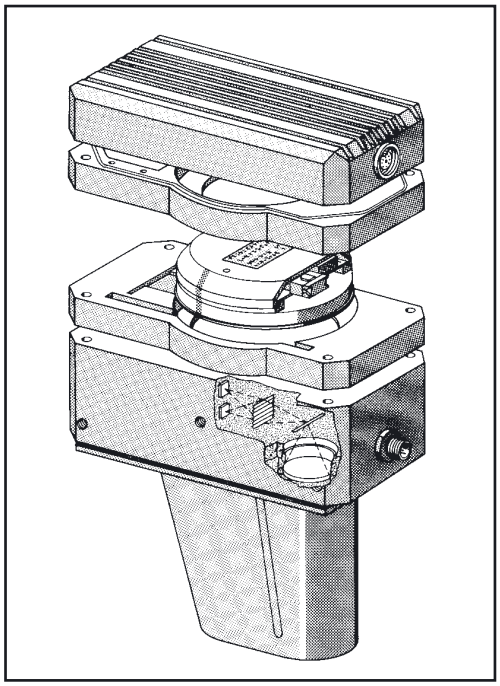
CORRSYS DATRON
Sensorsysteme GmbH



CORREVIT S-CE w/Gyro

Non-Contact Optical Sensor with Integrated Fiber-Optic Gyroscope

for

precise non-contact and slip-free measurement of longitudinal and transversal dynamics and angular velocity

CORRSYS-DATRON Sensorsysteme GmbH
P.O. Box 1349
35523 Wetzlar / Germany
Phone ++49 (6441) 9282-0
Fax ++49 (6441) 9282-17
E-mail sales@corrsys-datron.com
URL www.corrsys-datron.com

USER MANUAL

Notes:

CONTENTS

General Information

Legal Notice

Information furnished is believed to be accurate and reliable. However, CORRSYS-DATRON assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of CORRSYS-DATRON. Specifications mentioned in this publication are subject to change without notice and do not represent a commitment on the part of CORRSYS-DATRON. This publication supersedes and replaces all information previously supplied.

All brand names are trademarks of their respective holders.

Copyright Notice

Revision

D113-50-02-02E 11/04

Contact

International Headquarters:
CORRSYS-DATRON Sensorsysteme GmbH
Charlotte-Bamberg-Str. 12
35523 Wetzlar / Germany
Phone ++49 (6441) 9282-0
Hotline ++49 (6441) 9282-82
Fax ++49 (6441) 9282-17
E-mail sales@corrsys-datron.com
URL www.corrsys-datron.com

North American Headquarters:
CORRSYS-DATRON Sensorsystems, Inc.
21654 Melrose Avenue, Building 16
Southfield, MI 48075 / USA
Phone ++1 (248) 204-0850
Toll-free ++1 (800) 832-0732
Fax ++1 (248) 204-0864
E-mail 1. USA-sales@corrsys-datron.com or 2. sales@datron.com
URL www.corrsys-datron.com

Safety Instructions

Please read carefully before operating the equipment.

CORRSYS-DATRON is not responsible for damage that may occur when this system 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 equipment 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 the equipment only for intended applications. Improper application is not advised.
- Do not modify or change the 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.
- For additional information, please call the CORRSYS-DATRON Hotline: ++49 (6441) 9282-82

Danger

- Use caution when exchanging sensor lamps – lamps are extremely hot, and may cause injury.
- Do not look into sensor lamps – lamps are extremely bright, and may cause eye injury.
- Sensor head can become very hot and may cause injury if power has been applied to the sensor for extended periods of time. This is especially true if the sensor is used in hot environmental conditions.

Warning

- The sensor and/or sensor components may be damaged if power is applied for extended periods, especially in hot environmental conditions.

- Disconnect power from the sensor if the vehicle is stationary for extended periods.

CORRSYS DATRON Sensorsysteme GmbH

CORREVIT® S-CE w/Gyro

Non-Contact Optical Sensor *with* Integrated Fiber-Optic Gyroscope

for

precise non-contact and slip-free measurement of longitudinal dynamics and angular velocity

Art-No.: 1.002.13

Two different sensors are brought together in one compact system, exploiting the technical advantages of each. The CORREVIT® S-CE Sensor with integrated gyroscope simultaneously acquires the following parameters:

- Driving speed
- Yaw rate
- Fixed drift angle
- Transversal speed

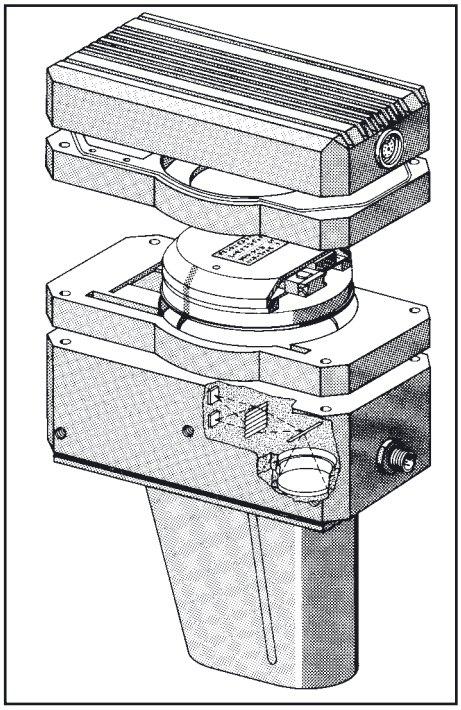
The CORREVIT® S-CE Sensor with integrated gyroscope uses proven optical correlation technology to ensure the most accurate possible signal presentation. This technology incorporates a high-intensity light source that illuminates the test surface, which is optically projected by the sensor onto an optical grating system. Fast, easy mounting and universal applicability distinguish this proven non-contact, optical sensor.

Easy to set-up and operate, the CORREVIT® S-CE Sensor with integrated gyroscope requires only one power supply (+12V) and one signal cable.

The new generation fiber-optic gyroscope is added as a system element for the measurement of angular velocity (°/s) and can also be retrofitted into most compact CORREVIT® Sensors.

Features

- Extremely high measuring accuracy – better than 0.1% (or better than 0.1° angular resolution) as a result of precision optical gratings and digital signalprocess-ing.
- Compact, robust but lightweight sensor construction with integrated filter electronicsand serial interface.
- Programmable standardized analog and digital signal outputs using the latest processortechniques, fast and easy calibration.
- Any required measurement quantity available.
- Easy operation, mounting angle correction and direct connection to PC or other evaluation systems.
- Tested and used under extreme weather conditions.
- Negligible service and maintenance requirements as a result of durable technology.



Applications

The compact, lightweight CORRSYS-DATRON S-CE Sensor with integrated fiber-optic gyroscope is designed for use in dynamic vehicle testing applications requiring highly accurate measurement of the following variables:

- Distance
- Speed
- Acceleration
- Longitudinal and transversal speed
- Tire slip angle
- Drift angle
- Yaw angle

2. Extent of delivery

Standard delivery

1. S-CE Sensor with Integrated Fiber-Optic Gyro #C100200G
2. Power Cable # K001.40.52
3. Signal Cable # K001.8C.53
4. Breakout Adaptor Cable: 25-pin DSUB to 5 BNC
7. Halogen Lamp 12V, 35W, 24° #200032
8. Mounting Screws

Options/Accessories

5. CE_CAL Communication Cable
6. CD-ROM with CeCalWin Software and User Manual
9. Calibration certificate ISO 9000 ++

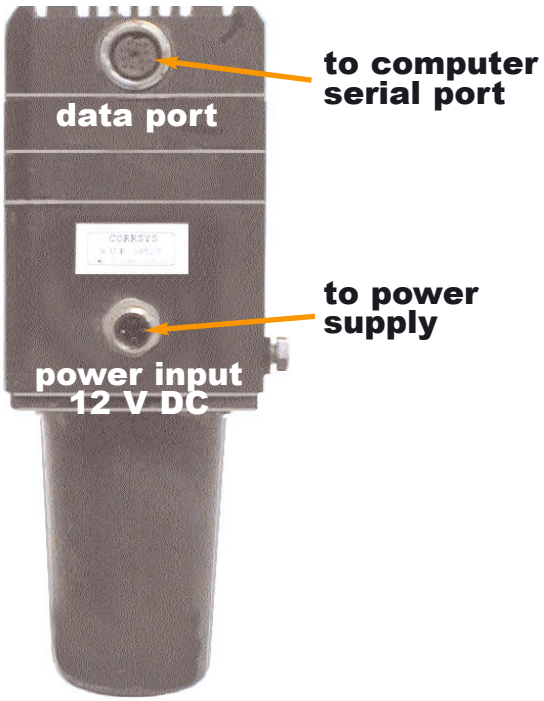
- Suction Mounting Hardware
- Transport Case #20600
- Replacement Halogen Lamp 12V, 35W, 24° #200032

About replacement halogen lamps
It is recommended that only halogen lamps supplied by CORRSYS-DATRON be used as these have been subjected to a special treatment. Optimal sensor function can only be assured when using original-equipment lamps.

3. Installation and connection

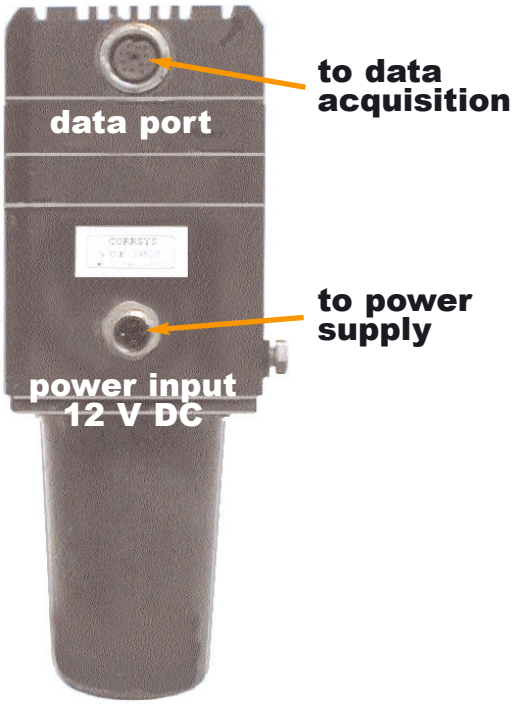
3.1 Connecting the Sensor to PC or laptop for calibration and sensor-setting adjustments with CeCalWin Software

1. Connect the CE_CAL Communication Cable to the data port of the Sensor.
2. Connect the Power Cable to the power input of the Sensor.
3. Connect the CE_CAL Communication Cable to the serial port of the PC or laptop operating CeCalWin Software or trigger box (trigger box is required if calibration should be started or stopped by a light barrier or a brake switch).
4. Connect the Power Cable to 12 V DC power supply.



3.2 Connecting the Sensor to data acquisition

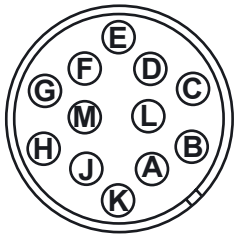
1. Connect to the Signal Cable to the Breakout Adaptor Cable.
2. Connect the Signal Cable to the data port of the Sensor.
3. Connect the Power Cable to the power input of the Sensor.
4. Connect the BNC Connectors of the Breakout Adaptor Cable to the data acquisition system.
5. Connect the Power Cable to 12 V DC power supply.



3.3 Pin assignments

3.3.1 Pin assignments: signal

Binder	D-Sub	Assignment	Signal	Signal Type & Description
A	1	shield (white)	GND ANA1	
B	2	white	ANA1	Speed - analog
C	3	brown	ANA2	Slip angle - analog / Transversal speed - analog
D	4	shield (brown)	GND ANA2	
E	13	green	TTL1	Longitudinal distance - digital
F	12	yellow	NA	
G	21	gray	Gyro	Gyro output
H	20	shield (gray/pink)	GND Gyro	
J	24	blue	NA	
K	25	red	TTL2	Slip angle - digital / Transversal speed - frequency modulation
L	11 23	shield (green/yellow) shield (red/blue)	GND TTL	
M		pink		



(view: soldering side)

Binder

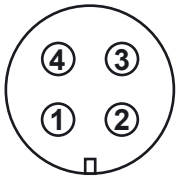
3.3.2 Pin assignments: BNC distributor

Signal	Color
Analog 1 (ANA1)	red
Analog 2 (ANA2)	blue
Digital 1 (TTL1)	green
Digital 2 (TTL2)	yellow
Gyro	black

3.3.3 Pin assignments: 12 V DC power supply

Plug	Socket	Assignment	Signal
1 & 2	1 & 2	white / brown	GND
3 & 4	3 & 4	blue / black	+12 V

10.5 V minimum required at the sensor

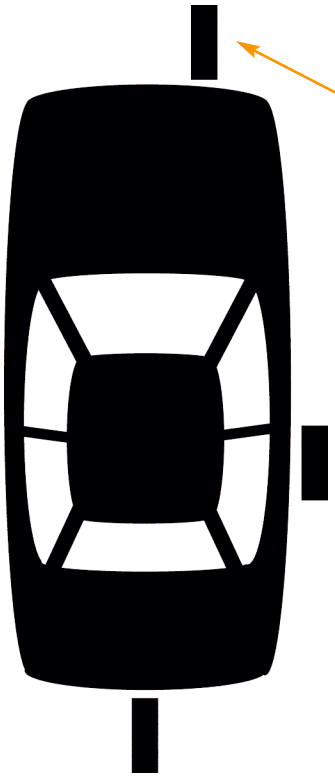


Power Supply

Reverse polarity protection

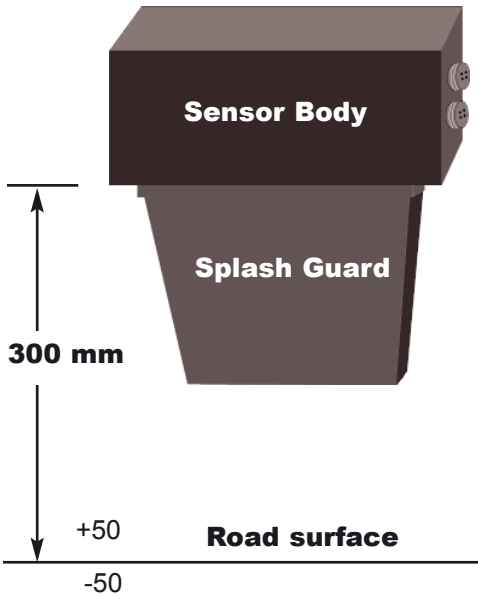
The Sensor is equipped with reverse polarity protection. In the event that polarity is inverted (9 V - 14.5 V DC), the sensor will not be damaged, but a red LED will be illuminated and seen in the sensor optics! If this happens, disconnect power from the sensor immediately and correct the power supply connection.

3.4 Mounting the sensor on the vehicle



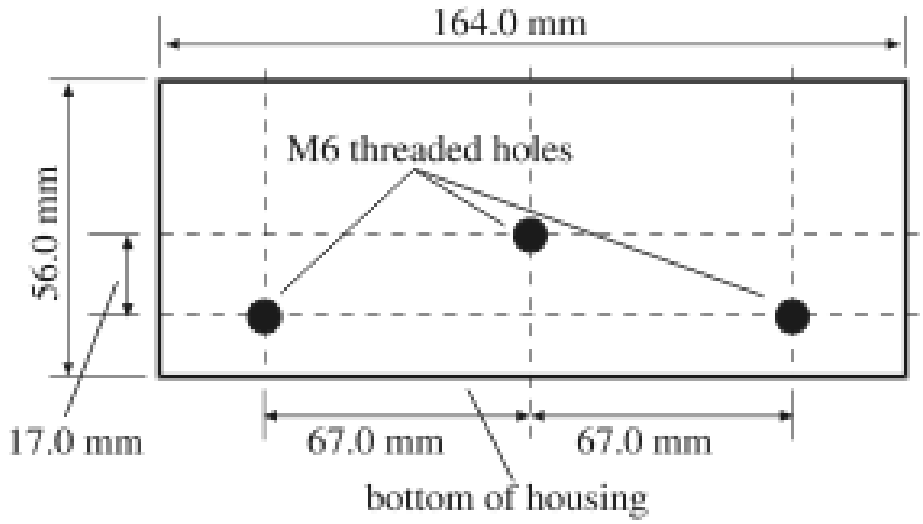
Mount the sensor in a longitudinal orientation, parallel to the vehicle

Notice:
When using the sensor in wet or snowy conditions, mount it at the front of the vehicle to avoid spray and/or blowing snow.



For optimum performance and accuracy, the mounting distance from the lower surface of the sensor body (not including the spray guard) to the road surface must be 300 mm ±50 mm.

S-CE mounting jig



Caution:
For proper sensor mounting, use only M6 screws with a maximum thread engagement depth of 10 mm. The use of screws with thread engagement depths of greater than 10 mm can damage the sensor housing and will void the warranty!

4. Technical data

4.1 Specifications

System parameters of the S-CE Sensor

Speed range		0.5 to 400 kph
Braking / coasting		to 0.2 kph
Distance resolution		1.5 mm
Measurement deviation		< ±0.1%
Angle range		±40°
Digital output 1 longitudinal distance		160 to 750 pulses/m
Digital output 2 switchable		Output as frequency
- Frequency modulated angle or transversal speed		
Analog output 1 longitudinal direction		0 to 10 V
Analog output 2 switchable		- 5 to 5 V
- Transverse speed or tire slip angle		
Power supply		11.5 to 14.5 V; 40W
Working distance		300 ±50 mm
Temperature range	Operation:	- 25 to 50° C
	Storage:	- 40 to 85° C
	Relative humidity:	5 to 80% not condensed
System of protection		IP 67
Dimensions (l x w x h)		approx. 164 x 78 x 84 mm
Weight		1.6 kg
Shock		50 g half-sine, 6 ms
Vibration		10 g, 10 to 150 Hz

Serial interface for connection to the PC, automatic sensor identification, function control

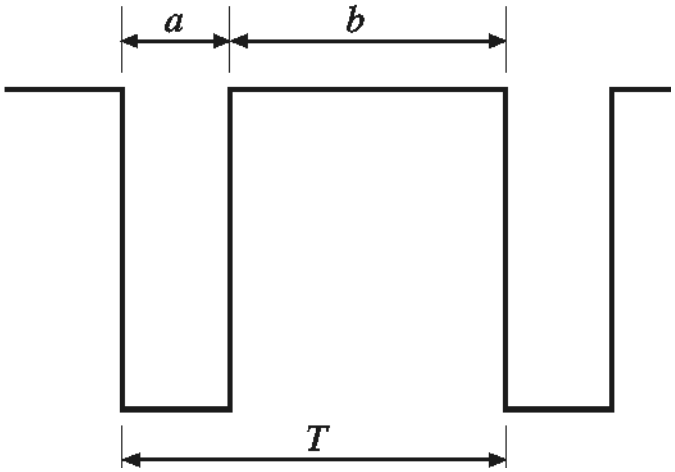
System parameters of the fiber-optic gyroscope (Type VG910 / VG910S)

Sensitivity	approx. 55 mV/°/s ±20%
Maximum measurement range	< 200°/s
Drift *(temperature corrected)*	< 30°/h
Drift *(constant temperature)*	< 10°/h
Linearity	0.2%
Sensitivity (1 Hz, 1s)	15°/h
Bandwidth	1000 Hz
Warm-up time	approx. 5 min.
Power on to signal output delay time	0.5 s

4.2 Measured values

Measurement	Output	Output Channel
Longitudinal speed V_L	analog	Analog 1
Magnitude speed |V|	analog	Analog 1
Angle β	analog	Analog 2
Transversal speed Vq	analog	Analog 2
Pulses/m for longitudinal distance	digital	Digital 1
Pulses/m for magnitude distance	digital	Digital 1
Angle β, frequency modulated	digital	Digital 2
Transversal speed Vq, frequency modulated	digital	Digital 2

4.3 The calibrated CORREVIT® S-CE sensor (set to 340 pulses/m) supplies the following pulse form at output DIG 1.



***a* = 25% of T**
***b* = 75% of T**

Pulse forms at a rate of 300 kph:

Conversion of the speed factor into m/s $\frac{300 \text{ kph}}{3.6} = 83.33 \text{ m/s}$

Frequency f of the S-CE Sensor 83.33 m/s x 340 P/m = 28.333 kHz

T: period $\frac{1}{28.33 \text{ kHz}} = 35.3 \text{ µs}$

A period of 35.2 µs requires a = 8.8 µs and b = 24.4 µs

Pulse forms at a rate of 1 kph

Conversion of the speed factor into m/s $\frac{1 \text{ kph}}{3.6} = 0.277 \text{ m/s}$

Frequency of the S-CE Sensor 0.277 m/s x 340 P/m = 94.44 Hz

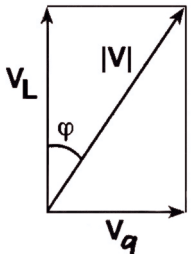
T: period $\frac{1}{94.444 \text{ Hz}} = 10.58 \text{ ms}$

A period of 10.58 ms requires a = 2.64 ms and b = 7.94 ms

4.4 The S-CE Sensor has been set as follows:

Analog channel 1	25 $\frac{mV}{kph}$	Magnitude speed |V|
Analog chanel 2	100 $\frac{mV}{°}$	Angle β
Digital channel 1	340 $\frac{pulses}{m}$	Longitudinal distance (output as pulses)
Digital channel 2	50 $\frac{Hz}{°}$	Angle (output as frequency)

4.5 Values to be measured



On digital channel 2, the angle output is frequency modulated (FM).
The carrier frequency used is 10 kHz and has a range of ±2 kHz.

With a setting of 25 mV / kph for longitudinal speed V_L,
a maximum speed of 300 kph can be achieved.

(A special configuration of the S-CE Sensor can measure speeds of up to 400 kph.)

The above settings produce the following values:
100 kph = 2.5 V
200 kph = 5.0 V
300 kph = 7.5 V
400 kph = 10.5 V

All signals can be used as inputs to all common data acquisition systems.
Should any problems arise, please contact CORRSYS-DATRON.

For analog signal representation of speed, the voltage scale may be changed to any of the following:

- 15 mV / kph
- 25 mV / kph
- 50 mV / kph
- 100 mV / kph

A further possibility is to smooth the signal using a moving average filter, which can be adjusted with different times for averaging. Note that signal detail and dynamics will be decreased the signal becomes increasingly smooth.

Filter Values

- 65.5 ms
- 131 ms
- 262 ms
- 524 ms

5. Using the CeCalWin Software Package

5.1 Introduction

CeCalWin is the Windows* version of the CE_CAL-Software used to configure all CORREVIT® optical sensors by CORRSYS-DATRON (www.corrsys-datron.com).

The current version, 3.3, is 32-bit and designed for use with Windows 95/98, NT 4.0, Windows 2000, and XP operating systems. The older CE_CAL-Software cannot be used with these operating systems because it does not support direct access to the serial interface and is not supported by the Windows operating system. CeCalWin features a considerably improved user interface making distance and angle calibration faster and easier. CeCalWin Software can also be operated in parallel with other programs, contingent upon operating system capabilities.

5.2 Quick-Start Tutorial

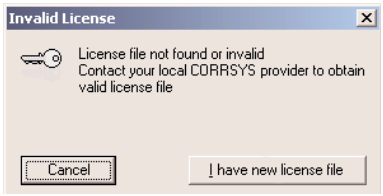
The Quick-Start Tutorial provides a brief overview of the installation and basic operation of the CeCalWin Software package, including back-up of software and sensor settings.

5.2.1 Install the software

CeCalWin Software can be installed in any directory of your file system. To install, insert the program disk and browse to "Setup.exe". Next, double-click on the file icon and follow the installation prompts. For faster access to CeCalWin Software, a shortcut is created on your desktop. You can create additional shortcuts from your desktop, the start menu etc. if you desire. A complete explanation of this process can be found in Windows* Help. It is not necessary to change any of the settings in your operating system when installing CeCalWin.
If possible (though not necessary) install the software unter NT and 2000 using an account to administrator rights.

5.2.2 Start and license the software

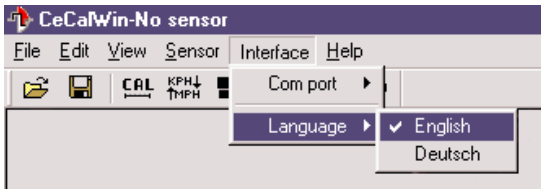
After installing the CeCalWin Software package, start the program by clicking on the program icon or by accessing the program via Windows Explorer*. Upon program start, you may be prompted to install the license file, cecalwin.dlf (if it is not already installed in the CeCalWin.exe directory).



The license file will be provided on separate diskette or sent via e-mail. To install it, click on the button labeled “I have new license file” and text-enter a path to the file, or browse to the file using standard Windows* operating protocol. Once located, CeCalWin will copy the file into the CeCalWin.exe directory.

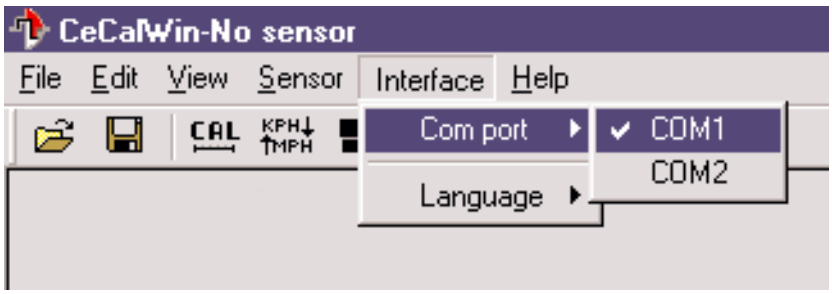
5.2.3 Set language preference

The CeCalWin software package provides the option to choose either German or English as the language in which the interface will be presented. To set the language preference, open CeCalWin and select Interface>Language, then select either English or Deutsch. You will then be prompted to confirm the selection. To do so, click OK. As indicated, language preference will be updated upon program restart or when reading the sensor.



5.2.4 Select a COM port

Before connecting a sensor to the computer running CeCalWin, select Interface>Com port, then select either COM1 or COM2. Baud rate and other COM port parameters are automatically set by the program.



5.2.5 Connect a sensor

Connect the sensor to the COM port selected above.

5.2.6 Make backup copies of the software and sensor settings

Prior to using the sensor, make backup copies of:

- The CeCalWin Software
- Default settings from the sensor

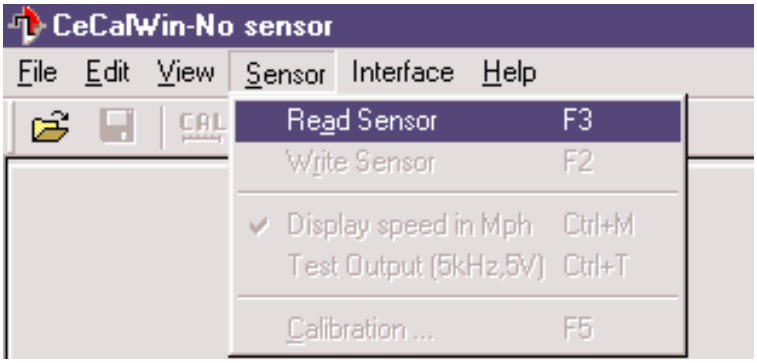
5.2.6.1 Back-up program diskettes

To create back-ups of all delivered software, simply copy the CeCalWin Software files CD-ROM or other media.

Do not store diskette copies near electromagnetic fields or anywhere they will be subjected to extreme temperatures.

5.2.6.2 Back-up sensor settings

1. Select Sensor>Read Sensor. Sensor settings will appear in the **Project Window**.



2. Select File>Save As.
3. Select a directory into which the file will be saved.
4. Name the file and select "Save".
5. Saved sensor settings are now available to be written back to the sensor, should it ever become necessary to do so.

All project files created by CeCalWin are automatically given the filename extension, ".ccw". Project files generated by earlier versions of the program used the extension ".idt". CeCalWin 3.1 and later can open and read both ".idt" and ".ccw" files, but create only ".ccw" files. **NOTE**: ".idt" and ".ccw" files are not compatible and **CAN NOT** be used together.

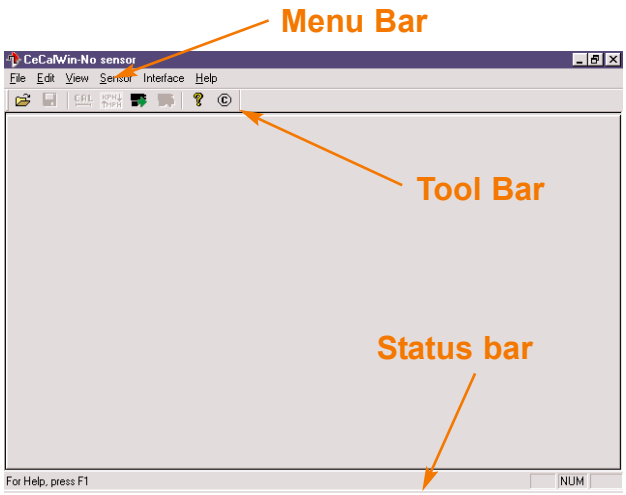
5.3 Using CeCalWin

5.3.1 Main Program Window

Upon opening CeCalWin, the Main Program Window will display:

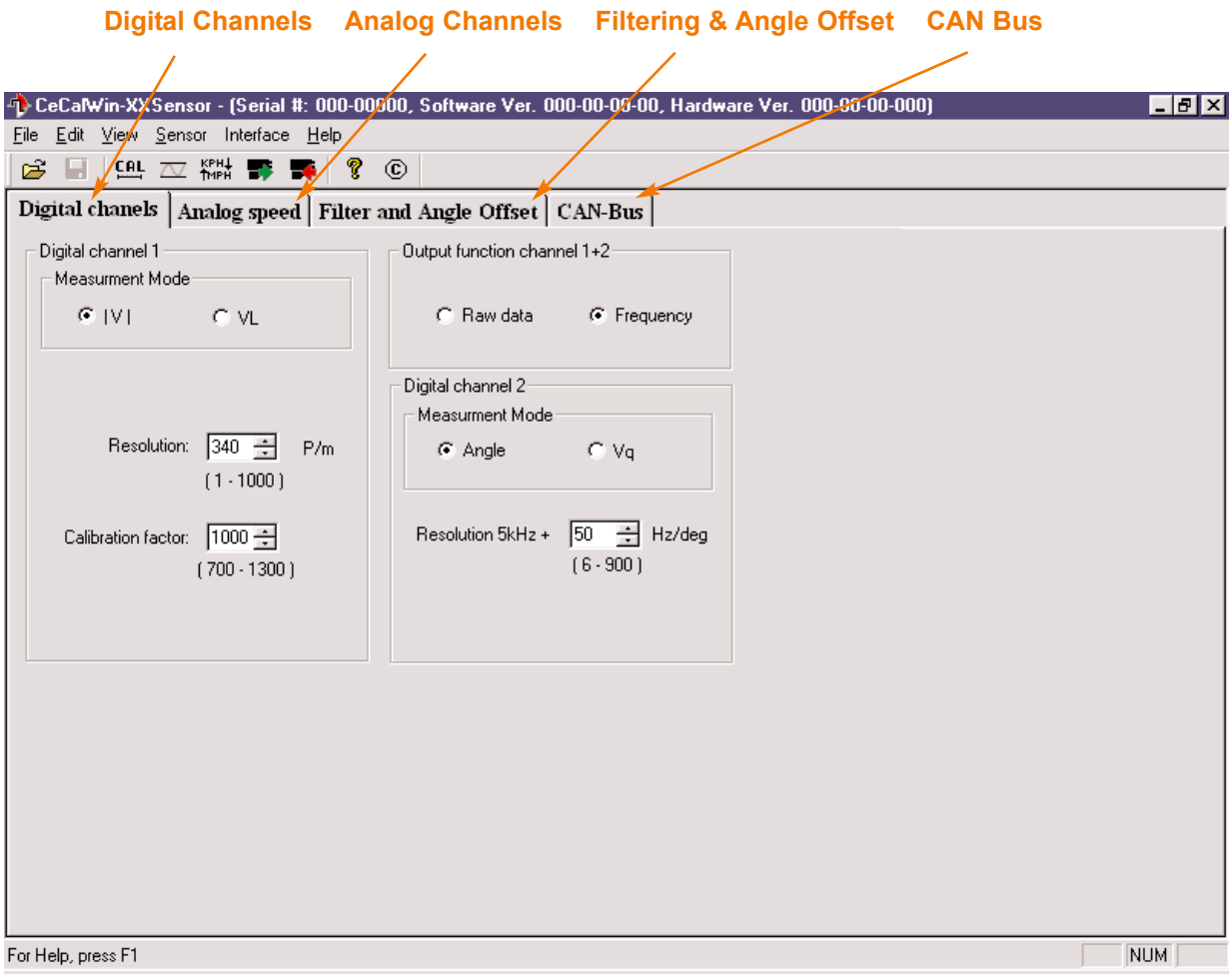
- Menu Bar
- Tool Bar
- Status Bar

After reading a project file (.ccw) or a connected sensor, available sensor settings are displayed in the Project Window, shown below.



5.3.2 Project window

The Project Window opens automatically when a sensor is read or a project file is opened. Here, all selectable sensor calibration settings are displayed within the selectable tabbed sections. Each of the three sections available in the Project Window can be accessed by clicking on the corresponding tab. You can also navigate through the tabbed sections using CTRL-TAB key command.



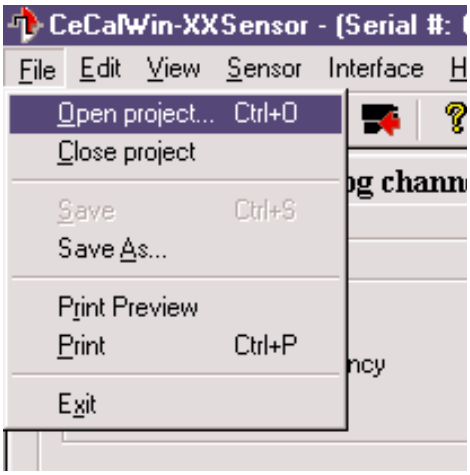
5.3.2.1 Menu Bar

File Menu

The File Menu includes the standard options available under the Windows operating system, including:

Open Project (Ctrl+O)
To open a project, select File>Open project and locate the directory in which the desired project file is saved. From there, double-click the project to be opened or select the project and click the “Open” button. If a project to which changes have been made is currently open, you will be prompted to save the changed settings before a new project can be opened.

Close Project
To close a project, select File>Close project. If any changes have been made to an open project, you will be asked to save the changed settings before the project can be closed.



Save (Ctrl+S)
Select File>Save to save the current project. If no file name has been previously assigned to the project, the Save As process will be executed. Otherwise, the existing file will be overwritten with the current data.

Windows 95/98, Windows NT, Windows 2000, and XP allow file names of up to 255 characters. For more information about allowable punctuation characters and other file naming conventions, see Windows Help.

Save As
Select File>Save As to save the current project as a new file. You can choose to overwrite data to an existing file name, or create a new file name, as will often be the case. The file extension “.ccw” will always be added to a new filename. For example, if you name a file “MySensor.sce”, the extension “.ccw” will be attached automatically. The file will therefore be named “MySensor.sce.ccw”.

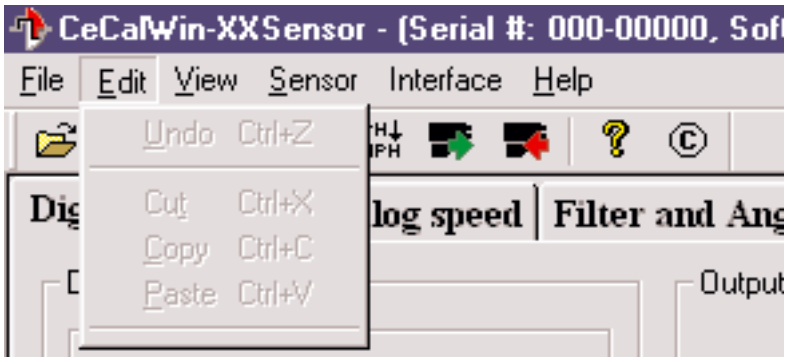
Print Preview
Select File>Print Preview and follow standard Windows procedures to see a print preview.

Print (Ctrl+P)
Select File>Print and follow standard Windows printing procedures to print the current sensor data display.

Exit (Alt+F4)
Select File>Exit to close the program. If any changes have been made to an open project, you will be prompted to save the project first.

Edit Menu

The Edit Menu includes the standard Windows edit functions: Undo, Cut, Copy and Paste.

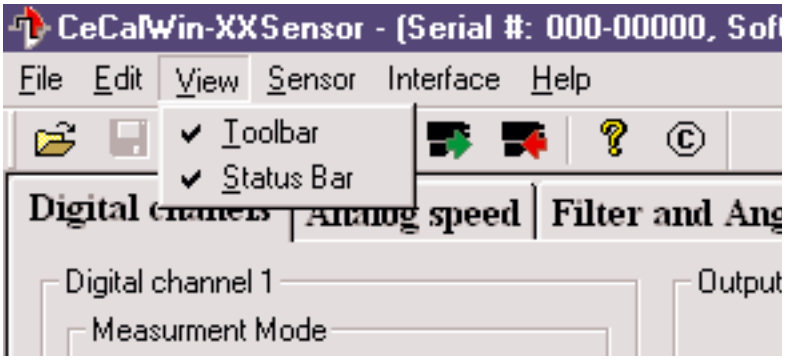


View Menu

The View Menu includes commands used to View options available in the Program Window.

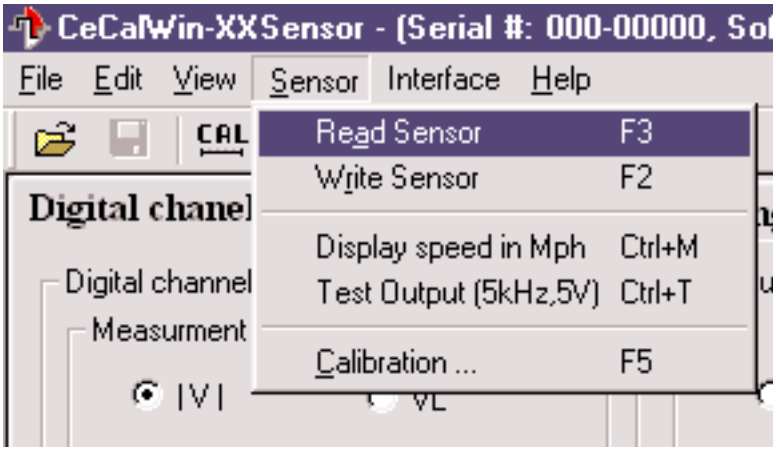
• Select View>Toolbar to view the Tool Bar.

• Select View>Status Bar to view the Status Bar.



Sensor Menu

The Sensor Menu is comprised of commands used to control communication with the sensor. If there is no sensor connected, or a connected sensor has not yet been read, menu selection is restricted to the item, Read sensor. When a Project Window is open (e.g. when a project has been opened, or when data has been read from a connected sensor), the Sensor Menu will be extended to include the full available range of selectable sensor settings.



Read Sensor (F3)

Select Sensor>Read Sensor to read data from the connected sensor. The sensor reading can take up to 20 seconds. If no sensor is connected or if a general communication problem exists, you will receive the error notification, “Connected sensor unknown!” If a project is open and changes have been made to the project settings, you will be receive the prompt, “Save changes before reading?”.

Write Sensor (F2)

Select Sensor>Write Sensor to write changes made to the sensor settings in tabbed sections of the Project Window to the connected sensor.

Display speed in Mph (Ctrl+M)

Select Sensor>Display speed in Mph to display speed values in Mph. Once selected, a checkmark will appear to the left of Sensor>Display speed in Mph. If not selected, speed values will be displayed in Kph.

Test Output (Ctrl+T)

Select Test Output to set 5 V on each analog output and 5 kHz on each digital output. Then, the stand-still LED will blink.

Calibration (F5)

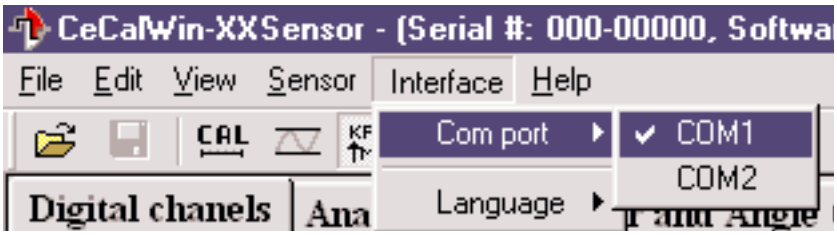
Select Calibration to access calibration and trigger settings (see **Distance & Angle Calibration**, page 25 for complete detail).

Interface Menu

The Interface Menu includes commands used to control interface options.

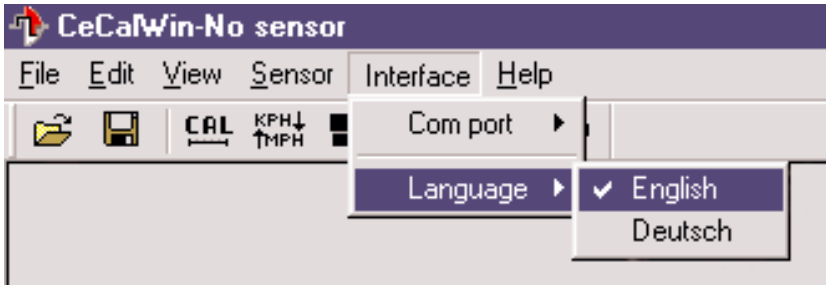
COM port

Before connecting a sensor to the computer running CeCalWin, select Interface>Com port, then select the COM port to which the sensor will be attached. Baud rate and other COM port parameters are automatically set by the program.

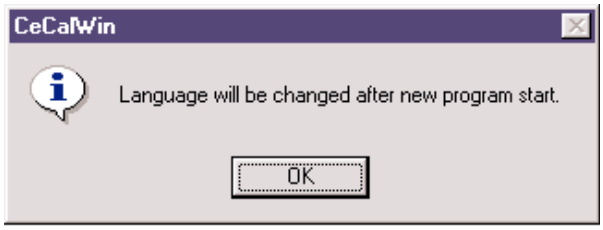


Language

The CeCalWin software package provides the option to choose either German or English as the language in which the interface will be presented. To set the language preference, open CeCalWin and select Interface>Language, then select either English or Deutsch.



You will then be prompted with the following dialog box. Click OK to confirm the selection.
As indicated, language preference will be updated upon program restart.



Help Menu

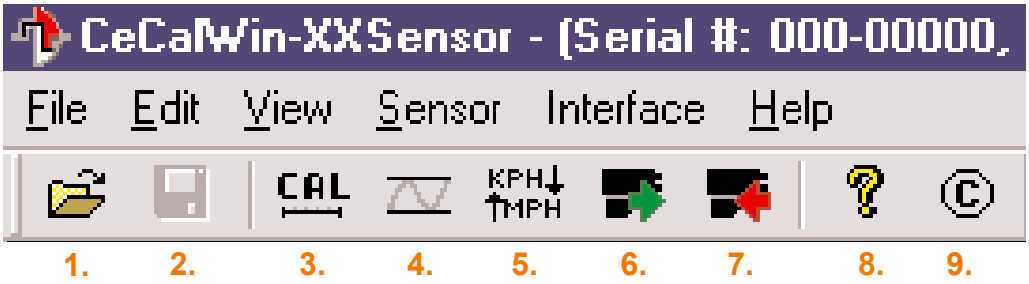
The Help Menu includes commands used to View options available in the Help Menu.

• Select Help>Help Topics to access Help Topics.

• Select Help>About cecalwin… to access version and license information.

5.3.2.2 Tool Bar

All Tool Bar functions correspond to functions also available in the Menu Bar.
See illustration below to reference equivalent menu functions.



1. File>Open project
2. File>Save
3. Sensor>Calibration...
4. Sensor>Test Output (5kHz, 5V)
5. Sensor>Display speed in Mph
6. Sensor>Read Sensor
7. Sensor>Write Sensor
8. Help>Help Topics
9. Help>About cecalwin...

5.3.2.3 Status Bar

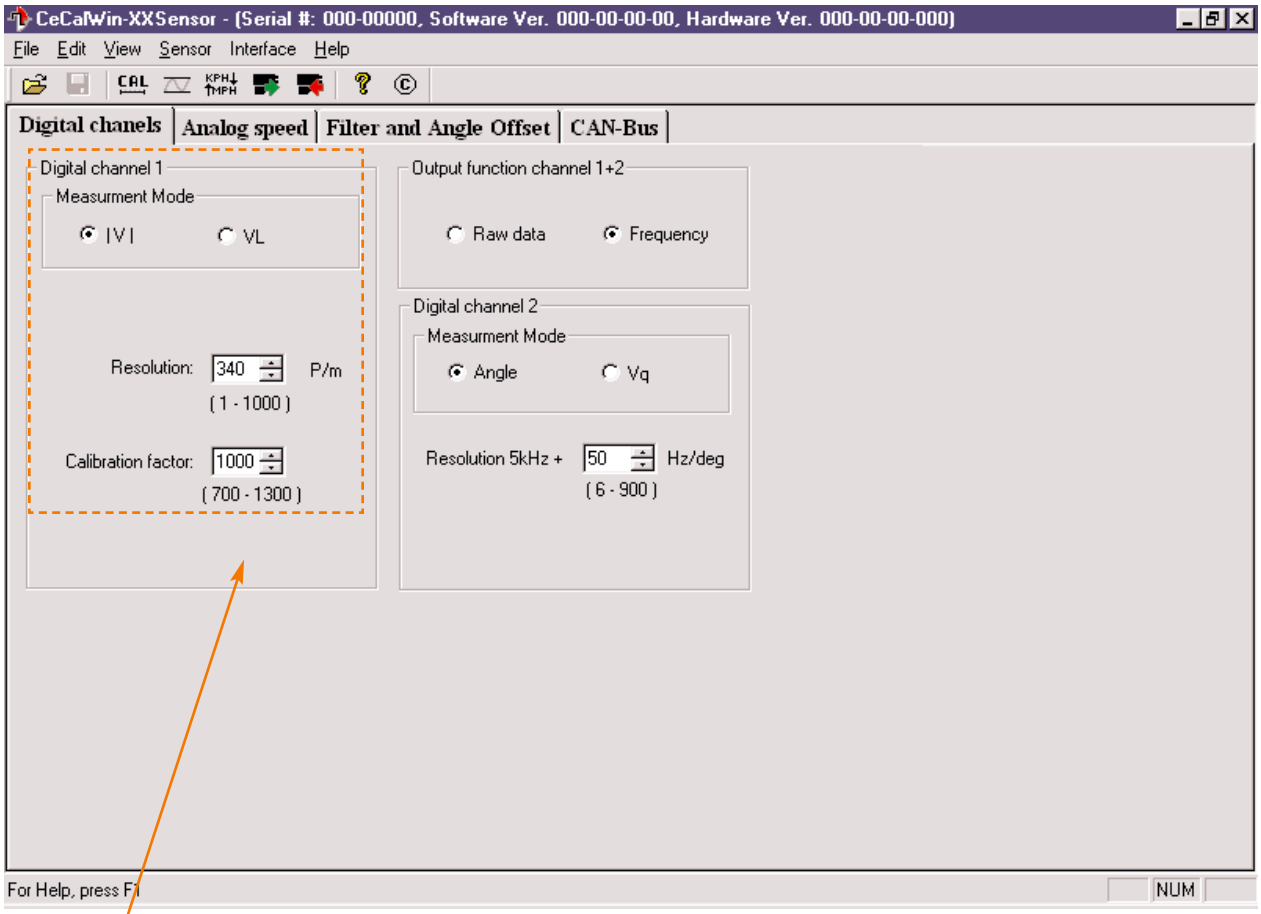
The Status Bar displays text information about the connected sensor. If an error occurs during communication with the sensor, the step in which the error occurs will be displayed. This information provides the user a diagnostic basis from which the required correction can be initiated. In the event that the error condition cannot be rectified, please be sure to note the error message before contacting the manufacturer.

5.3.2.4 Project Window Settings

The Project Window displays all selectable sensor settings. Within the SL Project Window, there are three tabbed sections: Digital Channels, Analog Channels and Filtering & Mode.

Digital Channels

Both digital outputs can be configured from within this section per the following descriptions.



Digital channel 1

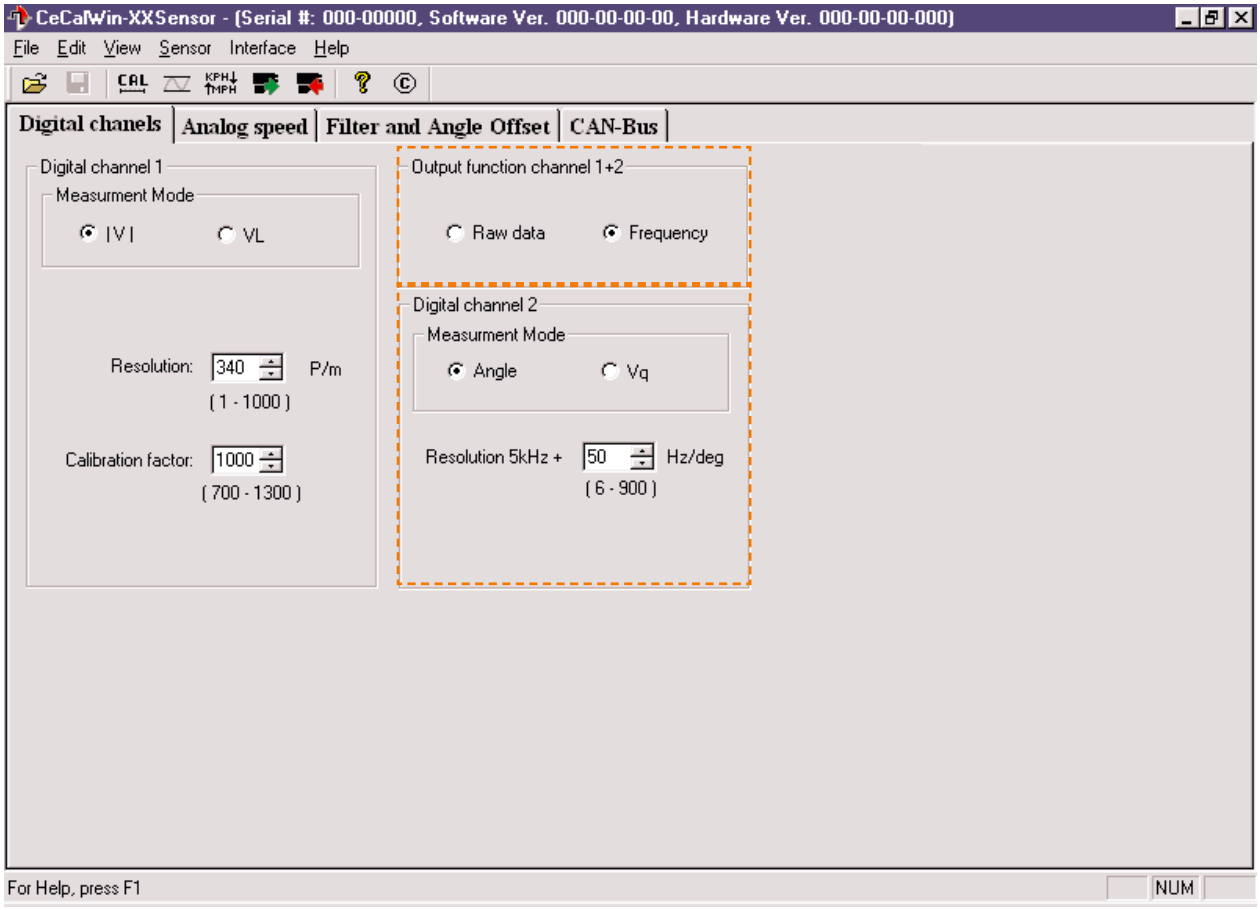
Options in the Digital channel 1 section are used to control variables related to digital output 1.

Measurement Mode (Default setting = |V|)
These options allow the selection of either:

|V| - magnitude speed
or
VL - longitudinal speed

Resolution (Default value = 340)
Selects the number of digital pulses/meter to be output.

Calibration factor (Default value = 1000)
This field displays the value that is produced during Calibration to correct for mounting errors, surface changes, etc. Value can also be changed manually using the scroll-edit function.



Output function channel 1+2 (Default setting = Frequency)

These options control the output of data from the sensor:

- **Frequency** - Digital channels 1 and 2 provide calculated, calibrated and filtered digital output pulses as selected in the Measurement Mode sections.
- **Raw data** - Digital Channels 1 and 2 provide the right and left optical channel pulses without any calculation for angle, filtering, or calibration.

Digital channel 2

Options in the Digital channel 2 section are used to control the funtion of digital output 2.

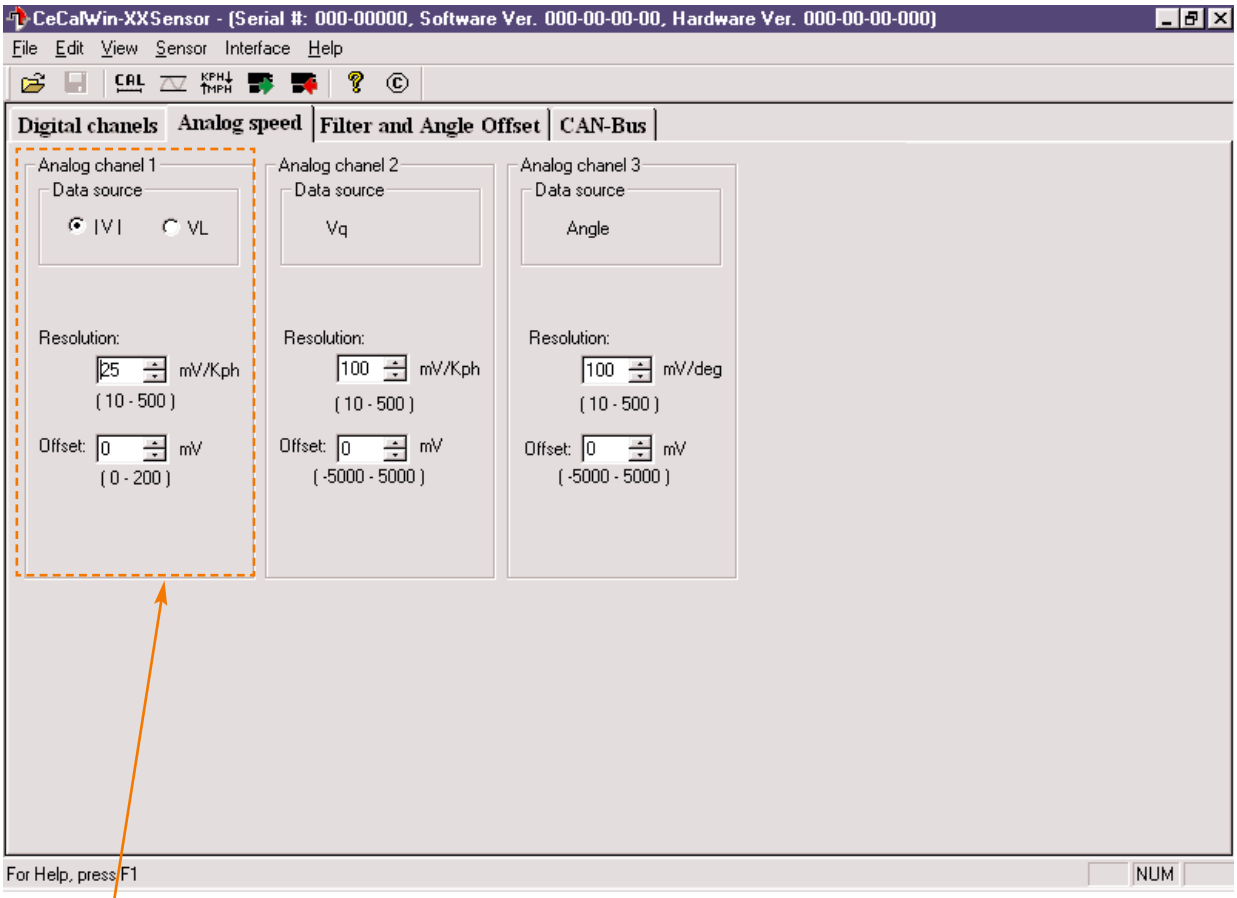
Measurement mode (Default setting = Angle)
These options provide a choice of two measurement modes. Note that in choosing either of the two selections below, the unit of measurement will be changed in accordance with the chosen measurement mode:

- **Angle *(slip angle)*** - the unit “degree” will be used.
- **Vq *(transverse velocity)*** - the unit “kph” will be used.

Resolution (Default values = 50Hz / Degree for angle, 100Hz/kph for Vq)
Use the scroll-edit function to set the resolution of the frequency modulated output of digital channel 2

Analog Channels

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



Analog Channel 1

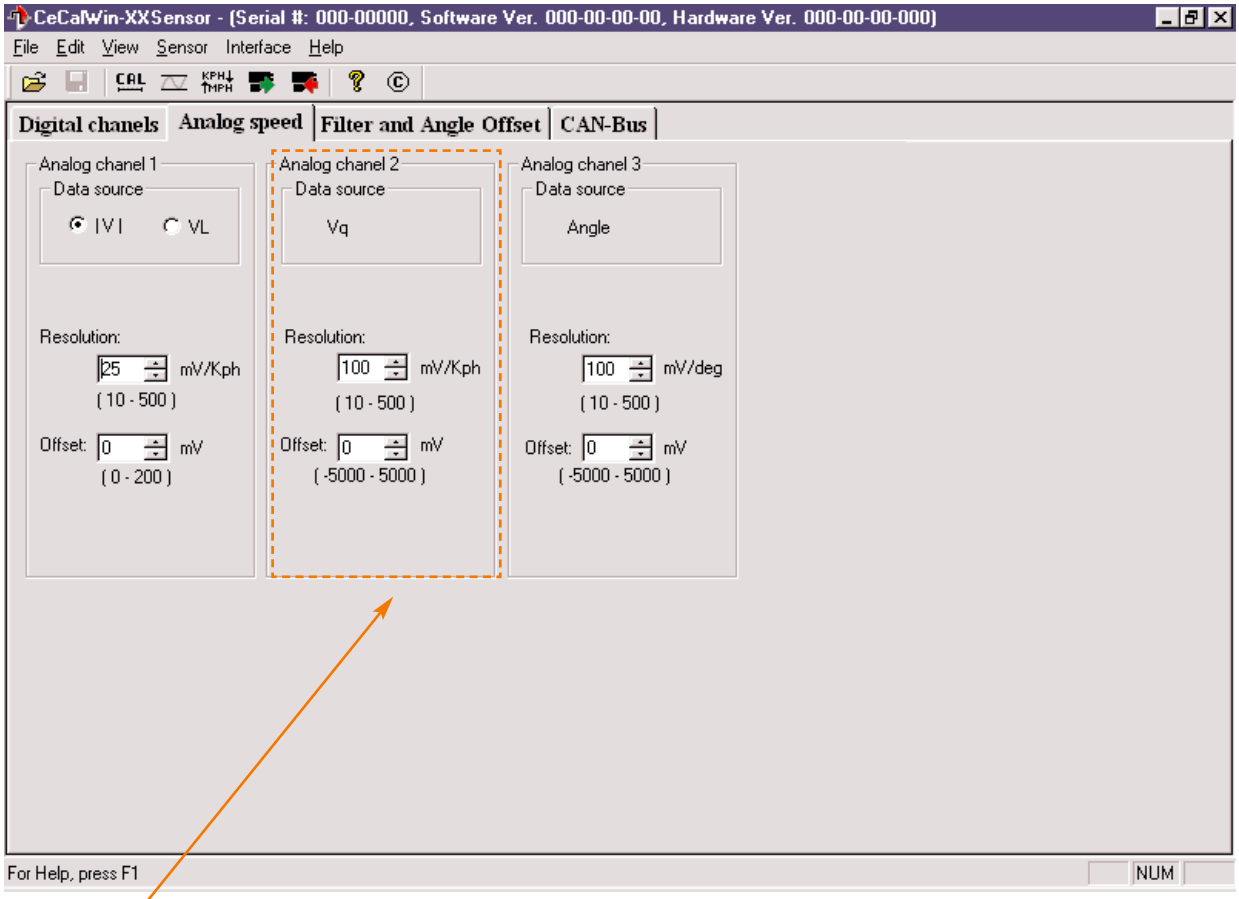
Options in the Analog Channel 1 section are used to control variables related to speed measurement.

Data Source (Default setting = |V|)
These options allow the selection of either corrected or uncorrected speed signals:

- **|V|** ***(magnitude speed)*** - the speed value produced by mathematical correction of angle deviance.
- **VL** ***(longitudinal speed)*** - without consideration of angle deviance.

Resolution (Default value = 25 mV/Kph)
Use the scroll-edit field to set the resolution of the analog output channel 1.

Offset (Default value = 0 mV)
Use the scroll-edit field to define an additional offset value.



Analog channel 2

Options in the Analog Channel 2 section are used to control variables related to angle measurement.

Data Source

Data source is pre-set to:

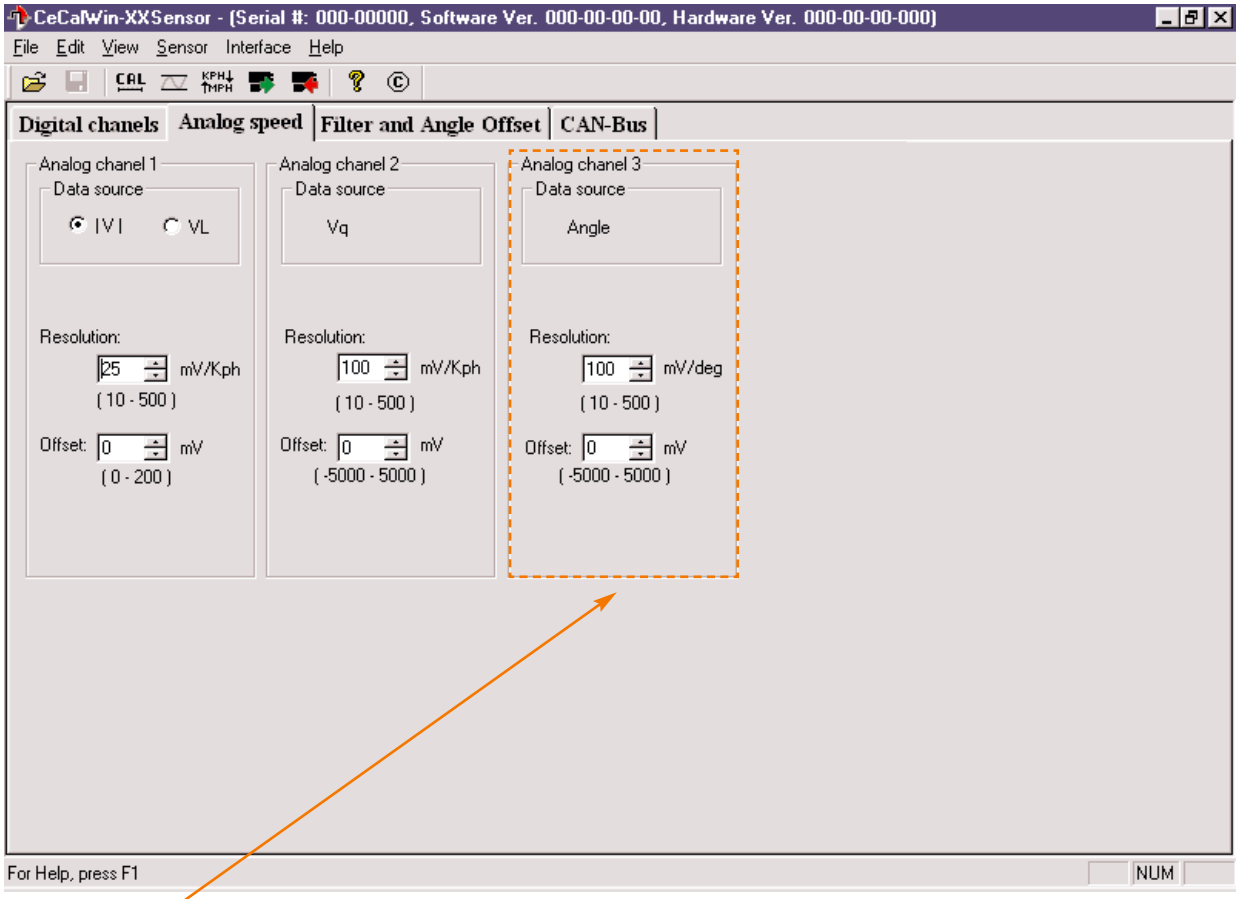
- **Vq *(transverse velocity)***

Resolution (Default value = 100 mV/Kph)

Use the scroll-edit field to set the resolution of the analog output channel 2.

Offset (Default value = 0 mV)

Use the scroll-edit field to define an additional offset value.



Analog channel 3

Options in the Analog Channel 3 section are used to control variables related to angle measurement.

Data Source

Data source is pre-set to:

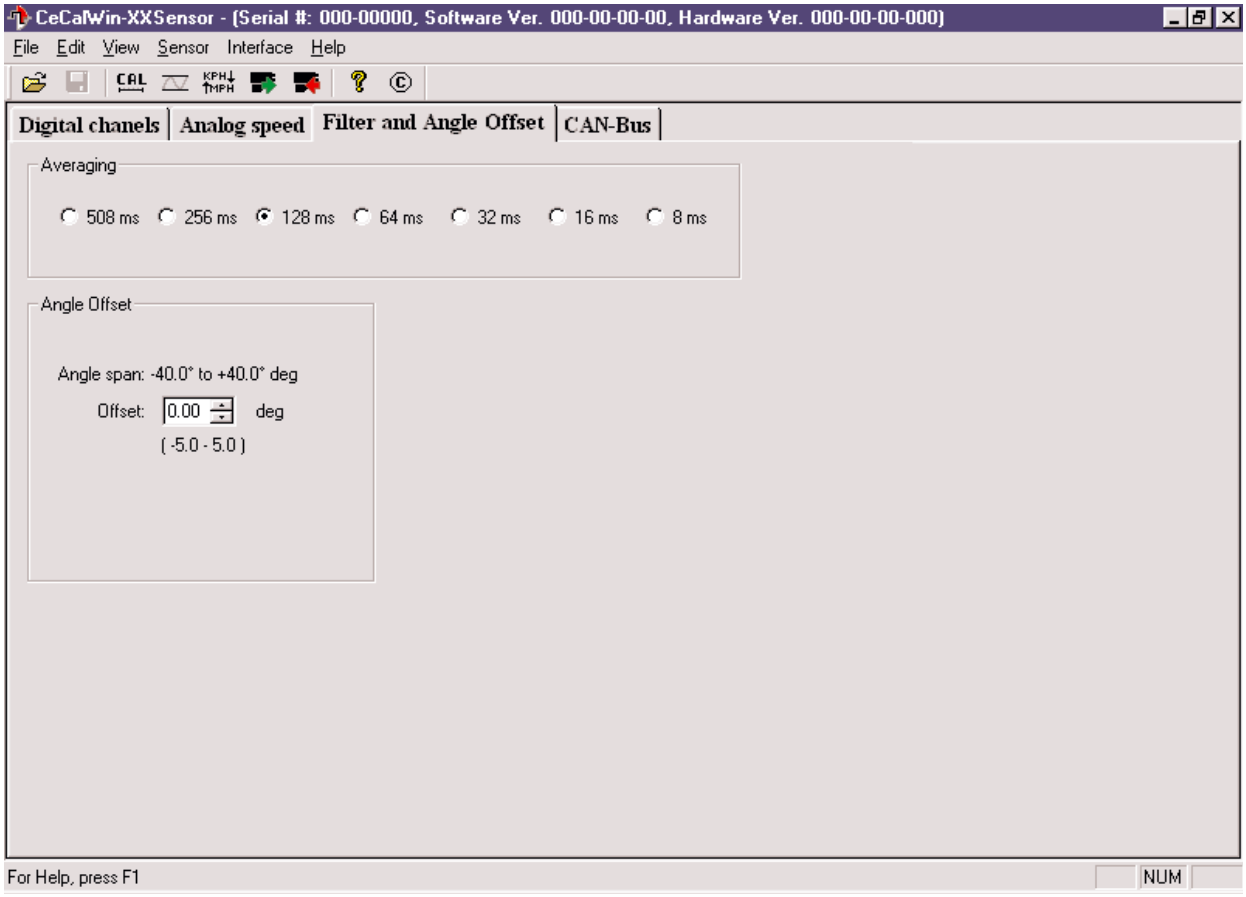
- **Angle *(slip angle)***

Resolution (Default value = 100 mV/Kph)

Use the scroll-edit field to set the resolution of the analog output channel 3.

Offset (Default value = 0 mV)

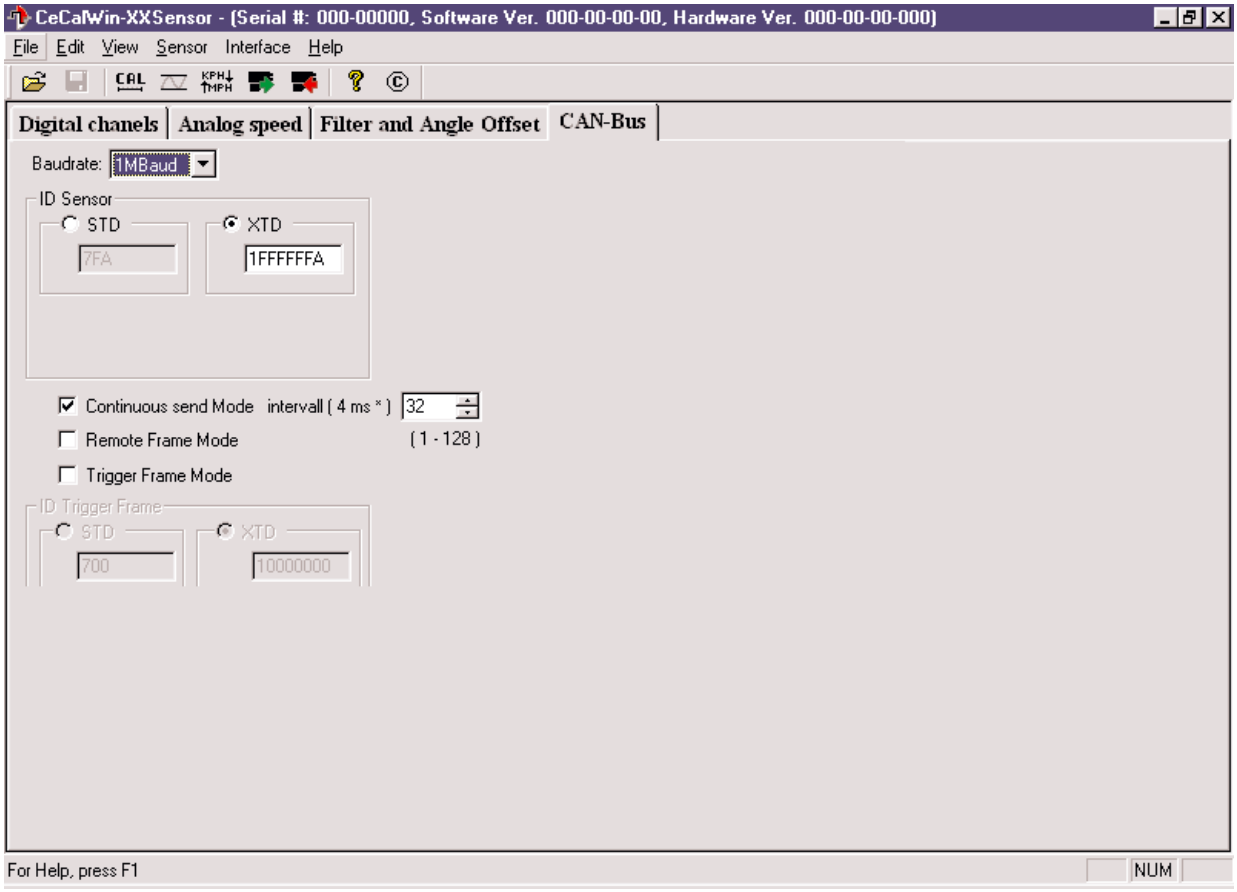
Use the scroll-edit field to define an additional offset value.



Filtering and Angle Offset

Averaging (Default value = 128 ms)
A moving average of the selected measurement value will be performed. Shorter time values produce more detailed measurement, but also increases signal fluctuations.

Angle Offset (Default value = 0.0 deg.)
Use this option to correct the measured value in a range of -5.0° to +5.0°. This value can also be determined via calibration (see **Distance & Angle Calibration**, page 25).



CAN Bus (optional)

Settings in this section apply only to sensors fitted with the optional CAN bus interface.
Also see CAN Protocol documentation for further information.

Baud rate (Default value = 1 Mbaud)
Sets the communication baud rate for the CAN Protocol.

ID Sensor (Default setting = XTD)
Sets Sensor Message Identifier (See CAN Protocol documentation).
Select either Standard (STD) or Extended (XTD) identifier mode.
(Default value, STD = 7 FA)
(Default value, XTD = 1 FFFFFFA)

Continuous Send Mode (Default setting = selected) (Default value = 32 ms)
Sets sensor to send CAN message frame at regular intervals, selectable in 4 ms increments.

Remote Frame Mode (Default setting = not selected)
Sets sensor to respond to Remote Frame requests.

Trigger Frame Mode (Default setting = not selected)
Sets sensor to respond to CAN Trigger Frames.

ID Trigger Frame (Default setting = not selected)
Sets Message Identifier for the trigger frame to which the Sensor responds.
(Default value, STD = 700)
(Default value, XTD = 10000000)

5.4 Distance and Angle Calibration

To perform distance and angle calibration, a known measured distance must be specified and subsequently measured with the sensor in a test drive.

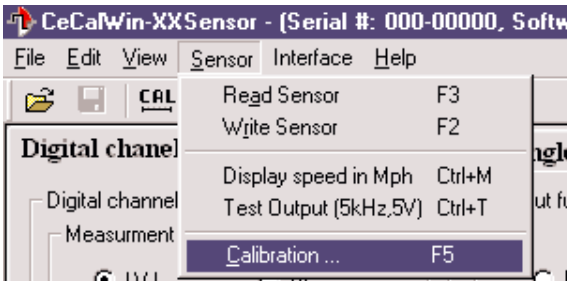
NOTE:

- The new distance calibration factor is calculated based the number of pulses generated as the sensor travels over this known distance.

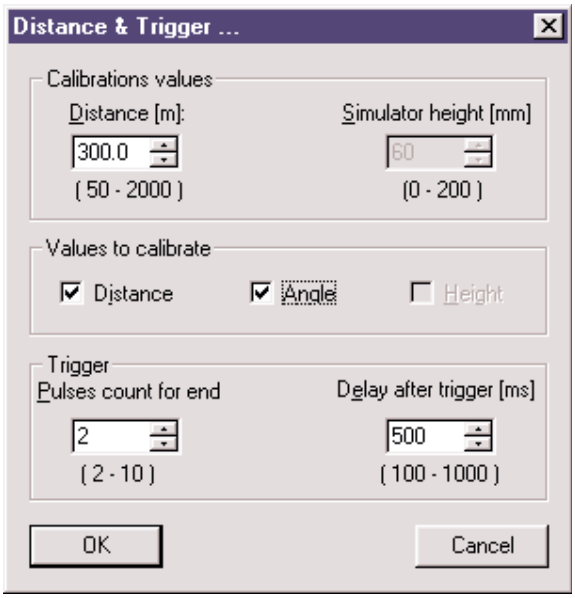
- The vehicle must be driven in a straight line during the test run. Angle error correction is based on the measurement made over this known distance.

1. If a light barrier interface or external trigger unit will be used, connect either trigger device via the DCD line of the serial interface.

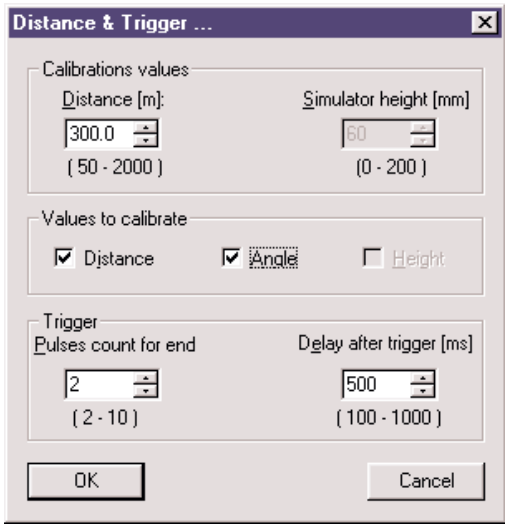
2. Be sure that the vehicle is at a complete standstill, then select Sensor>Calibration… to open the "Distance & Trigger" dialog box.



3. Set the known distance to be traveled in the test drive using the scroll-edit box labeled "Distance:"



4. Select “Distance” and “Angle” under “Values to calibrate”. Values can also be calibrated individually.

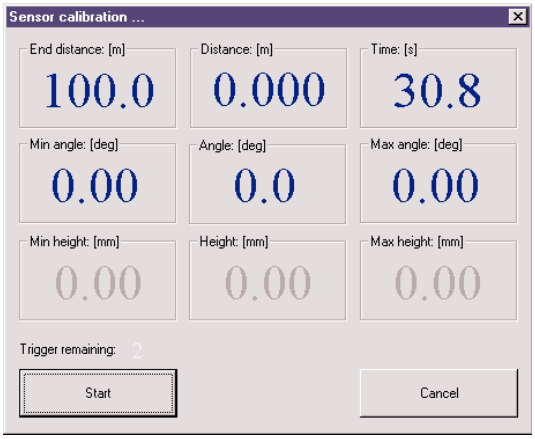


5. Beneath the heading, “Pulses count for end”, use the scroll menu to select the number of trigger pulses to be used in the test run (the minimum is 2, one for start and one for stop). As an example, if the test track has a light barrier every 200 m and you want to do a calibration of 1000 m, then you would require 6 trigger pulses.

6. Beneath the heading “Delay after trigger [ms]” use the scroll menu to select the minimum time between 2 trigger pulses for each of the 2 pulses to be considered as separate pulses.

7. Click OK to continue, or Cancel to return to the Project Window.

8. The “Sensor calibration…” dialog box will open.

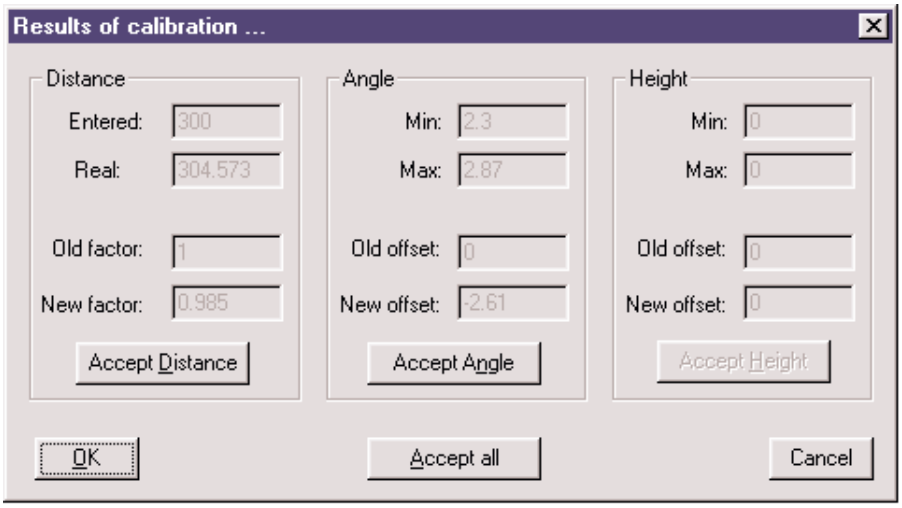


9. To begin the calibration run, click Start (or click Cancel to return to “Distance & Trigger” dialog box).
   - Calibration distance (as selected in the “Distance & Trigger” dialog box) is displayed below the heading “End distance [m]”.
   - Actual distance traveled will be displayed below the heading “Distance [m]”.
   - Elapsed time will be displayed below the heading “Time [s]”.
   - Minimum angle deviation will be displayed below the heading “Min angle [deg]”.
   - Maximum angle deviation will be displayed below the heading “Max angle [deg]”.
   - Angle correction will be displayed below the heading “Angle [deg]”.

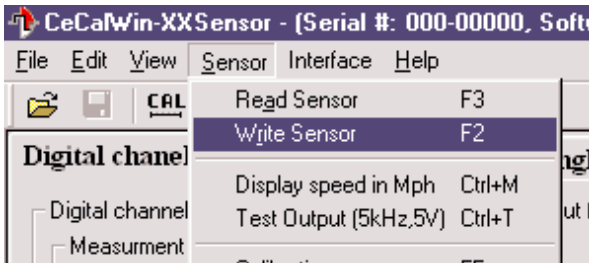
   NOTE: maximum allowable angle correction is ±5°.

10. When the end of the calibration distance has been reached, click “Stop” (or click Cancel to return to “Distance & Trigger” dialog box).

11. New calibration factors will appear in the Results of calibration… window. To accept these values select each of the “Accept” buttons individually, or click “Accept all” to simultaneously accept all new calibration values, then click OK. To reject new calibration values, click “Cancel”.



12. To write the new calibration factors to the sensor, select Sensor> Write Sensor.



5.5 Troubleshooting

The first step in troubleshooting should always be to check all connections:

- First, check the wiring connection between sensor and PC/Notebook.
- Also be sure to note which serial interface is used for sensor connection.
- Open menu item, Sensor>Interface and choose the correct interface.
- Proper communication with the sensor should now be possible.
- Check this by selecting the Read Data command in the Sensor Menu.

Error messages and possible causes:

"Connected sensor unknown!"
This message usually indicates that no sensor or an unknown sensor is connected. This message often appears as a result of improper or incomplete connection. Double-check all connections and also check the sensor interface by opening the menu item, Sensor>Interface and choosing the correct interface.

In some instances, this message will be produced because the connected sensor is not supported by the software. CeCalWin supports only CORREVIT® S- and L- series sensors.

"Could not read sensor!"
This error message typically occurs during the first reading of the sensor. Check to be certain the software is compatible with the sensor.

"Could not write file"
This message indicates that faults occurred as a file was being written. Check to be certain that the storage media the file is being written to has sufficient space for the file and that the storage media is not write-protected. Write permission can be changed in the directory (under Windows NT* and Windows 2000*).

"Loading error"
This message indicates that faults occurred as a file was being read. Be sure that the file is a CeCalWin project and that it has not been damaged by a write error. If a write error has occurred, data loss can result.

"Listindex out of bounds"
An internal program fault has occurred during measurement. Close all program windows and read the sensor again.

Additional Notes On Error Correction

Please contact us if other faults occur and no error messages are displayed so we can correct these issues in subsequent software versions and service releases.

For errors relating to the Windows* operating system, please see Windows Help or consult the Windows user manual.

**Windows, Windows NT and Windows 2000 are registered trademarks of the Microsoft Corporation.*
***Windows Explorer is a registered trademark of the Microsoft Corporation.*