CORRSYS DATRON Sensorsysteme GmbH

CeCalWin Pro & SFII P

Sensor Configuration and Data Acquisition Software

for

Setup and calibration of the CORRSYS-DATRON SFII P Sensor

USER MANUAL VOLUME III

SFII 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 please refer to the separate user manual Volume I.

VOLUME III - SFII P Sensor-specific Software Description

Table of Contents

General Information

Legal Notice

Copyright Notice

Revision

SFIIP-CCWPro_m-816-p3-e-rev001 10/08

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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.

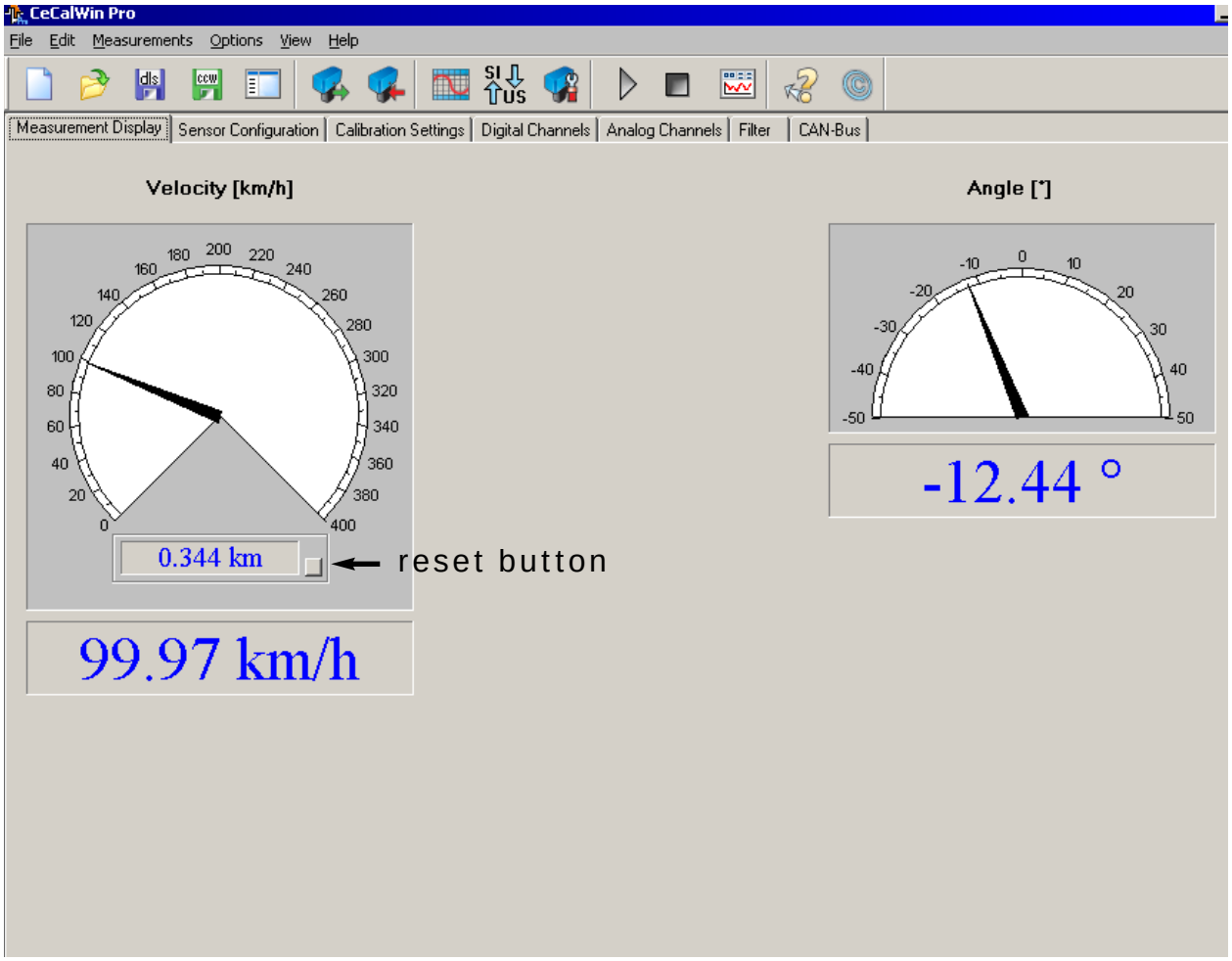
- Use hardware and/or software only for intended applications. Improper application is not advised.
- Do not modify or change equipment or its accessories in any way.
- Improper use or mounting of the equipment may affect the safety of the vehicle and/or occupants.
- The equipment must not be mounted 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.

1. Project Window Settings for the SFII P Sensor

Within the Project Window, seven tabbed sections will be displayed: Measurement Display, Sensor Configuration, 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 SFII P Sensor in real time.



Velocity [km/h]

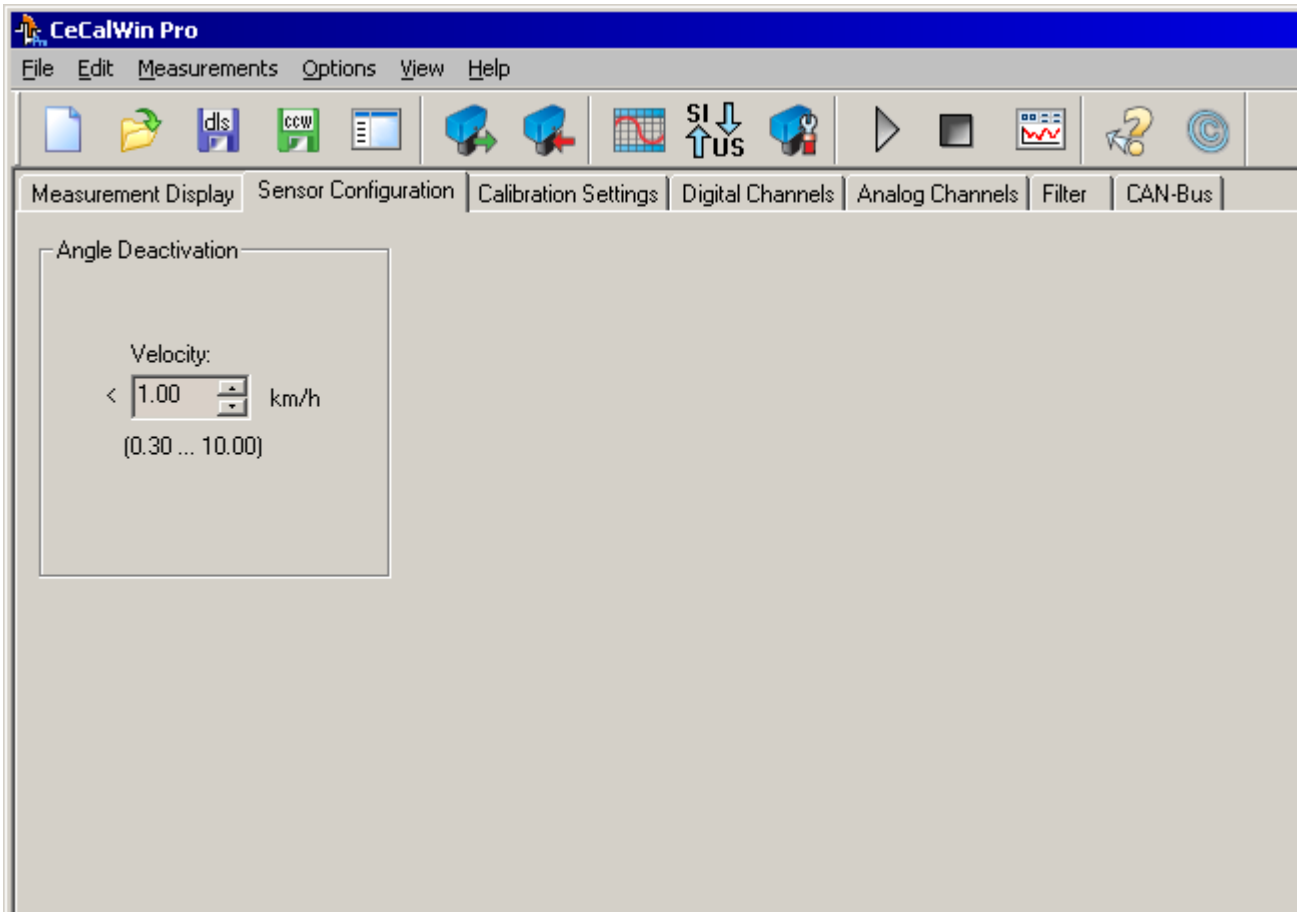
The display shows the actual velocity and the milage of the sensor.
With the reset button, the user can reset the milage to 0.

Angle [°]

The Display shows the actual angle.

1.2 Sensor Configuration

The Sensor Configuration tab enables sensor parameterization.



Angle deactivation:

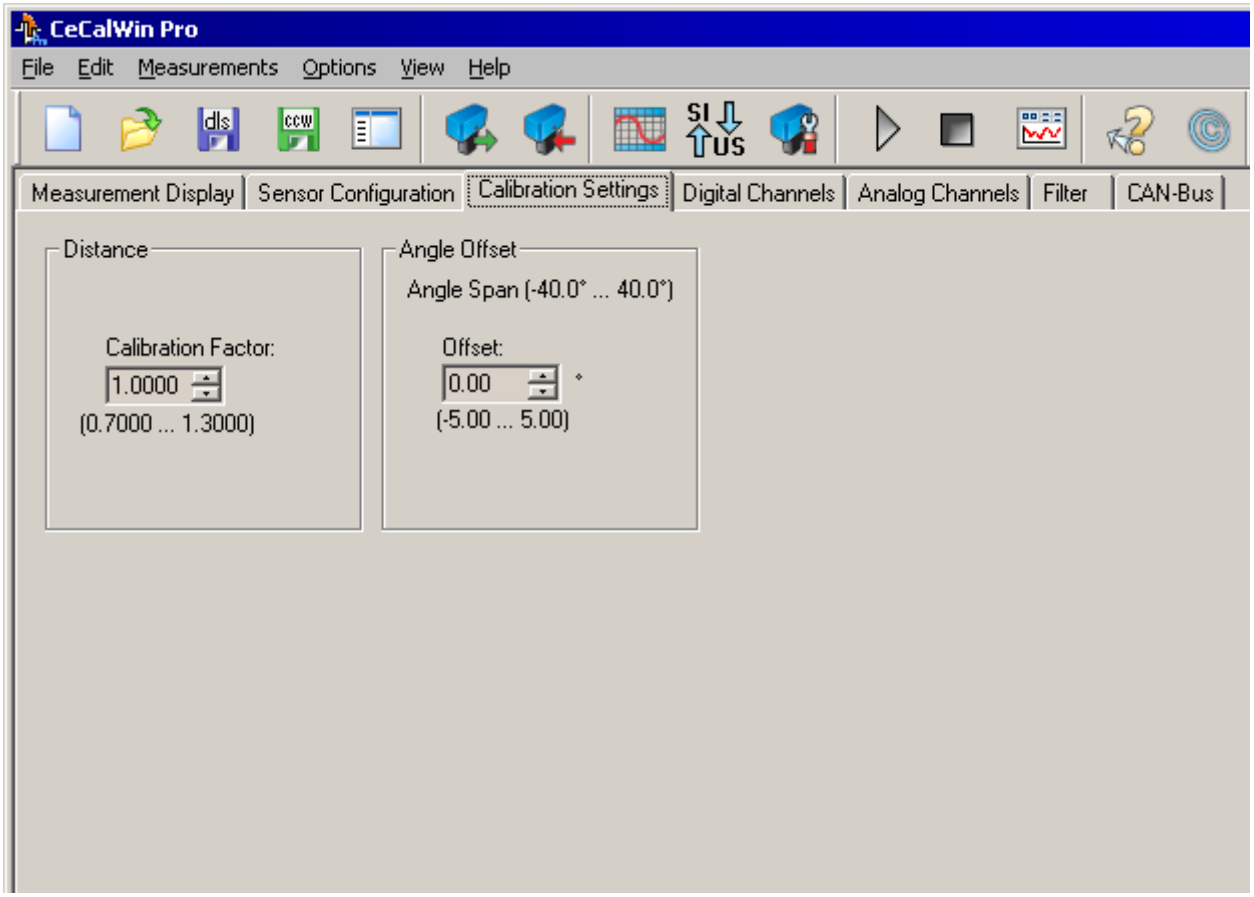
If the velocity of the sensor is lower as the entered threshold, the sensor sets the value of the angle to 0.

Velocity (Default value = 1.0 km/h)

Use the scroll-edit field to set the velocity threshold, or enter the new value manually.

1.3 Calibration Settings

The Calibration Settings tab enables editing the calibration factor.



Distance

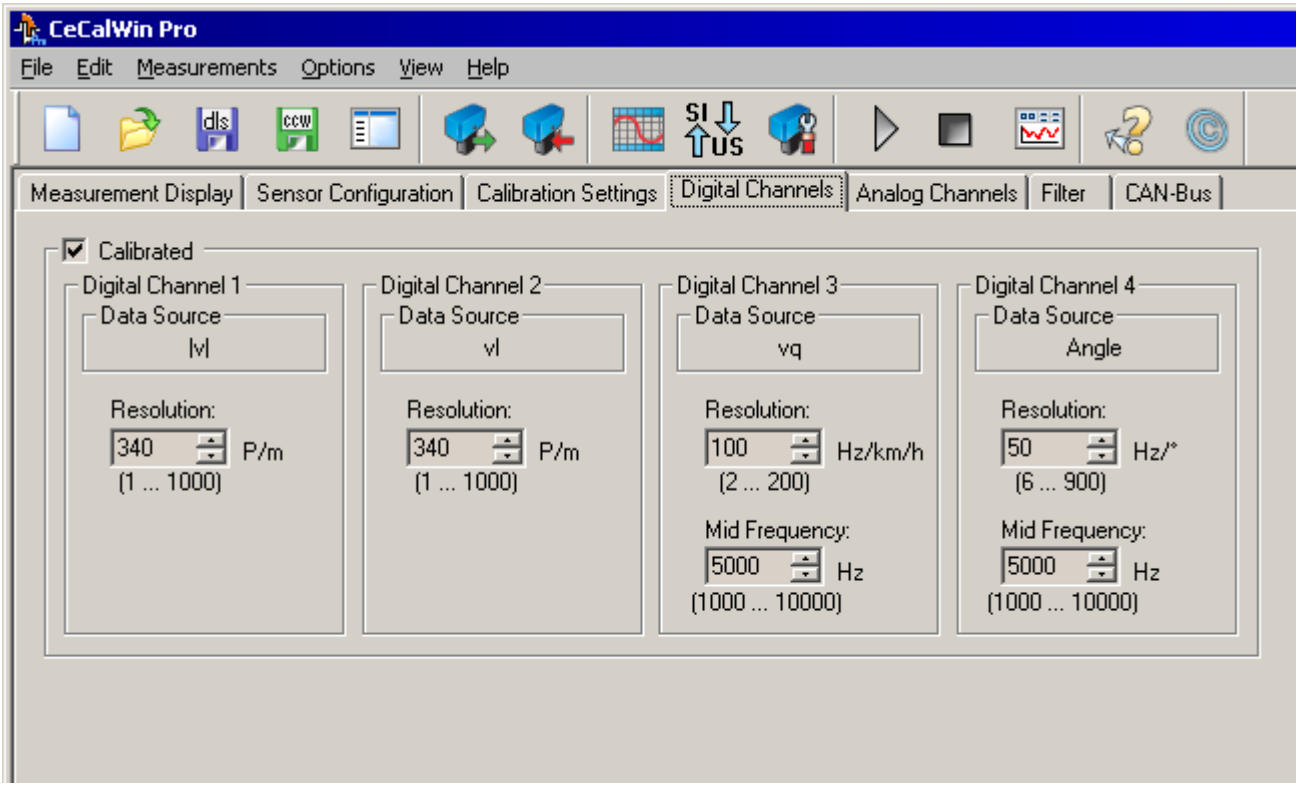
Calibration factor (Default value = 1.0000)
Displays the value that is calculated during calibration to correct for mounting errors, surface changes, etc. The value can also be changed by using the scroll-edit function, or enter new value manually.

Angle Offset

Offset (Default Value = 0.0°)
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.

1.4 Digital Channels

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



Calibrated (Default = selected)
Select the checkbox to set microcontroller calculated signals on Digital Channels .

Digital channel 1
Data source is lvl

Resolution (Default value = 340 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.

Digital channel 2
Data source is vl

Resolution (Default value = 340 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.

Digital channel 3
Data source is vq

Resolution (Default value = 100 Hz/km/h)
Selects the desired resolution for the selected digital output. Other values can be entered manually, or by using the scroll-edit field.

Mid Frequency (Default value = 5000 Hz)
Selects the desired resolution for the selected digital output. Other values can be entered manually, or by using the scroll-edit field.

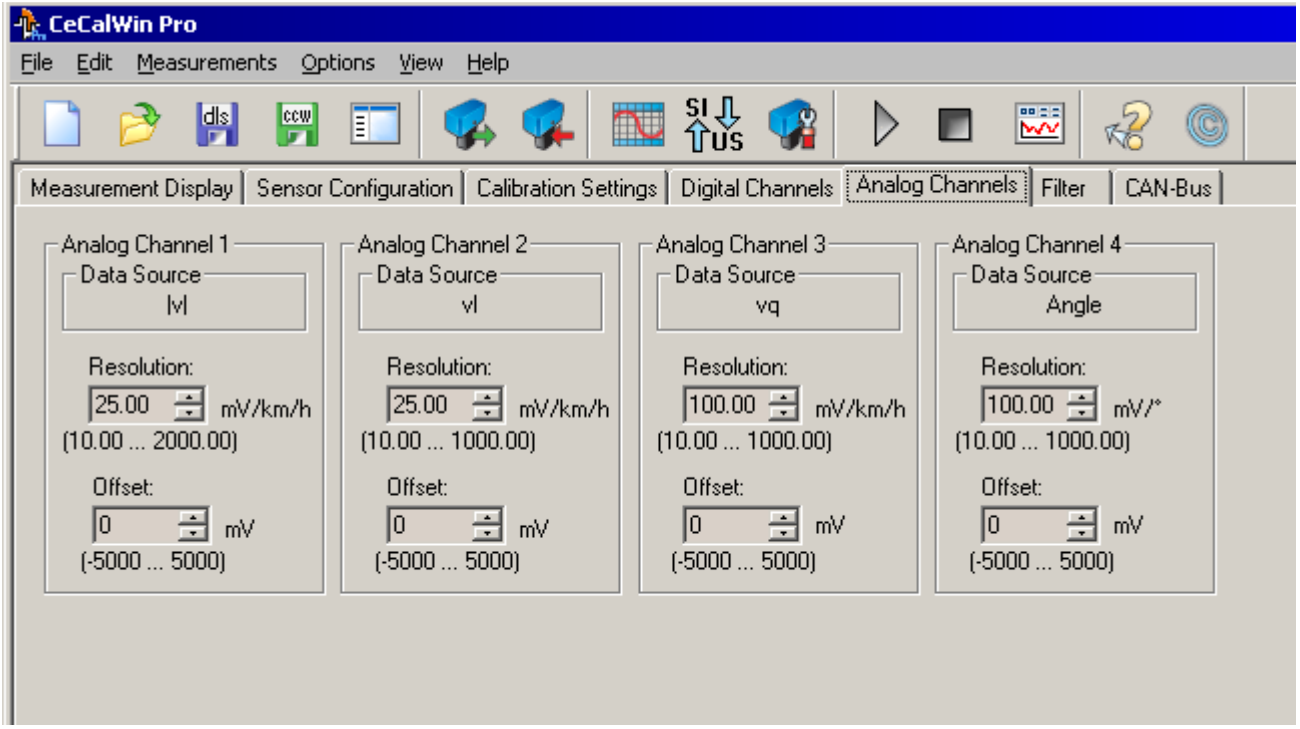
Digital channel 4
Data source is angle

Resolution (Default value = 50 Hz/°)
Selects the desired resolution for the selected digital output. Other values can be entered manually, or by using the scroll-edit field.

Mid Frequency (Default value = 5000 Hz)
Selects the desired resolution for the selected digital output. Other values can be entered manually, or by using the scroll-edit field.

1.5 Analog Channels

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



Analog Channel 1
Data source is |v|

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.

Analog Channel 2
Data source is vl.

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.

Analog Channel 3
Data source is vq

Resolution (Default value = 100 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.

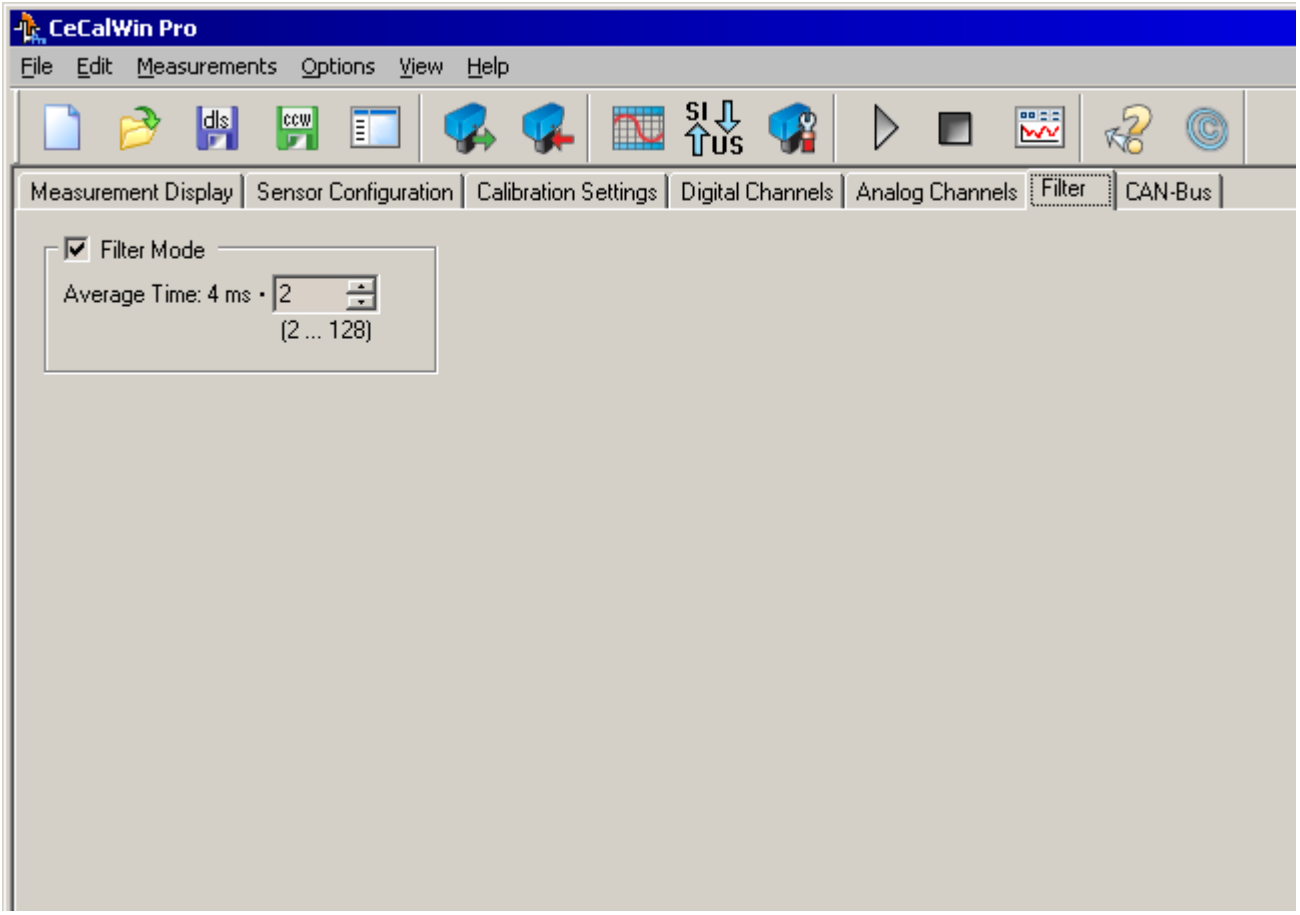
Analog Channel 4
Data source is angle.

Resolution (Default value = 100 mV/°)
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.

1.6 Filter

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

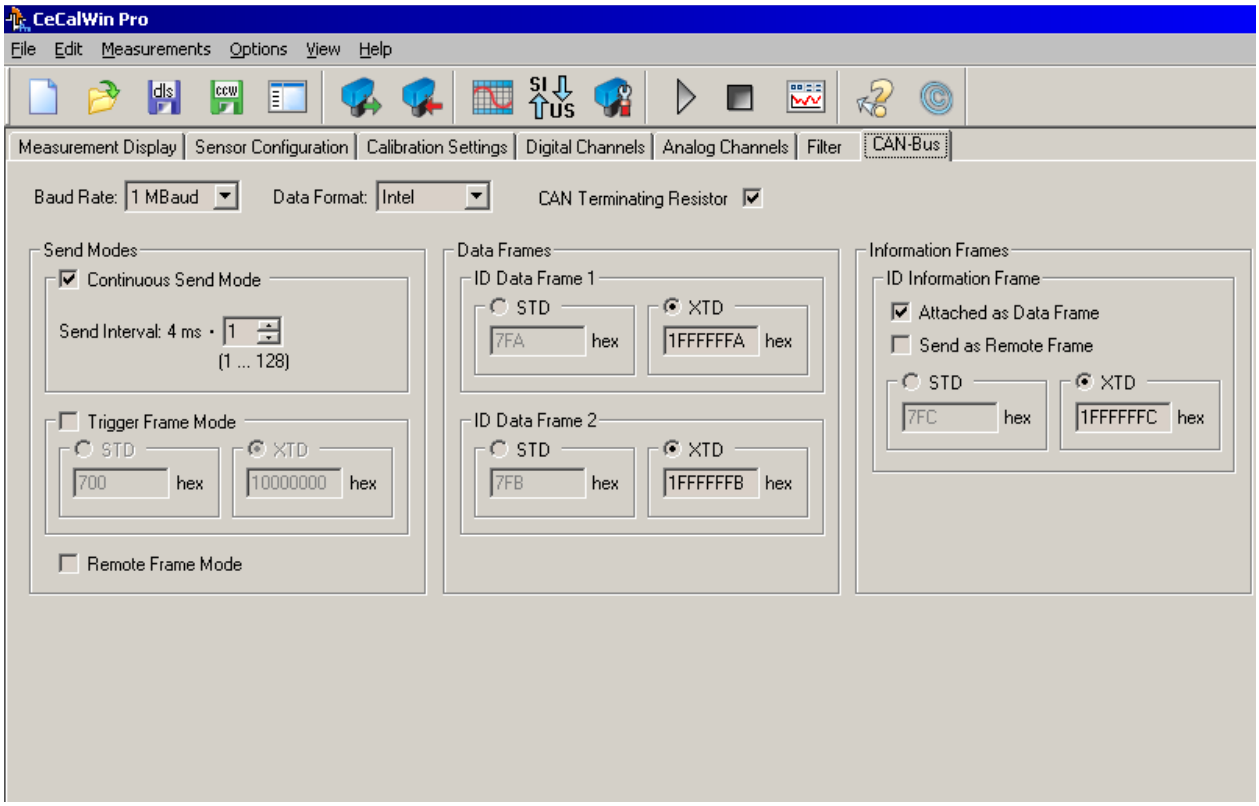


Filter Mode (Default = selcted)
Select the checkbox to activate access to the filter-time setting for the connected CORREVIT® SFII P Sensor.

Average Time: user-selectable (default value = 2 x 4 = 8 ms).
Other values can be entered manually, or by using the scroll-edit field.

1.7 CAN Bus

In this menu you can configure the CAN Bus according to your requirements.
Also see for further information (Data Protocol CAN-Bus, page 19 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 19ff)

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 = 1FFFFFFA)

ID Data Frame 2

Select either Standard (STD) or Extended (XTD) Identifier mode (Default setting = XTD)
Set Sensor Message Identifier (Default value, STD = 7FB)
(Default value, XTD = 1FFFFFFB)

Information Frames

Sets Sensor Information Frame (see CAN Protocol, page 19ff)
Select either Standard (STD) or Extended (XTD) Identifier mode (Default setting = XTD)
Set Sensor Message Identifier (Default value, STD = 7FC)
(Default value, XTD = 1FFFFFFC)

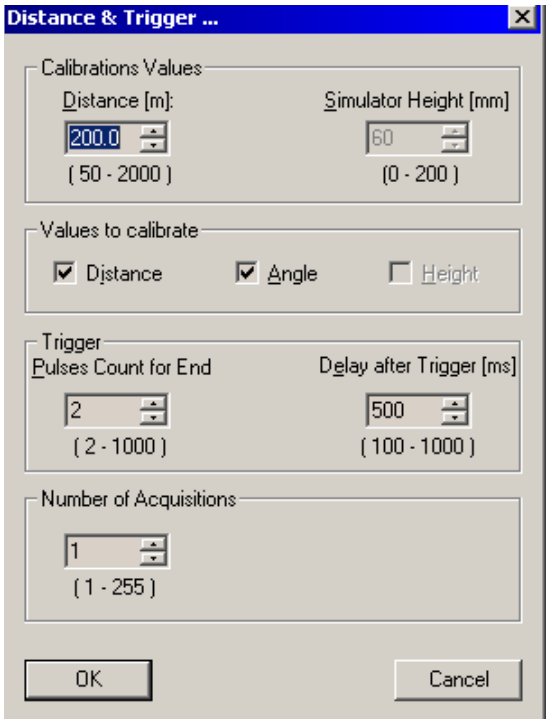
Attached as Data Frame

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 SFII P Sensors.

Values to calibrate

Select the signal you want to calibrate.

Note: **“Height”** ist only for 3-axis sensors and not active for SFII 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

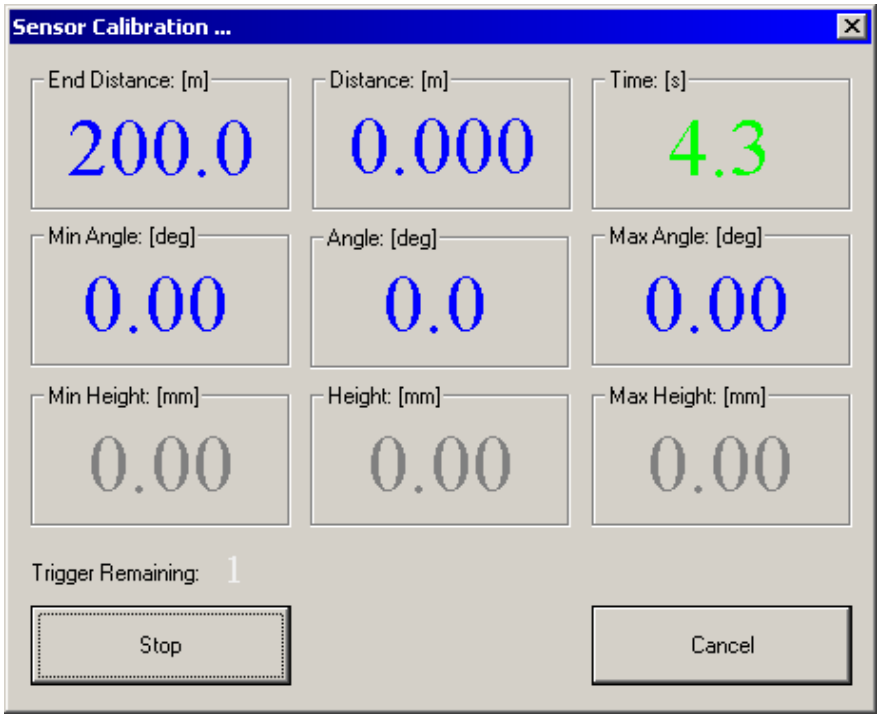
CeCalWin Pro is able to calculate an average for the calibration values. With "Number of Acquisitions" you can set the number of acquisitions for the average calculation.
Use the scroll-edit field to set the number of acquisitions, or enter the new value manually.

Button "OK"

Pushing the "OK" button initializes CeCalWin Pro for calibration and the calibration can start.

Button "Cancel"

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



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.

Min Angle [deg]
Here you can see the minimum angle during calibration.

Angle [deg]
This value shows the actual measured angle.

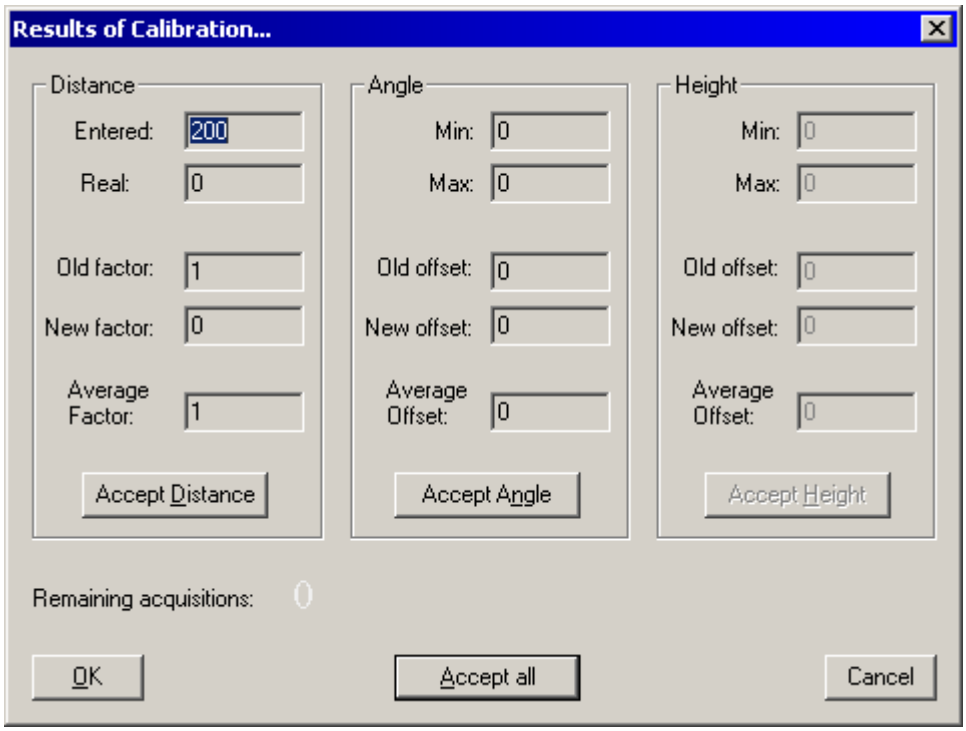
Max Angle [deg]
Here you can see the maximum angle during calibration.

Note: The Values **"Min Height"**, **"Height"** and **"Max Height"** are only for 3-axis sensors not active for SFII P Sensors.

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

Button "Start / 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.



Distance:

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.

Angle:

Min
This value shows the minimum value of angle during calibration.
Max
This value shows the maximum value of angle during calibration.
Old offset
This value shows the old angle offset, which is stored in the sensor.
New offset
This value shows the actual angle offset, which was calculated at the end of the actual calibration acquisition.
Average Offset
Average over all valid calibration offsets
Button "Accept Angle"
To accept the actual angle offset, please push the button "Accept Angle".
The accepted offset will be used to calculate the average angle offset.

Note: **"Height"** is only for 3-axis sensors not active for SFII P Sensors.

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 or the actual angle offset, the last acquisition will not be valid and has to be repeated.

Button "Accept all"
If you want to accept the actual values of calibration factor and angle offset at once, you can do this with pushing the button "Accept all".

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

3. Data Protocol CAN-Bus

SFII 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 the 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).

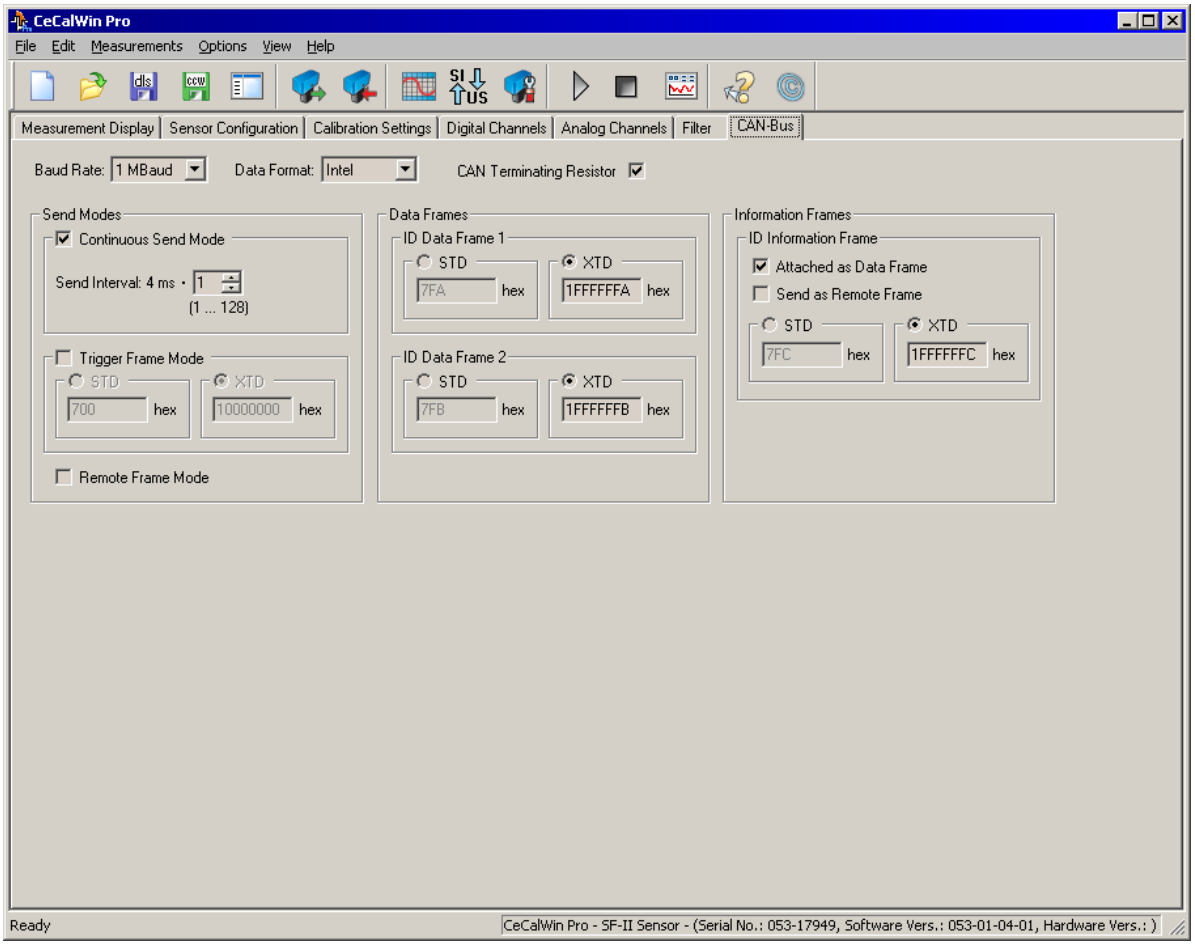
The sensor sends two **Data-Frames** and one combined **ID-Status-Frame**. The frame format is the same for each send mode. It is possible to choose between **Intel** data format or **Motorola** data format.

To reduce the traffic on the can bus, it's 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 CeCalWin Pro (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 one Data-Frame (response to the remote frame request) followed by the second Data-Frame and, if switched on, the ID-Status-Frame.

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 all **Data-Frames** and the **ID-Status-Frame** can be set separately in CeCalWin Pro. The settings of baud rate and data format is settable with CeCalWin Pro as well.

CAN-bus type : CAN V2.0B
Baud rate : 1MBaud (default), 500kBaud, 250kBaud, 125kBaud
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 1
Format: 8 Data bytes
Default ID (Standard): 0x7FA
Default ID (Extended): 0x1FFFFFFA

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

Data_Frame 2
Format: 6 Data bytes
Default ID (Standard): 0x7FB
Default ID (Extended): 0x1FFFFFFB

Data byte	Description	Unit	Data type
0	v_L (Bit 0...7)	10^{-2} m/s	unsigned
1	v_L (Bit 8...15)		
2	v_T (Bit 0...7)	10^{-2} m/s	signed
3	v_T (Bit 8...15)		
4	Angle (Bit 0...7)	10^{-2} (°)	unsigned
5	Angle (Bit 8...15)		

ID-Status_Frame:
Format: 8 Data bytes
Default ID (Standard): 0x7FC
Default ID (Extended): 0x1FFFFFFC

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 23	
7	Status byte 2	see Table 2, page 23	

Definitions for Motorola Format

Data_Frame 1
Format: 8 Data bytes
Default ID (Standard): 0x7FA
Default ID (Extended): 0x1FFFFFFA

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

Data_Frame 2
Format: 6 Data bytes
Default ID (Standard): 0x7FB
Default ID (Extended): 0x1FFFFFFB

Data byte	Description	Unit	Data type
0	v_L (Bit 8...15)	10^{-2} m/s	unsigned
1	v_L (Bit 0...7)		
2	v_T (Bit 8...15)	10^{-2} m/s	signed
3	v_T (Bit 0...7)		
4	Angle (Bit 8...15)	10^{-2} (°)	signed
5	Angle (Bit 0...7)		

ID-Status_Frame:
Format: 8 Data bytes
Default ID (Standard): 0x7FC
Default ID (Extended): 0x1FFFFFFC

Data byte	Description	Unit	Data type
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 23	
7	Status byte 2	see Table 2, page 23	

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 byte 2) 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 **Data-Frame** followed by the **ID-Status-Frame**, if switched on. (Synchronization)
0x01	Sensor goes in self-test mode - LEDs are modulated in appox. 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 *"Distance since sensor power on"*
0xF0	Switch LED off
0xF1	Switch LED on
Other	No sensor reaction

3.2 Troubleshooting CAN with the CORREVIT® SFII P

Problem: There are no messages on the CAN-bus
Check to be sure that:
- the electronic has power
- data acquisition is connected to the SFII 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**, or may also be obtained by contacting the CORRSYS-DATRON application department directly.