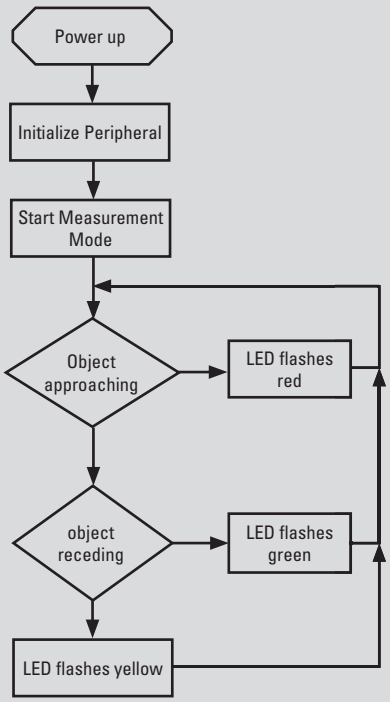
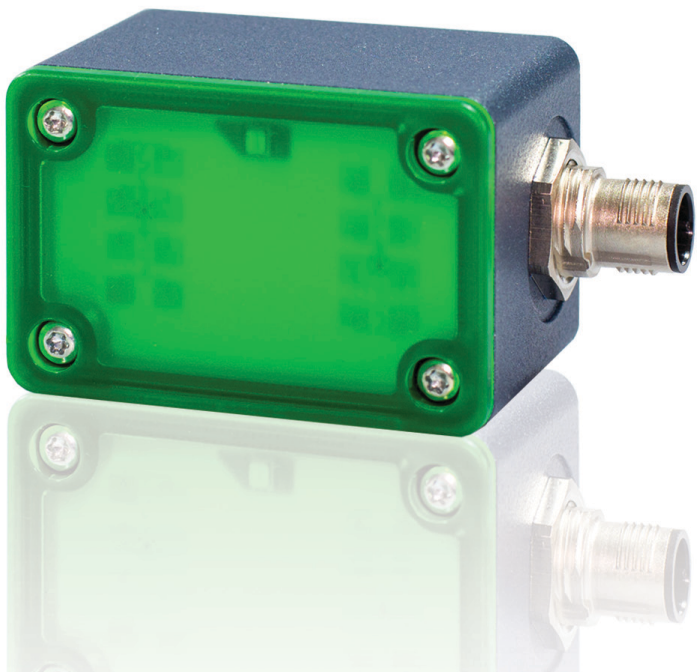
iSYS
www.InnoSenT.de

iSYS-4001
iSYS-4002
iSYS-4003
iSYS-4010

GUI interface - V2.2



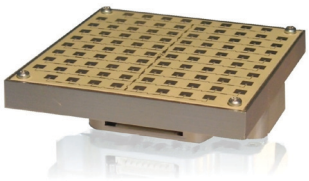


content

iSYS-400x

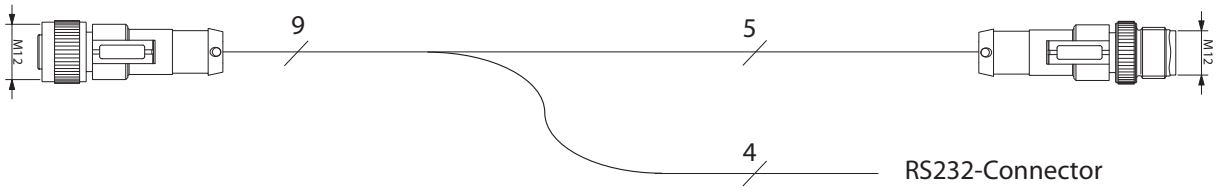
GUI - description

The iSYS-GUI can be used to configure and display the measured signals of an iSYS-400x radar sensor.
It displays the target list, FFT magnitude with threshold and the signal raw data.

iSYS-4001	iSYS-4002	iSYS-4003	iSYS-4010
			
RS232 -250...250 km/h	RS485 -250...250 km/h	RS485 -45...45 km/h „low speed“	RS485 -250...250 km/h

1. connecting the iSYS-400x to your PC

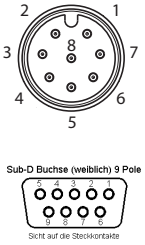
To connect the iSYS-400x with your PC use the following configuration (complete cables can be purchased from InnoSenT).



Also see device datasheet: DataSheet iSYS-4000-SERIES - CABLE SET.pdf

iSYS-4001

Input	Pin#	Signal	Pin#	Output
Connector M12x8 female	1	OUT1	1	Connector M12x8 male
Connector M12x8 female	2	OUT2	2	Connector M12x8 male
Connector M12x8 female	3	OUT3	3	Connector M12x8 male
Connector M12x8 female	5	VCC	5	Connector M12x8 male
Connector M12x8 female	6	GND	6	Connector M12x8 male
Connector M12x8 female	4	not connected	4	Connector Sub-D-9 female
Connector M12x8 female	6	GND	5	Connector Sub-D-9 female
Connector M12x8 female	7	RS232_Rx	2	Connector Sub-D-9 female
Connector M12x8 female	8	RS232_Tx	3	Connector Sub-D-9 female



iSYS-4002 / iSYS-4003

Input	Pin#	Signal	Pin#	Output
Connector M12x8 female	1	OUT1	1	Connector M12x8 male
Connector M12x8 female	2	OUT2	2	Connector M12x8 male
Connector M12x8 female	3	OUT3	3	Connector M12x8 male
Connector M12x8 female	5	VCC	5	Connector M12x8 male
Connector M12x8 female	6	GND	6	Connector M12x8 male
Connector M12x8 female	4	not connected	4	Connector Sub-D-9 female
Connector M12x8 female	6	GND	5	Connector Sub-D-9 female
Connector M12x8 female	7	R485_A	2	Connector Sub-D-9 female
Connector M12x8 female	8	RS485_B	3	Connector Sub-D-9 female

The sensor provides an M12x8 Conec type SAL - 12 - FSH8 - P5,5 - 9 (PN: 43-01071) with SAL - 12 - FKH8 - P5,5 - 9 PLUG (PN: 43-01063).

The sensor has a RS232 or RS485 interface (depending on sensor-type). An iSYS-4001 with RS232 interface can be connected directly to the COM port of the PC otherwise there can be a RS232 to USB adapter used. The Adapter installs a virtual COM port which can be selected in the GUI.

2. installing iSYS-GUI

Software is available @ www.innosent.de
(Service -> Downloads ->Software)

- Download Software-Package for iSYS-4001
- Open folder iSYS-4001_iSYS-4002_iSYS-4003/GUI/...
- Double-click on „iSYS_GUI_vX.XXX.exe“ to start Setup-Wizard.
- Follow instructions.

- Click „Finish“ to close setup and to launch GUI.

3. start screen

After launching the GUI the start screen appears.

To connect the iSYS-4001 sensor to the GUI

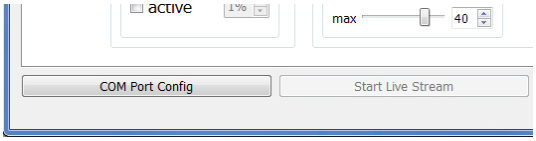
- click „COM Port Config“
- select your COM-Port
- set baud rate
- set device address (default=128)
- click „Connect“
- click „Close“

During the connection process the GUI reads some parameters from the Sensor. The red lamp in the connection window switches to green if successfull.

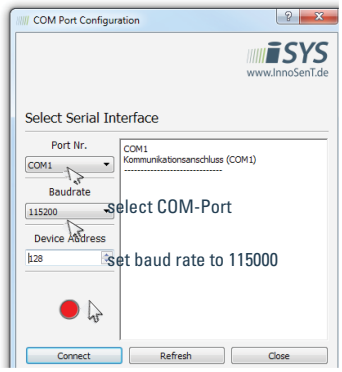
Default baud rates:

- iSYS-4001 115 200 Baud
- iSYS-4002 115 200 Baud
- iSYS-4003 9 600 Baud
- iSYS-4010 115 200 Baud

The device address is only for RS485 communication interface required. Adapt this address in case of RS485 interface to the devices address you want to connect.



click to configure COM Port



click to connect

4. „Live View“

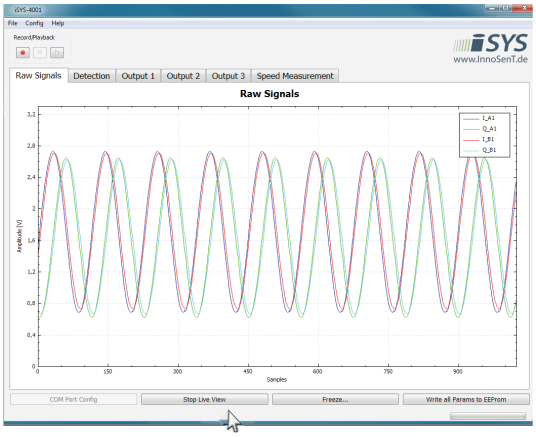
A click on „Start Live Stream“ starts displaying the live data in the opened tab.

4.1 Freeze/Run

For an improved analysis of the sensor data, the display can be frozen by clicking on “Freeze…”. To enable the live data again click on “Run…” .

4.2. Write all Params to EEPROM

This command writes all data into the EEPROM. This command is mandatory after setting all your parameters, otherwise all configurations made are lost.



click to start „Live View“

5. „Save“ - „Load“ configuration

To configure more than one sensor with the same settings all parameters can be saved in an *.ipf file.

5.1 Save configuration to file

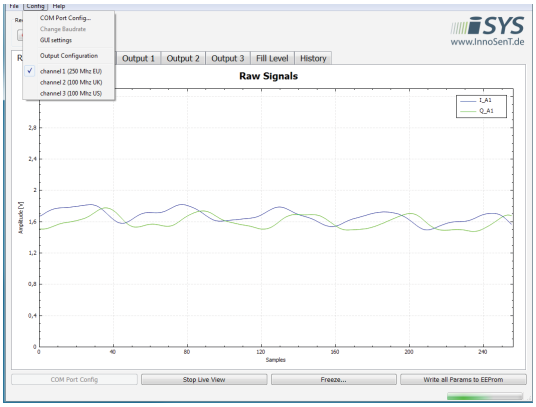
By clicking on “File” => “Save configuration to file” the actual parameters will be saved in an *.ipf file.

5.2. Load configuration from file

By clicking on “File” => “Load configuration from file” parameter sets can be loaded. To write these parameters to the sensor click on “Write all parameters to EEPROM” otherwise the settings are lost after shutdown the sensor. The Standard configuration is the “Short Range” parameter set (compare table beside). Other parameters sets are available @ www.innosent.de

	Short Range.ipf
output1	approaching & receding active low, if object exist open, if NO object exist
output 2	approaching open, if object exist active low, if NO object exist
output 3	receding open, if object exist active low, if NO object exist
rising delay	375ms
falling delay	75ms
filter type	highest amplitude
single target filter	20% for all outputs
amplification	20dB
distance range	0....50m
detection level	0dB

6. frequency channels

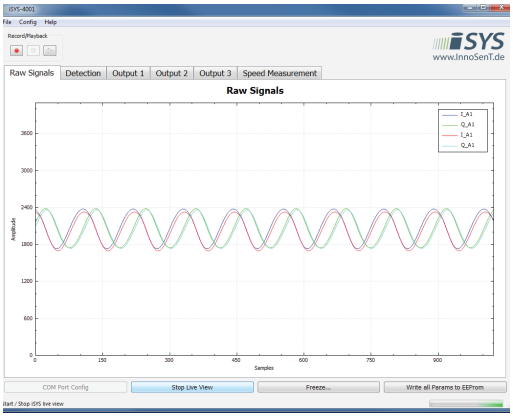


To avoid interferences if two sensors are mounted close to each other 2 different frequency channels can be selected.

- click „Config“
- select „use channel 1“ or „use channel 2“ for using the sensor in Europe
- select „use channel 3“ or „use channel 4“ for using the sensor in the US

Channel 1 is corresponding to a transmit frequency of 24.190GHz
Channel 2 is corresponding to a transmit frequency of 24.210GHz
Channel 3 is corresponding to a transmit frequency of 24.115GHz
Channel 4 is corresponding to a transmit frequency of 24.135GHz
Channel 5-8 are available from firmware v1.310
Channel 5 is corresponding to a transmit frequency of 24.195GHz
Channel 6 is corresponding to a transmit frequency of 24.215GHz
Channel 7 is corresponding to a transmit frequency of 24.120GHz
Channel 8 is corresponding to a transmit frequency of 24.140GHz

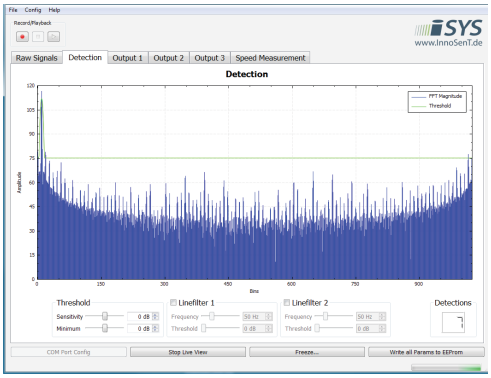
7. tab „Raw Signals“



The Option „Raw Signals“ can be used to view the analog received signals.

The raw signals tab shows the signal raw data which sampled by the analog to digital converter.

8. tab „Detection“



This tab shows the FFT and the threshold calculated by the radar sensor.

The threshold consists of three parts:

- adaptive value, height of the threshold depending on the noise level
- low-pass filter, for the frequency selection of the different objects
- user defined threshold value, will be added to the threshold

8.1. User defined threshold values

Minimum:
The threshold is limited to a minimum value. This value can be adapted with the minimum slider.
Sensitivity:
The height of the low pass filtered signal can be changed with the sensitivity slider.

8.2. Linefilter

By activating the Line Filters, several frequencies can be cancelled. This can be used for example to prevent interference from fluorescent lamps.

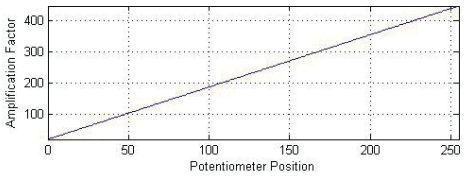
8.3 Threshold adaption

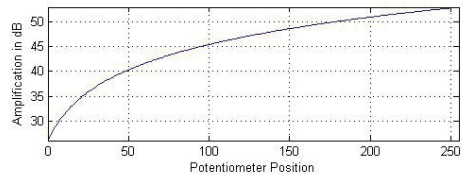
Adapt the threshold within a few steps to a specific application scenario:

- Install the iSYS-400x in the real scenario
- Open the iSYS-GUI and connect to the device and start "Live View"
- The blue bars are the spectrum of the received signal and in green is plotted the threshold for detection
- Adapt the threshold by moving the "Minimum" slider. If you want to improve the detection range move the slider to the left to shift the threshold down.
- For a proper function shift the detection line down as long you can see no detection. Take care that there are no available targets in your detection field while adjusting.

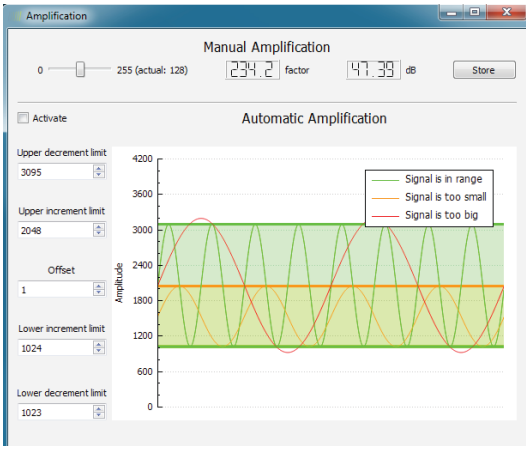
9. IF amplification

The iSYS-4001 sensor features a variable IF amplification with an 8 Bit digital potentiometer. For changing the amplification, open the amplification window in „Config" => „Amplification".



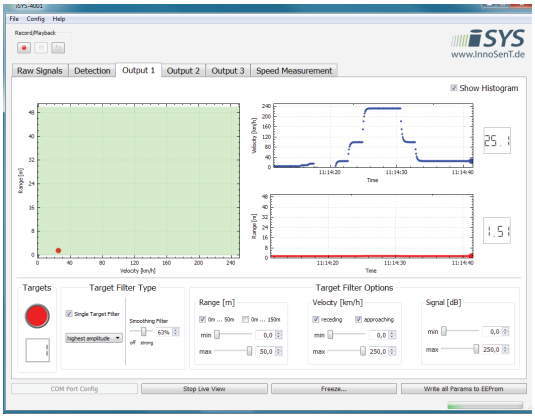


Manual amplification:
Adapt the digital potentiometer step with the slider.
The button "Store" stores all actual set parameters including the amplification into the devices EEPROM.
The figures beside are showing the amplification for the different potentiometer positions.



Automatic amplification:
Use the automatic amplification if you have continuous signals with constant amplitudes.
If the signals does not exceed the inner threshold (orange area), the signal will be increased.
If the radar signal exceeds the inner threshold, but does not exceed the outer threshold (green area), nothing happens to the signal amplification (signal is inside hysteresis).
If the radar signal exceeds the outer threshold, the signal amplification will be decreased.

10. tab „output 1-3“



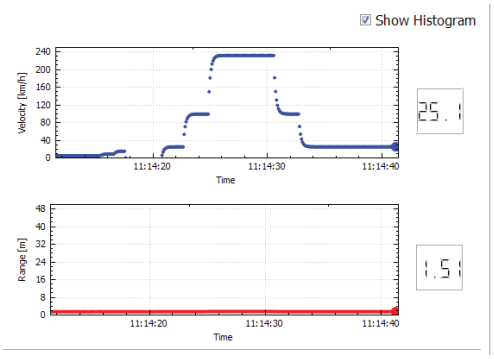
The iSYS-4001 offers 3 output signals that can be activated and configured independently of each other.

The tabs “Output 1”, “Output 2” and “Output 3” shows the different target lists. Each target list has separate filter parameters which can be changed in the specific output tab.

During a live stream a colored button shows the actual status of the detected object:

- Green – object is receding
- Red – object is approaching
- Orange – no object detected

Show Histogram
By activating the Histogram option you can follow the time dependent trend of changes in speed and range of the object(s).



Target filter type:
While **single target filter** is deactivated all targets are shown in the different Plots. With an activated single target filter you can choose a filter type to get one target out of all detections. The filter type must be chosen depending on the application scenario. If unsure try the **highest amplitude** first.

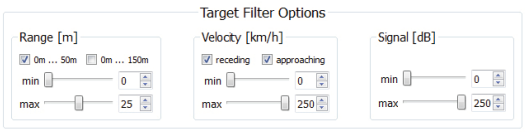
- **Highest amplitude:** Get the target with the highest amplitude in the detection tab
- **Mean velocity:** Get a target with the mean velocity from all target
- **Median velocity:** Get a target with the median velocity from all targets
- **Minimum velocity:** Get the target with the lowest velocity
- **Maximum velocity:** Get the target with the highest velocity
- **Mean range:** Get a target with the mean range from all target
- **Median range:** Get a target with the median range from all targets
- **Minimum range:** Get the target with the lowest range
- **Maximum range:** Get the target with the highest range

The selection of the wanted option has a direct influence to the signals in the GUI as well as on the Output Configuration.

Smoothing filter:
The “smoothing filter” filters the velocity and range values from successive measurements. By moving the slider you can adjust the degree of filtering. On the left side the filter is off and to the right the degree of filtering increases. Use this filter if you have a constant target.

Target filter options:

The target filter options declare the velocity-, range- and signal-area within the sensor is able to detect objects. Velocity has an additional option to set the sign of the velocity to detect only receding or approaching objects.



The filters can be set in the following range:

iSYS-4001/ iSYS-4002/ iSYS-4010

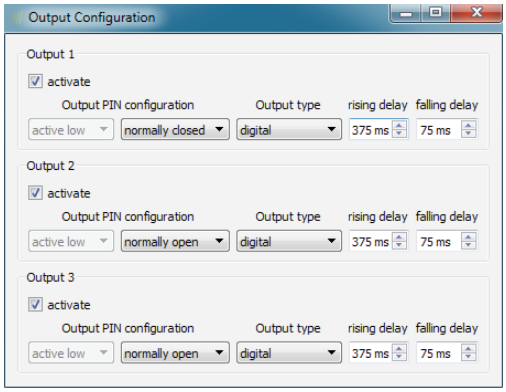
Speed range:	0....250km/h
Distance range 1:	0....50m
Distance range 2:	0....150m
Signal Level:	0....250dB

iSYS-4003

Speed range:	0....50km/h
Distance range 1:	0....50m
Distance range 2:	0....150m
Signal Level:	0....250dB

11. digital output configuration

To configure the output signals go to menu „Config“ => „Output Configuration“



The output PINs can be activated and configured separately from each other.

Possible setting of output type are:

- digital (open drain)
- pwm (velocity) (open drain)
- pwm (range) (open drain)

In case of „pwm“ a pulse-width modulated signal will be send to the output PINs corresponding to the speed or range of the objects (depending on which option is selected)

Output PIN configuration:

configuration	description	target detected	output pin state
normally open	low side switch	yes	high impedance
normally open	low side switch	no	connected to GND
normally closed	low side switch	yes	connected to GND
normally closed	low side switch	no	high impedance

Delay Configuration:

This feature is used to influence the output timing of an object. To blank out false object, generated by noise measurement, you can set the rising delay. Therefore an object has to be detected some cycles in a row until the information is transmitted. The cycle time is 75ms. When the rising delay is set to 375ms it takes five cycles until you can get target data. When rising delay is zero you get the data directly. The falling delay holds target information after it is undetected until the time has run out. With a falling delay of 75ms an object is one cycle active after the sensor lost detection. If you want to measure in real-time, rising and falling delay have to be set to zero.

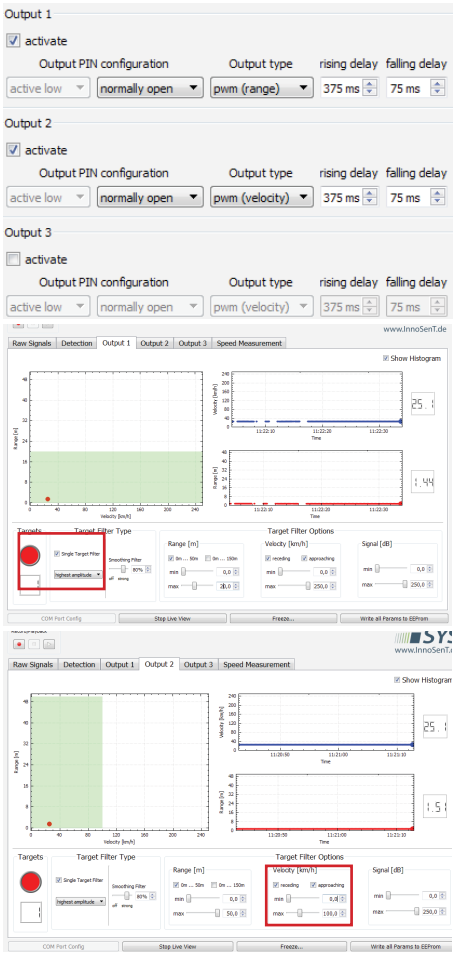
Output type:

- digital: Open as soon as there is a target available – otherwise LOW
- pwm (velocity): Streaming velocity information of "single target filter" coded with duty cycle
- pwm (range): Streaming range information of "single target filter" coded with duty cycle

Duty cycle is calculated by the iSYS-400x by following formula:

$$DC = \frac{\text{Measured value} - \text{Threshold}_{min}}{\text{Threshold}_{max} - \text{Threshold}_{min}} \cdot 100$$

Example configuration for Output 1 set as "pwm (range)" and Output 2 set as "pwm (velocity)", Output 3 is disabled



Output 1 (pwm range):

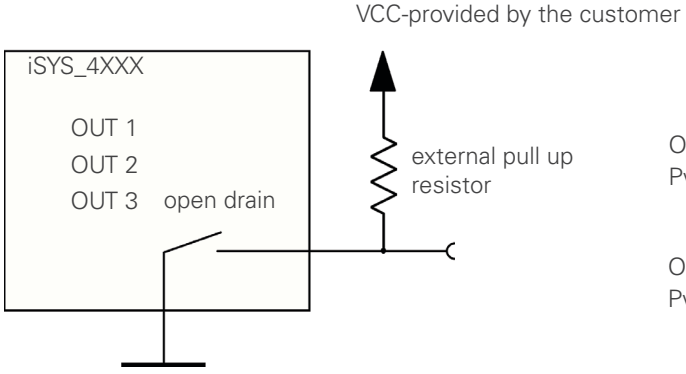
$$DC = \frac{1.44m - 0m}{20m - 0m} * 100 = 7.2\%$$

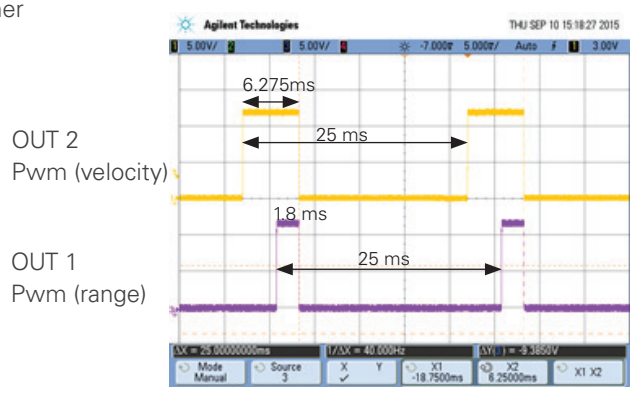
$$T_{ON} = 7.2\% * 25ms = 1.8ms$$

Output 2 (pwm velocity):

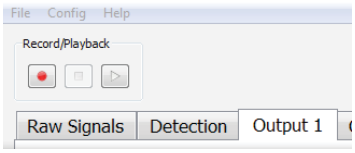
$$DC = \frac{25.1km/h - 0km/h}{100km/h - 0km/h} * 100 = 25.1\%$$

$$T_{ON} = 25.1\% * 25ms = 6.275ms$$

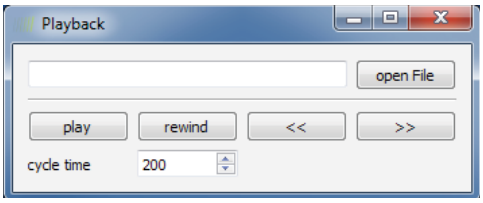




12. record & playback



The iSYS-4001 radar sensor features a record & playback functionality for raw data, fft & threshold and Targetlist. Depending on the active tab the specific data is recorded.

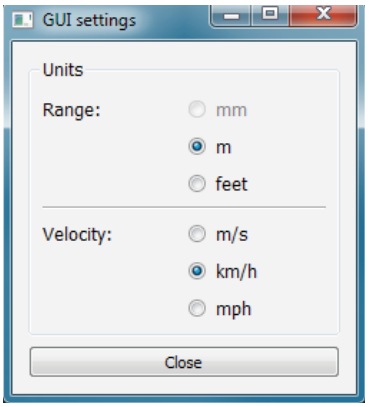


- **record:** Start recording with record button. Stop recording with stop button and chose file name and storage location. A filename including date and time is suggested.

- **playback:** Open playback window with play button. After opening a recoded file (xx.log) the playback can be started. Set the playback speed by adjusting the cycle time (The cycle time of the iSYS-4003 is 300 ms – all other devices working with 75 ms.).

13. GUI setting

Open in the GUI setting window in the "Config" menu. Change the units as useful for the measurements.

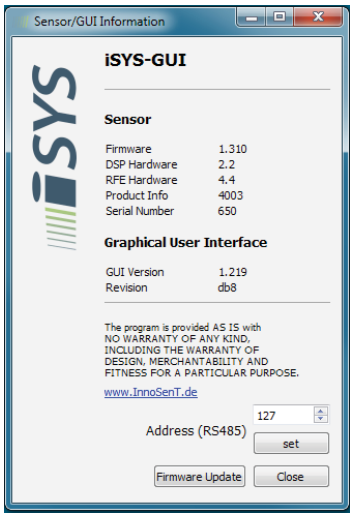


14. Change RS485 address

Changing RS485 address is a special feature of the iSYS-4002 and iSYS-4003. Open the slider window in the "Help" menu under "About". Set the new device address and click set.

After changing the device address the command acknowledge is sent with the new device address.

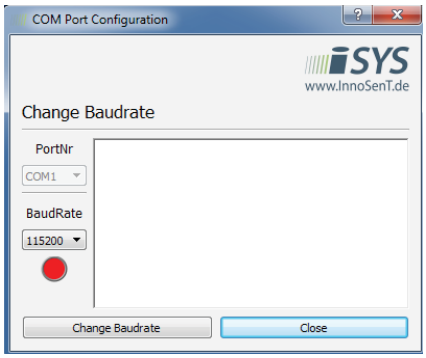
Note: The address is written directly to the EEPROM.



15. Change RS232 / RS485 baudrate

The iSYS-4001 sensor supports different baudrates. For changing the baudrate, open the slider window in the "Config" menu under "Change Baudrate"."
Select new baudrate in dropdown menu and click "Change Baudrate".

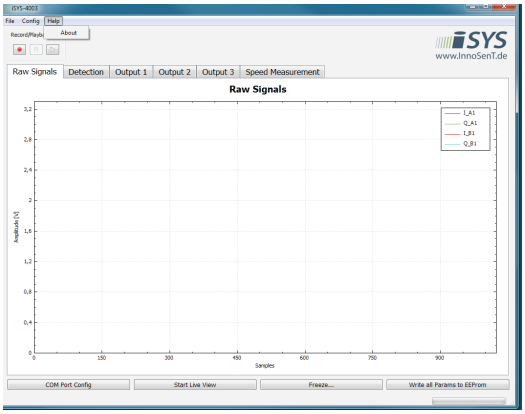
Note: The baudrate is written directly to the EEPROM.
Can only changed if "Live View" stopped.



16. firmware

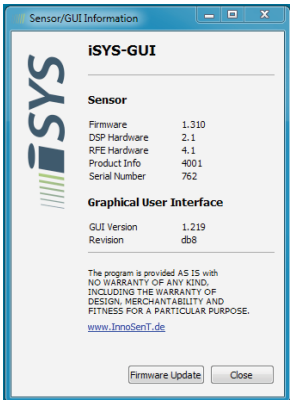
Firmware is available @ www.innosent.de (Service -> Downloads -> Software) Software-Package folder: iSYS-4001_iSYS-4002_iSYS-4003\Firmware\..

To start the firmware update go to menue „Help“ => „about“



16.1 sensor/GUI information

Information about the actual sensor firmware and GUI software



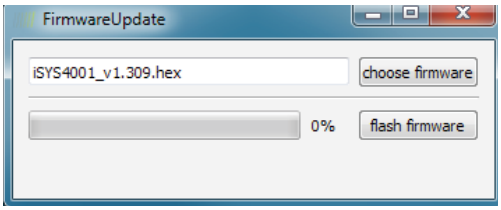
(1)

16.2 firmware update

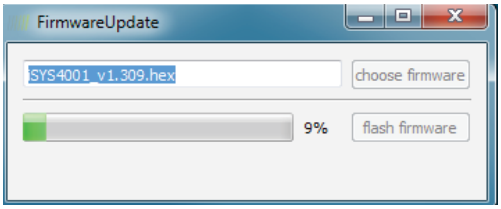
To start the firmware update

- select „update“ **(1)**
- select new firmware version (*.hex - file) **(2)**
- confirm with button „flash firmware“ **(3)**
- wait until progress bar reaches 100% **(4)**

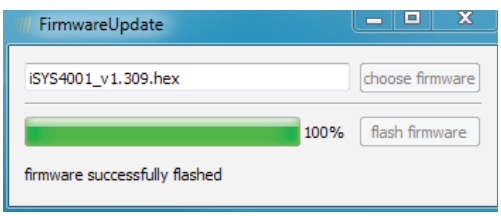
Note: Use same firmware iSYS-4001_vX.XXX.hex for all devices: 4001, 4002, 4003, 4010



(2)



(3)



(4)

contact information

If you have any questions please contact us!

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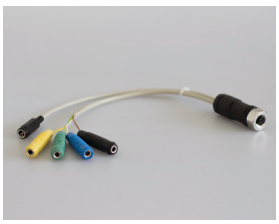
part numbers

P/N: iSYS-4001

P/N: iSYS-prog_adap



P/N: iSYS-pow_adap

P/N: iSYS-pow_supply

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