

**CORRSYS**

**DATRON**

Sensorsysteme GmbH



# CeCalWin Pro & LFII P Sensor Configuration and Data Acquisition Software

for

*Set-up and calibration of the CORRSYS-DATRON LFII P Sensor*

## USER MANUAL VOLUME III

LFII P

Sensor-specific Software Description

## Note:

For a general description of the CeCalWin Pro Software please refer to the separate user manual Volume II.

For the hardware description of the LFII P Sensor please refer to the separate user manual Volume I.

# VOLUME III - LFII P Sensor-specific Software Description

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# General Information

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## Revision

LFIIIP-CCWPro\_m-816-p3-e-rev001 10/08

## Contact

International Headquarters:

**CORRSYS-DATRON Sensorsysteme GmbH**

Charlotte-Bamberg-Str. 12

35578 Wetzlar / Germany

Phone ++49 (6441) 9282-0

Hotline ++49 (6441) 9282-82

Fax ++49 (6441) 9282-17

E-mail [sales@corrsys-datron.com](mailto:sales@corrsys-datron.com)

URL [www.corrsys-datron.com](http://www.corrsys-datron.com)

North American Headquarters:

**CORRSYS-DATRON Sensorsystems, Inc.**

40000 Grand River, Suite 503

Novi, MI 48375 / USA

Phone ++1 (248) 615-2035

Toll-free++1 (800) 832-0732

Fax ++1 (248) 615-2184

E-mail [USA-sales@corrsys-datron.com](mailto:USA-sales@corrsys-datron.com)

URL [www.corrsys-datron.com](http://www.corrsys-datron.com)

China Headquarters:

**CORRSYS-DATRON Sensorsysteme GmbH, China Office**

Room 610, JinTianDi International Mansion,

No. 998 RenMin Road, Shanghai (200021), P.R.China

Tel.: ++86-21-63114144

Fax: ++86-21-63114154

E-mail: [Xiaoying.Li@corrsys-datron.com.cn](mailto:Xiaoying.Li@corrsys-datron.com.cn)

URL: [www.corrsys-datron.com.cn](http://www.corrsys-datron.com.cn)

# Safety Instructions

Please read the following instructions carefully before installing or using CeCalWin Pro Software

CORRSYS-DATRON is not responsible for damage that may occur if hardware and/or software is used in any way other than that for which it is intended.

To assure safe and proper operation, all supplied equipment, components and/or accessories must be carefully transported and stored, as well as professionally installed and operated. Careful maintenance and usage in full accordance with operating instructions is imperative.

CORRSYS-DATRON hardware and/or software should be installed and operated only by qualified persons who are familiar with devices of this type.

Local regulations may not permit the operation of motor vehicles on public highways while the equipment is mounted on the exterior of the vehicle.

- Use hardware and/or software only for intended applications. Improper application is not advised.
- Do not modify or change equipment or its accessories in any way.
- Improper use or mounting of the equipment may affect the safety of the vehicle and/or occupants.
- The equipment must not be mounted and/or operated in any way that may compromise vehicle or and/or occupant safety.
- Equipment must be mounted firmly and securely.
- Use only original equipment, components and/or accessories included in the scope of delivery.
- Do not mount equipment, components and/or accessories near heat sources (e.g. exhaust).
- Do not use defective or damaged equipment, components and/or accessories.
- Always note correct pin assignments and operating voltages when connecting equipment to power supplies, data acquisition/evaluation systems, and/or any other applicable system or component. Equipment may be damaged if not properly connected and/or operated.
- CORRSYS-DATRON recommends using cables supplied within the scope of delivery. If it is necessary to make cables, always note correct pin assignments (see the pin assignments in the supplied sensor user manual).  
Damage to the device caused by cables other than those supplied by CORRSYS-DATRON is not covered under the product warranty.
- For additional information, please call the CORRSYS-DATRON Hotline: ++49 (6441) 9282-82 or email: [hotline@corrsys-datron.com](mailto:hotline@corrsys-datron.com).

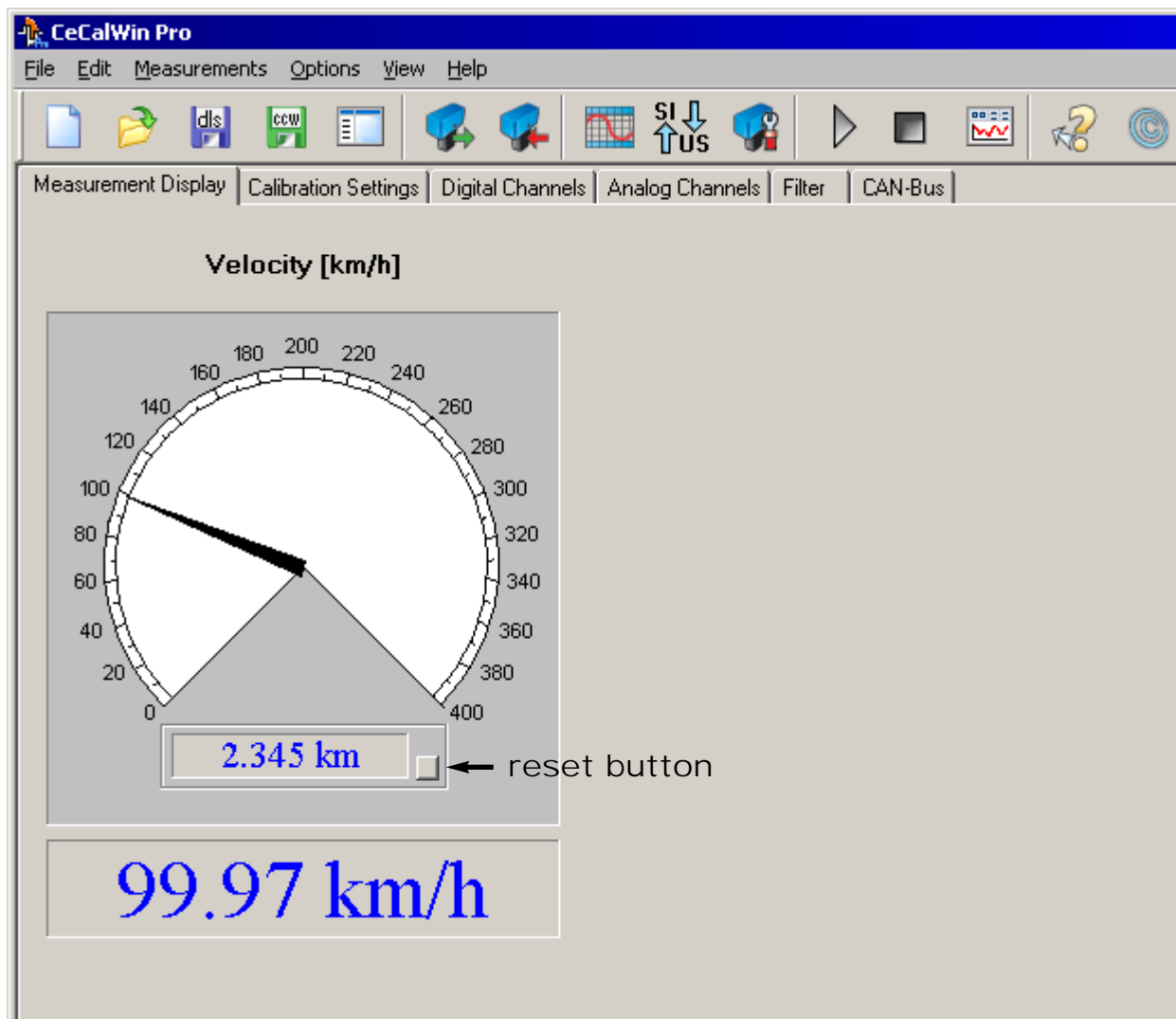
## 1. Project Window Settings for the LFII P Sensor

Within the Project Window, six tabbed sections will be displayed: Measurement Display, Calibration Settings, Digital Channels, Analog Channels, Filter, and CAN-Bus.

Options for system configuration, operation and data display are explained in the following pages.

### 1.1 Measurement Display

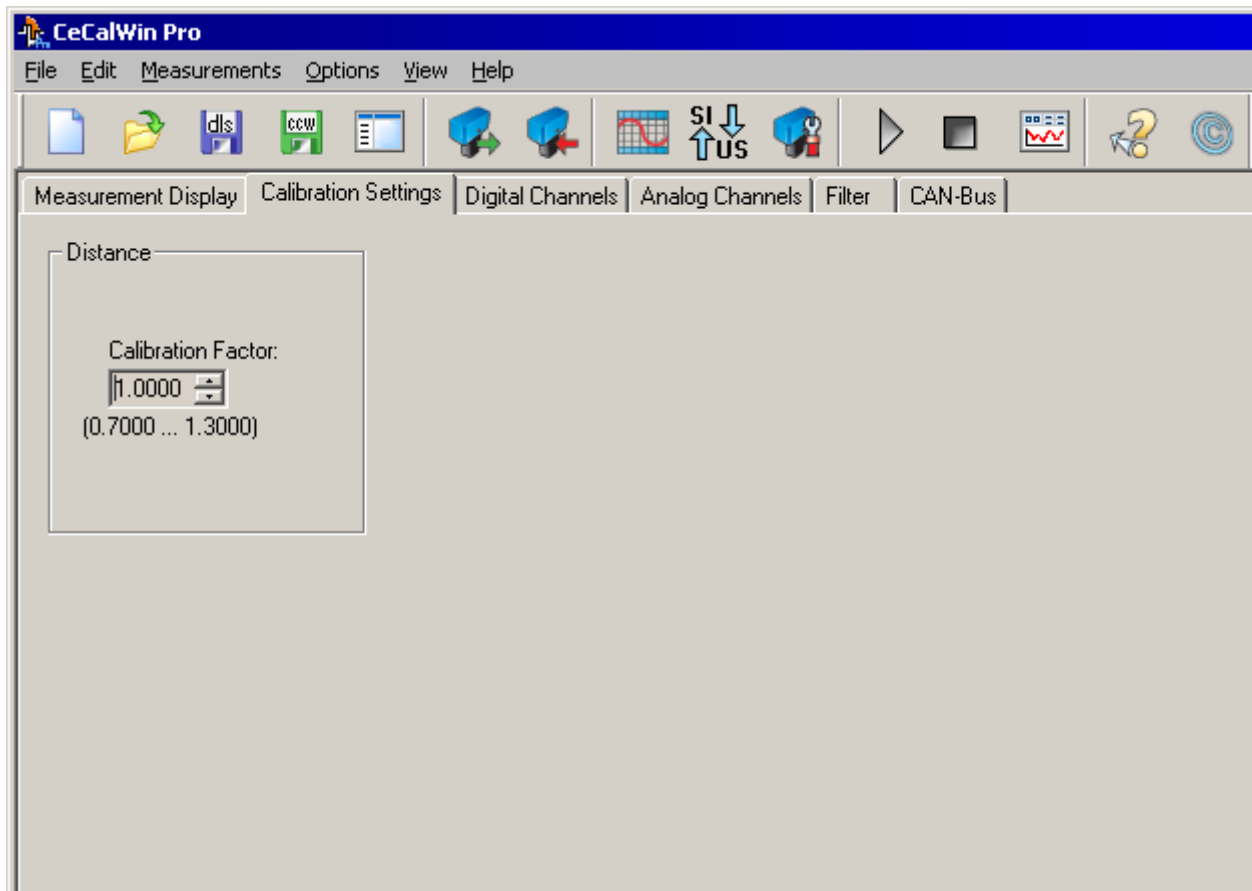
The Measurement Display tab shows measurement values from the LFII P Sensor in real time.



The display shows the actual velocity and the milage of the sensor. With the reset button, the user can reset the milage to 0.

## 1.2 Calibration Settings

The Calibration Settings tab enables editing the calibration factor.



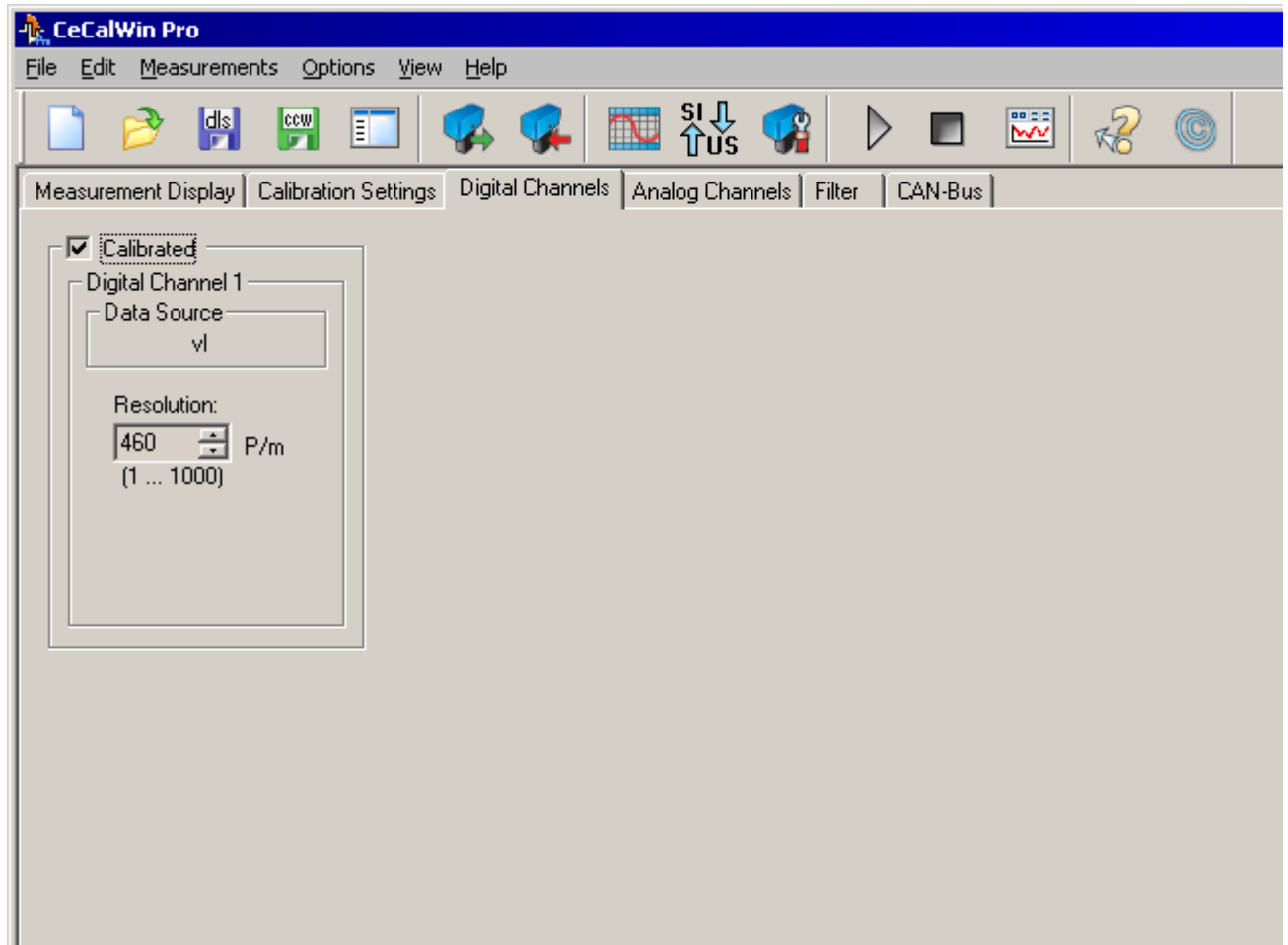
### Distance

Calibration factor (Default value = 1.0000)

Displays the value that is calculated during calibration to correct for mounting errors, surface changes, etc. The value can also be changed by using the scroll-edit function, or enter new value manually.

### 1.3 Digital Channels

The digital output can be configured from within this section per the following descriptions.



#### Output

##### Calibrated

Select the checkbox to set microcontroller calculated signal on Digital Channel 1.

##### Digital channel 1

Data source is the longitudinal velocity.

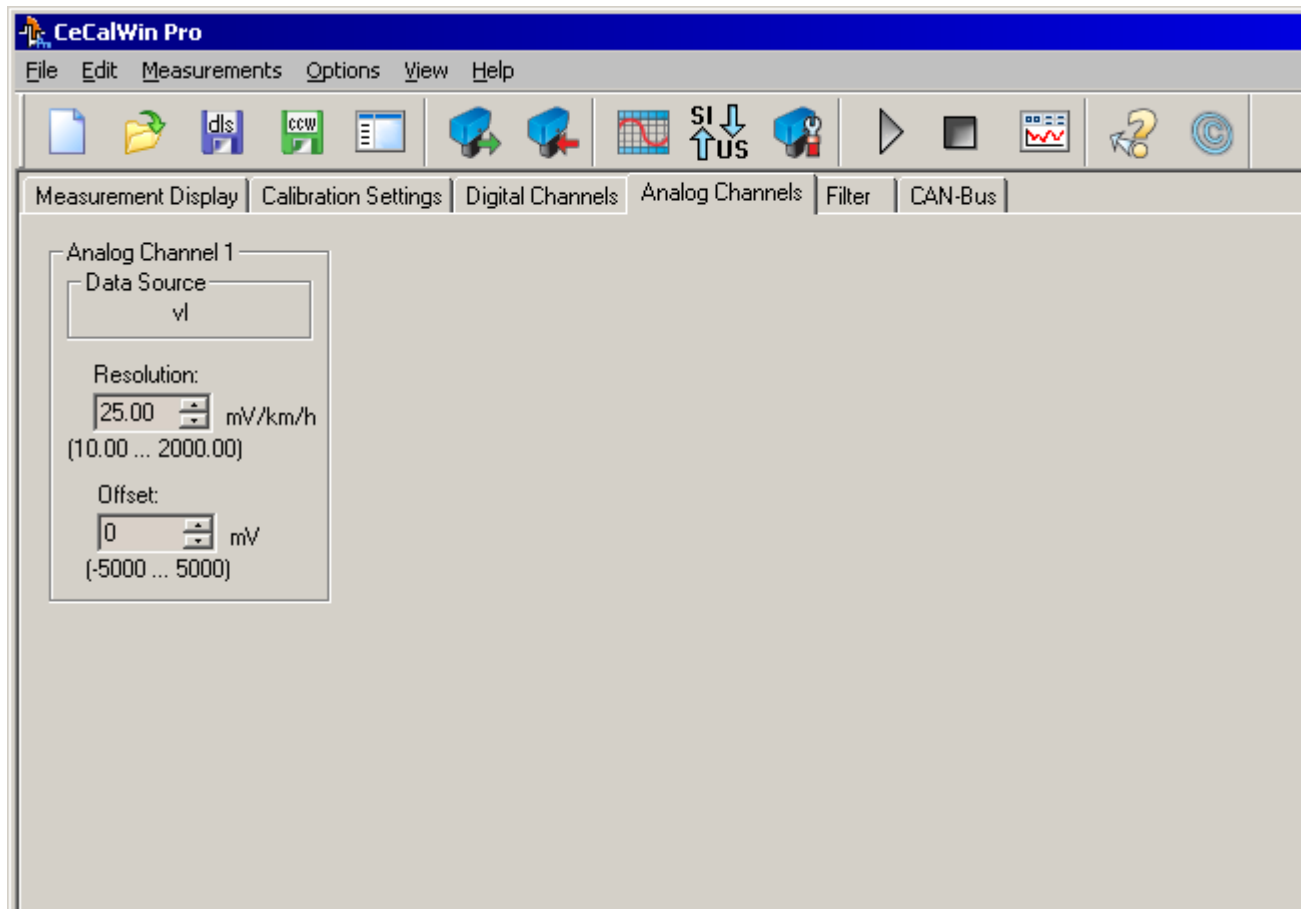
##### Resolution (Default value = 460 P/m)

Selects the number of digital pulses/meter at the digital output.

Other values can be entered manually, or by using the scroll-edit field.

## 1.4 Analog Channels

The analog output can be configured from within this section per the following descriptions.



### Analog Channel 1

Data source is the longitudinal velocity.

Options in the Analog Channel section are used to control variables related to speed measurement.

Resolution (Default value = 25 mV/km/h)

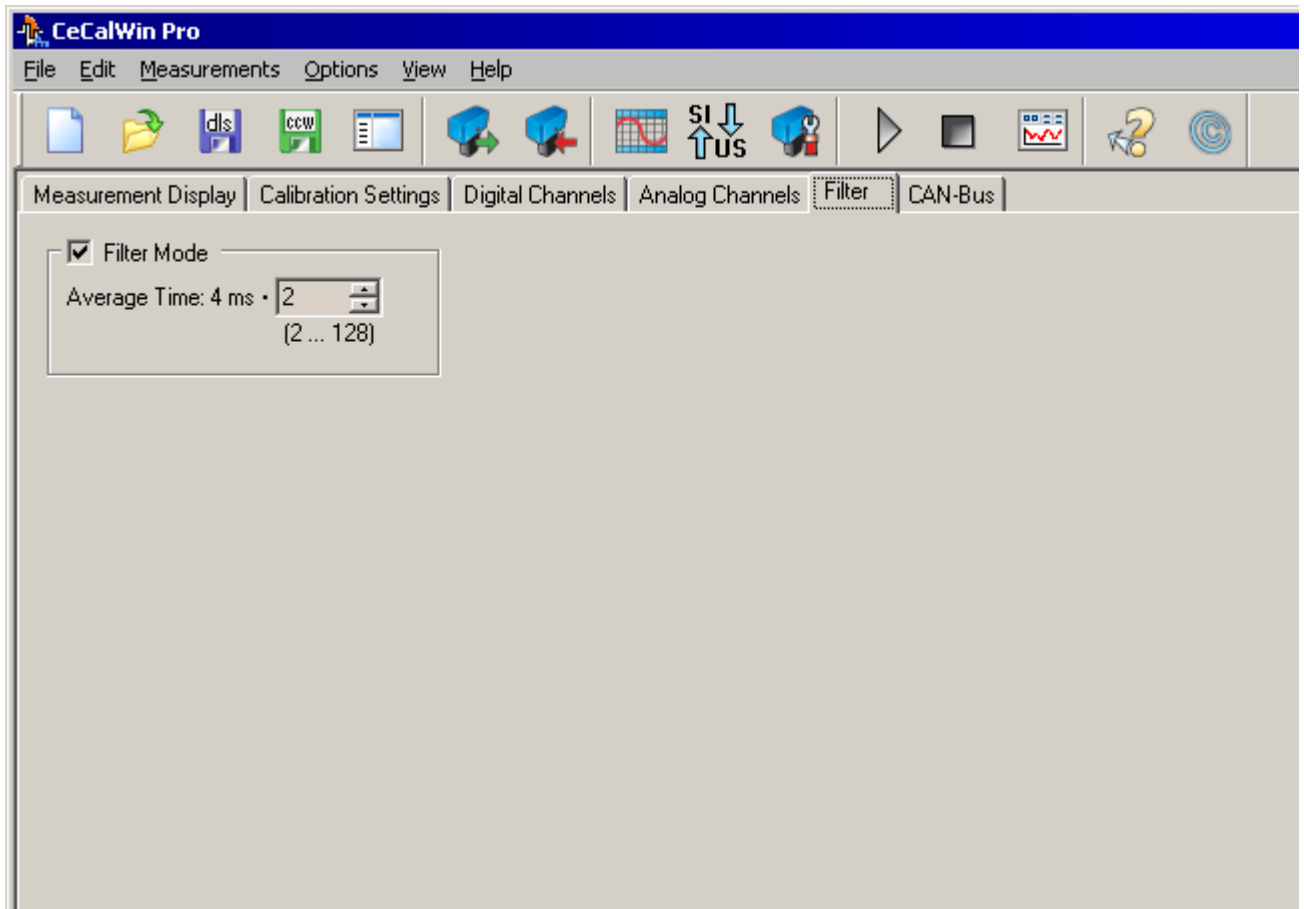
Use the scroll-edit field to set the resolution of the analog output, or enter the new value manually.

Offset (Default value = 0 mV)

Use the scroll-edit field to define an additional offset value, or enter the new value manually.

## 1.5 Filter

The Filter tab enables adjustment of the filter-time setting for a connected CORREVIT® LFII P Sensor.



### Filter Mode

Select the checkbox to activate access to the filter-time setting for the connected CORREVIT® LFII P Sensor.

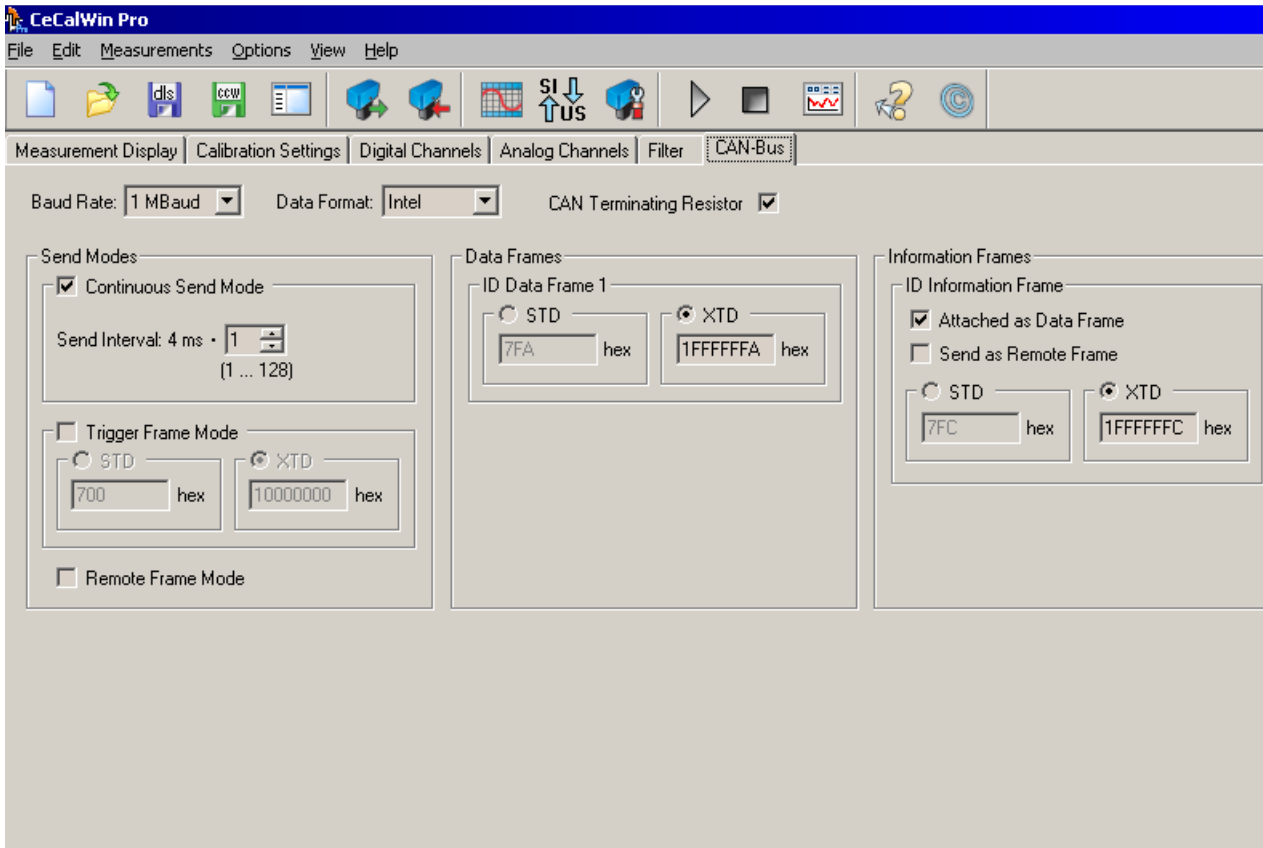
Average Time: user-selectable (default value =  $2 \times 4 = 8$  ms).

Other values can be entered manually, or by using the scroll-edit field.

## 1.6 CAN Bus

In this menu you can configure the CAN Bus according to your requirements.

Also see Chapter 3 for further information (Data Protocol CAN-Bus, page 16 ff).



Baud rate (Default value = 1 Mbaud)

Sets the communication baud rate for the CAN Protocol.

Data Format (Default = Intel)

You can choose between Intel or Motorola data format.

CAN Terminating Resistor (Default = selected)

Select the checkbox to terminate the CAN Bus

Send Modes:

Continuous Send Mode (Default setting = selected) (Default value = 1)

Sets sensor to send CAN message frame at regular intervals, selectable in 4 ms increments.

Trigger Frame Mode (Default setting = not selected)

Sets sensor to respond to CAN Trigger Frames.

Select either Standard (STD) or Extended (XTD) Identifier Mode (Default setting = XTD)

Set Sensor Message Identifier (Default value, STD = 700)

(Default value, XTD = 10000000)

Remote Frame Mode (Default setting = not selected)

Sets sensor to respond to Remote Frame requests.

## Data Frames

Sets Sensor Data Frames (see CAN Protocol, page 16ff)

## ID Data Frame 1

Select either Standard (STD) or Extended (XTD) Identifier mode (Default setting = XTD)

Set Sensor Message Identifier (Default value, STD = 7FA)  
(Default value, XTD = 1FFFFFFFA)

## Information Frames

Sets Sensor Information Frame (see CAN Protocol, page 16ff)

Select either Standard (STD) or Extended (XTD) Identifier mode (Default setting = XTD)

Set Sensor Message Identifier (Default value, STD = 7FC)  
(Default value, XTD = 1FFFFFFFC)

## Attached as Data Frame

Select the checkbox to attach the Information Frame as Data Frame

## Send as Remote Frame

Select the checkbox to set Information Frame to respond to Remote Frame request.

## 2. Sensor Calibration

### Calibration Values

#### Distance [m]

These values define the nominal value of the calibration distance.

Use the scroll-edit field to set the calibration distance, or enter the new value manually.

Note: Value "Simulator Height [mm]" is only for 3-axis sensors and not active for LFII P Sensors.

### Values to calibrate

Select the signal (Distance) you want to calibrate.

Note: "Angle" ist only for 2-axis sensors and not active for LFII P Sensors.

"Height" ist only for 3-axis sensors and not active for LFII P Sensors.

### Trigger

#### Pulses Count for End

This value defines the number of trigger pulses to stop the calibration.

For example: If Pulses Count for End is 4, the first trigger pulse will start the calibration and the fourth trigger pulse will stop it. Trigger pulses 2 and 3 will be ignored.

Use the scroll-edit field to set the pulses count for end, or enter the new value manually.

#### Delay after Trigger [ms]

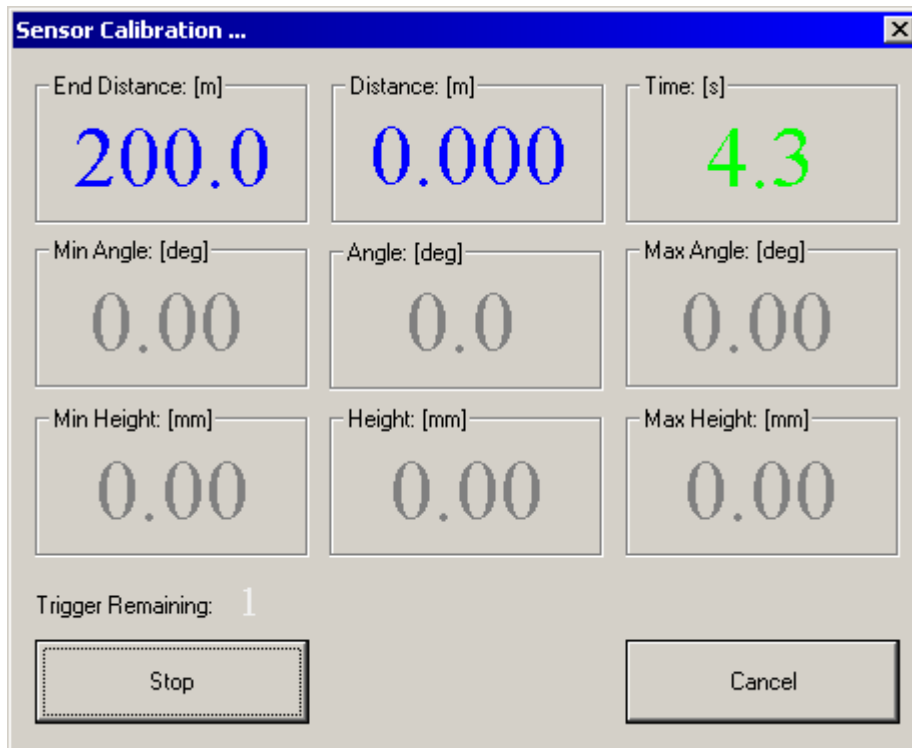
To debounce the Trigger signal, you can set a delay time here.

Use the scroll-edit field to set the delay time, or enter the new value manually.

### Number of Acquisitions

CeCalWin Pro is able to calculate an average for the calibration values. With "Number of Acquisitions" you can set the number of acquisitions for the average calculation.

Use the scroll-edit field to set the number of acquisitions, or enter the new value manually.



#### End Distance [m]

This value displays the nominal calibration distance.

#### Distance [m]

Here you can see the actual distance since start trigger.

#### Time [s]

This value shows the actual time since start trigger.

#### Trigger Remaining

The value shows the actual remaining trigger pulses to end the actual calibration acquisition.

#### Button "Start" and "Stop"

To start the calibration manually, push the "Start" button. To stop the calibration manually, push the button "Stop".

#### Button "Cancel"

To cancel the calibration, push the "Cancel" button.

#### Notes:

The Values "Min Angle [°]", "Calibration Angle [°]" and "Max Angle [°]" are only for 2-axis sensors and are inactive for LFII P Sensors.

The Values "Min Height [mm]", "Height [mm]" and "Max Height [mm]" are only for 3-axis sensors and are inactive for LFII P Sensors.

The screenshot shows a dialog box titled "Results of Calibration...". It is organized into three main sections: Distance, Angle, and Height. Each section has a set of input fields and a corresponding "Accept" button. The "Distance" section has fields for "Entered" (value: 200), "Real" (value: 0), "Old factor" (value: 1), "New factor" (value: 0), and "Average Factor" (value: 1). The "Angle" section has fields for "Min" (value: 0), "Max" (value: 0), "Old offset" (value: 0), "New offset" (value: 0), and "Average Offset" (value: 0). The "Height" section has fields for "Min" (value: 0), "Max" (value: 0), "Old offset" (value: 0), "New offset" (value: 0), and "Average Offset" (value: 0). At the bottom of the dialog, there are three buttons: "OK", "Accept all", and "Cancel". A label "Remaining acquisitions:" is followed by the value "0".

Distance [m]:

**Entered**

This value shows the nominal calibration distance.

**Real**

This value shows the actual measured distance.

**Old factor**

This value shows the old calibration factor, which is stored in the sensor.

**New factor**

This value shows the actual calibration factor, which was calculated at the end of the actual calibration acquisition.

**Average Factor**

Average over all valid calibration factors

Button "Accept Distance"

To accept the actual calibration factor, please push the button "Accept Distance". The accepted factor will be used to calculate the average calibration factor.

Remaining acquisitions:

The value shows the actual number of remaining acquisitions.

Button "OK"

With pushing the "OK" button, you get either to the next calibration acquisition, or the calibration routine will be finished with writing the average factor in edit field "Calibration factor" on tab "Calibration Settings".

**Note: If button "OK" will be pushed without accepting the actual calibration factor, the last acquisition will not be valid and has to be repeated.**

Button "Accept all"

For LFII P sensors this button has the same functionality as the "Accept Distance" button.

Button "Cancel"

If you want to finish the calibration routine without storing the average factor, you are able to do this with this button.

**Note: The section "Angle" is only for 2-axis sensors and is inactive for the LFII P Sensor. The section "Height" is only for 3-axis sensors and is inactive for the LFII P Sensor.**

### 3. Data Protocol CAN-Bus

LFII Sensors Version 1.1

(Valid from Sensor Software Version 053-01-00-01)

18.08.2006

There are 3 modes of data transmission on the CAN-bus. The transmission mode can be selected using CeCalWin Pro Software. The CAN messages sent by the sensors for all three modes consist of one or more Frames (a Frame is defined in the CAN-bus specifications).

The sensor sends one **Data-Frame** and one **combined ID-Status-Frame**. The frame format is the same for each send mode. It is possible to choose between **Intel** data format or **Motorola** data format.

To reduce the traffic on the CAN bus, it is possible to switch off the ID-Status-Frame or to send this frame as a remote frame independent from the data frames.

#### Continuous Send Mode (CONT):

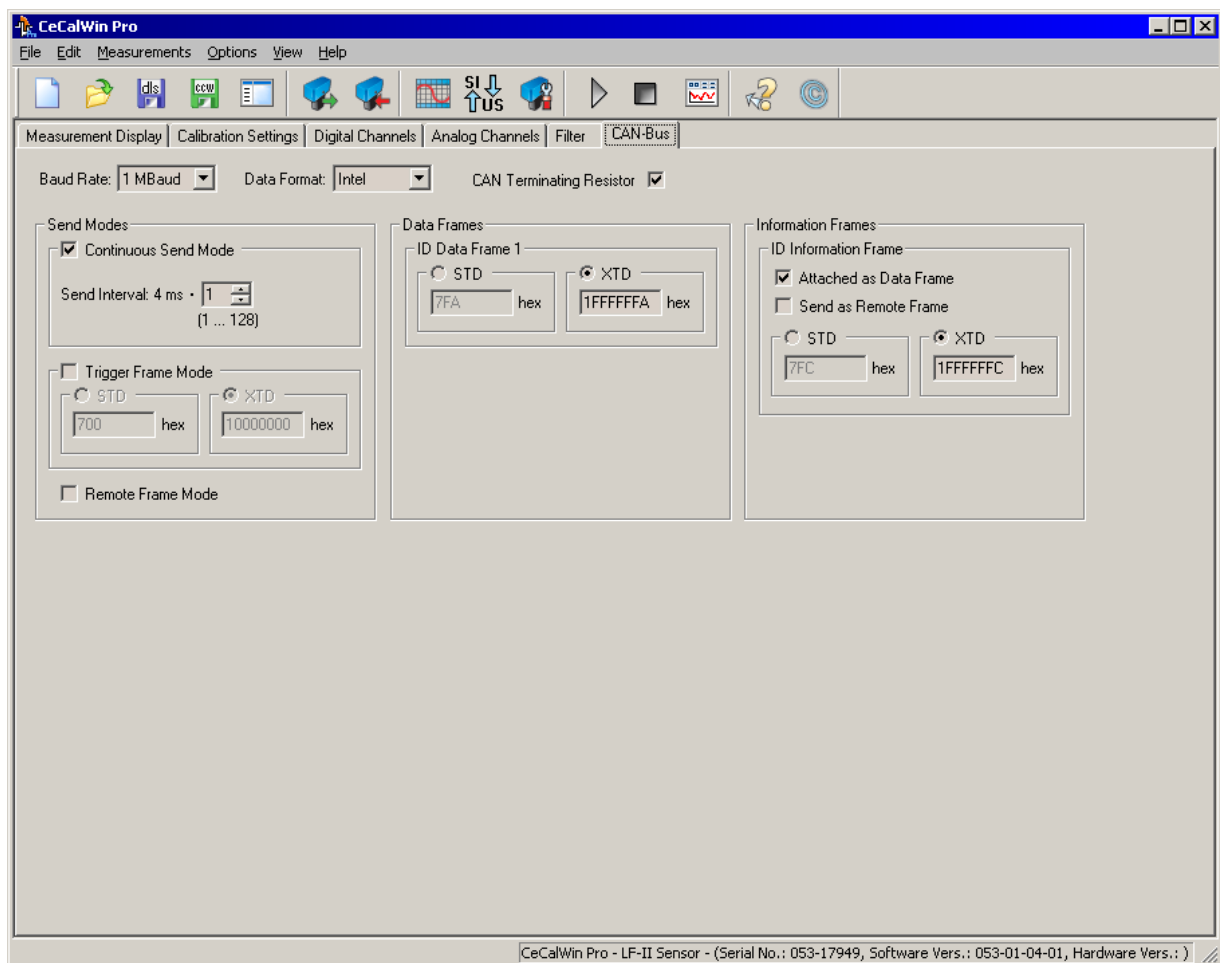
The messages are sent continuously and cyclically with a period set in CeCalWinPro (by default 4ms). Cycle times between 4ms and 512ms (in 4ms steps) can be selected.

#### Remote Frame Mode (REM):

The sensor responds to a remote-frame request from a master controller. The sensor sends the **Data-Frame** (response to the remote frame request), followed by the **ID-Status-Frame**, if switched on.

#### Trigger Frame Mode (TRG):

The sensor responds to a trigger frame from a master controller (for synchronization). The trigger frame ID must be entered in the sensor using CeCalWinPro.



The Identifier numbers of the Data-Frames and the ID-Status-Frame can be set separately in CeCalWinPro. The settings of baud rate and data format is settable with CeCalWinPro as well.

CAN-bus type : CAN V2.0B  
 Baud rate : 1MBaud (default), 500kBaund, 250kBaund, 125kBaund  
 Data format : Intel (default), Motorola backward

### 3.1 Definitions of the Frames

The definitions here present how the data bytes within a CAN message frame are allocated in order to decipher the data transmitted.

#### Definitions for Intel Format

Data\_Frame

Format: 8 Data bytes

Default ID (Standard): 0x7FA

Default ID (Extended): 0x1FFFFFFFA

Data byte	Description	Unit	Data type
0	Timestamp (Bit 0...7)	4 ms	unsigned
1	Timestamp (Bit 8...15)		
2	$v_L$ (Bit 0 ... 7)	$10^{-2}$ m/s	unsigned
3	$v_L$ (Bit 8 ...15)		
4	<i>Distance since sensor power on</i> (Bit 0...7)	mm	unsigned
5	<i>Distance since sensor power on</i> (Bit 8...15)		
6	<i>Distance since sensor power on</i> (Bit 16...23)		
7	<i>Distance since sensor power on</i> (Bit 24...31)		

ID-Status\_Frame:

Format: 8 Data bytes

Default ID (Standard): 0x7FC

Default ID (Extended): 0x1FFFFFFFC

Data byte	Description	Unit	Data type
0	Serial number (Bit 0...7)	none	unsigned
1	Serial number (Bit 8...15)		
2	Serial number (Bit 16...23)		
3	Sensor number	none	unsigned
4	Temperature	°C	signed
5	LED illumination current	$10^{-2}$ A	unsigned
6	Status byte 1	see Table 1, page 19	
7	Status byte 2	see Table 2, page 19	

Definitions for Motorola Format

## Data\_Frame

Format: 8 Data bytes

Default ID (Standard): 0x7FA

Default ID (Extended): 0x1FFFFFFFA

Data byte	Description	Unit	Data type
0	Timestamp (Bit 8...15)	4 ms	unsigned
1	Timestamp (Bit 0...7)		
2	$v_L$ (Bit 8 ...15)	$10^{-2}$ m/s	unsigned
3	$v_L$ (Bit 0 ... 7)		
4	<i>Distance since sensor power on (Bit 24...31)</i>	mm	unsigned
5	<i>Distance since sensor power on (Bit 16...23)</i>		
6	<i>Distance since sensor power on (Bit 8...15)</i>		
7	<i>Distance since sensor power on (Bit 0...7)</i>		

## ID-Status\_Frame:

Format: 8 Data bytes

Default ID (Standard): 0x7FC

Default ID (Extended): 0x1FFFFFFFC

<i>Distance since sensor power on</i>			
0	Serial number (Bit 16 ...23)	none	unsigned
1	Serial number (Bit 8 ... 15)		
2	Serial number (Bit 0 ... 7)		
3	Sensor number	none	unsigned
4	Temperature	°C	signed
5	LED illumination current	$10^{-2}$ A	unsigned
6	Status byte 1	see Table 1, page 19	
7	Status byte 2	see Table 1, page 19	

Table 1, Status byte 1:

Bit	Description	Status
0	STST_bit	0: Sensor activ 1: Sensor is at standstill
1	Selftest_FLAG	0: Sensor in operating mode 1: Sensor in self-test mode
2	Sensor_OK	0: Sensor error (see Bits 3-7 in Status byte 1) 1: Sensor OK
3	Temperature_OK	0: Temperature is to high 1: Temperature OK
4	Optics_OK	0: Error in optical path 1: Optical path OK
5	Current_Low_High	0: LED current too low 1: LED current too high
6	Current_OK	0: LED current not OK (see Bit 5) 1: LED current OK
7	Power_Supply_OK	0: Error in power supply (see bits 3-6 in status byte2) 1: Power supply OK

Table 2, Status byte 2:

Bit	Description	States
0	LED_Kal	0: LED Calibration mode off 1: LED Calibration mode on
1	LED_Status (Bit 0)	0: LED off 1: LED on
2	LED_Status (Bit 1)	2: LED flashing ( 2 kHz )
3	V25_OK	0: Error in +2.5V power supply 1: +2.5V power supply is OK
4	V33_OK	0: Error in +3.3V power supply 1: +3.3V power supply is OK
5	VEE_OK	0: Error in -12V power supply 1: -12V power supply is OK
6	VDD_OK	0: Error in +12V power supply 1: +12V power supply is OK

## Control Frame:

The control frame is generated by the host controller and has two functions. The first is for synchronization whereby the sensor responds to a trigger frame from a master controller. The other is to accept control messages from the host controller and react upon them.

Data byte zero of the control frame is read out and the function described below is performed. All other data bytes (Data byte 1 to data byte 7) of the trigger frame are ignored.

Format: 8 Data bytes

Default ID (Standard): 0x700

Default ID (Extended): 0x10000000

Data byte 0 value	Sensor reaction
0x00	Sensor sends the <b>Data-Frame</b> followed by the <b>ID-Status-Frame</b> , if switched on. (Synchronization)
0x01	Sensor goes in self-test mode - LEDs are modulated in approx. 2kHz - a speed of approx. 14 kph should be output by sensor. Vehicle must be at standstill for this to occur.
0x02	Sensor goes out of test mode - normal functionality of LEDs and sensor
0xAA	Reset Sensor
0xAB	Reset value " <i>Distance since sensor power on</i> "
0xF0	Switch LED off
0xF1	Switch LED on
Other	No sensor reaction

### 3.2 Troubleshooting CAN with the CORREVIT® LFII P Sensor

Problem: There are no messages on the CAN-bus

Check to be sure that:

- the electronic has power
- data acquisition is connected to the LFII P Sensor electronics
- the data acquisition system and all sensor electronics use the same settings for baud rate, CAN identifiers and identifier types (standard or extended)
- if you use CANalyser or a data acquisition system with an acceptance filter, be sure the message from the sensor is not disabled

Problem: Data received via the CAN bus appear to be incorrect

Please be sure that:

- the data acquisition system uses Intel data format for communication via CAN-bus
- the data acquisition system and all sensor electronics use the same settings for the type of measured value (signed or unsigned, number of bits)

CORRSYS-DATRON recommends that the .dbc file option be used to avoid problems with false data types or bit lengths. Sensor-specific .dbc files are available for download at [www.corrsys-datron.com](http://www.corrsys-datron.com), or may also be obtained by contacting the CORRSYS-DATRON application department directly.