the parameters loaded in the input mask are identical to the parameters stored in the sensor.

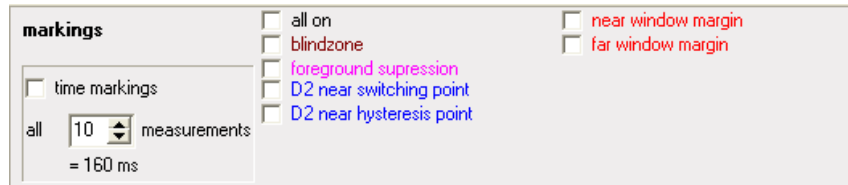
### Min/Max display

During measurement recording, the minimum and maximum measured values are displayed numerically and as a yellow bar to the left of the measurement window. The minimum and maximum can be reset with the »Delete« button.

## Trigger

After clicking on the button , further settings become visible. Among others, the following parameters can be displayed:

### Markings



Blindzone, foreground suppression, switching- and hysteresis points (on sensors with switching output) and window margins (on sensors with analogue output).

If »time markings« is activated, a vertical white line is shown in the diagram every X measurements. It represents the time between the measurements.

### Trigger



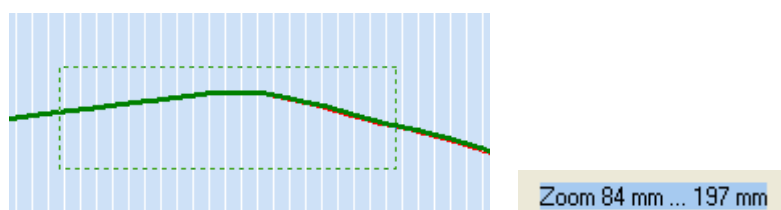
In the mode »Free Run« the measuring values are displayed in an continuous way. In the mode »Triggered« writing starts, when the distance value exceed a trigger level. The presentation ends with reaching the right window margin and starts only then, when the above mentioned condition comes true.

In the mode »Single Shot« displaying starts, when the values exceed a trigger level. The display ends when the right window margin is reached and does not start again until the »Reset« button is pressed.

### Zoom

The displayed measuring range (0 mm to the selected detection range) can be reduced for better visualisation.

- ➔ Select a section with the mouse pointer (hold down the left mouse button and drag). The area is displayed and the display is zoomed after releasing the left mouse button.



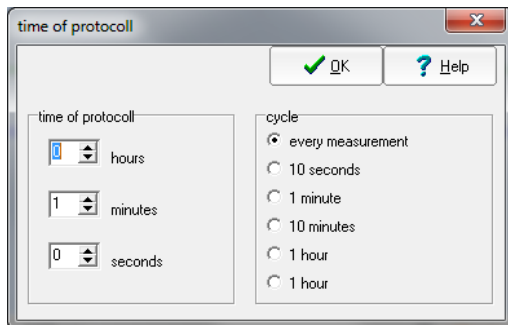
Switching off the zoom:

- Click on the graphic window with the left mouse button.

## Protocol measurements

The measured values can be written to a file to log a measurement:

- Press button »Protocol«.
- Specify a file name for the log file (extension is \*.TXT).
- Specify maximum logging duration.
- Specify logging cycle.



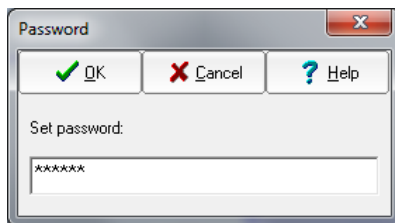
All sensor parameters are written to the file, followed by the measured values.

## Individual input mask

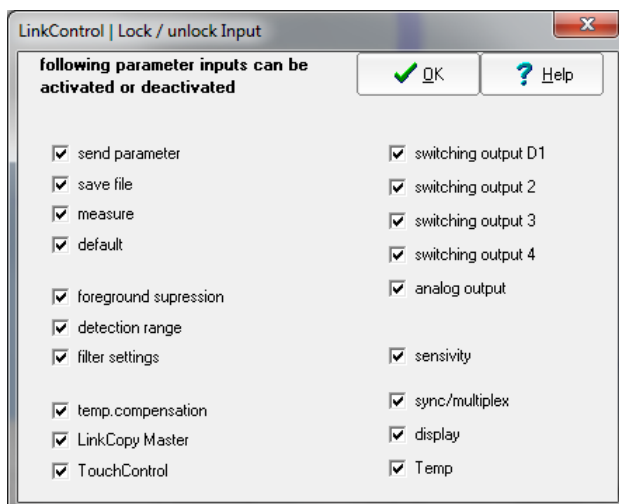
It is possible to create an individual input mask by locking or unlocking certain input fields. This is useful if, for example, you want to pass on a parameter set as well as the LinkControl software to third parties, but only want to allow the switching points to be adjusted.

To design an individual input mask, the LinkControl software offers the possibility to lock or unlock each parameter input individually.

- ➔ In the »File« menu, select the submenu »Lock inputs«.
- ➔ Enter password »snoopy«.



- ➔ Select which input fields are to be locked or unlocked.



## Offline functions of the LCA-2

The LinkControl-Adapter LCA-2 can also be used without connection to the PC to read, copy or write parameters.

### TeachBox functions

The TeachBox can be used to conveniently set all ultrasonic sensors taught via pin 5 on the sensor connector.

#### **Key functions:**

- T1        Press T1 to apply +UB to pin 5 of the sensor (on the display, the length of the button press is displayed in seconds).
  
- T2        Press T2 to apply -UB to pin 5 of the sensor (on the display, the length of the button press is displayed in seconds).
  
- R         Press R to interrupt the power supply of the sensor (reset).
  
- F         Press F to display the measured values in mm/cm in display mode (T1, T2 disabled, press R to exit).

## LinkCopy function

The LinkCopy function allows the download of parameters from the sensor to the LCA-2 and the subsequent upload of these parameters to a different sensor. This way, sensor settings can be conveniently copied from one sensor to the other.

### **Key functions:**

- F + T2 Loads all parameters from the sensor to the LCA-2 (download). The parameters are retained in the LCA-2 after the power supply is disconnected.
  
- T1 + T2 Option for some sensor families: calls offline parameterisation of parameters stored in the LCA-2 (parameters are only changed in the LCA-2).
  
- F + T1 Loads all parameters from the LCA-2 to the sensor (upload).
  
- R Press R to interrupt the power supply of the sensor (reset).
  
- F Press F to display the measured values in mm/cm in display mode (T1, T2 disabled, press R to exit).



For more information, see the LCA-2 Quick Start Guide.



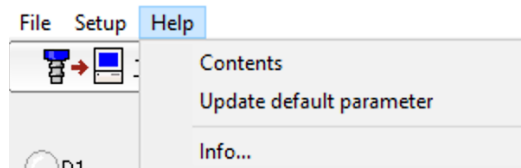
## Update LinkControl

LinkControl is constantly updated. The current LinkControl software can be downloaded from [microsonic.de](http://microsonic.de) under the following link:

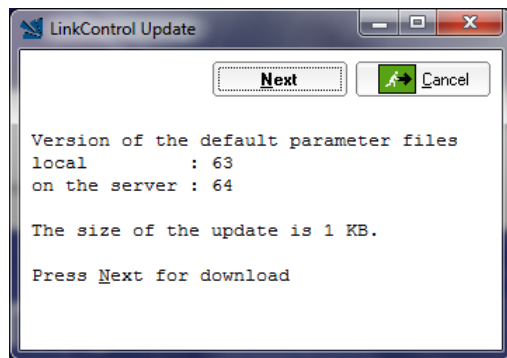
<https://www.microsonic.de/en/support/download/linkcontrol-software.htm>

LinkControl itself offers the possibility to update the default parameter files. This is necessary, for example, when microsonic launches new sensors on the market.

→ Select »Help/Update default parameters« for this purpose.



A dialogue shows the version installed on the computer and the version available on the Internet.



→ Press button »Next«.

The update for LinkControl is downloaded, unpacked and loaded into LinkControl.