TiltView

User Manual

IES-Elektronikentwicklung

TiltView User Manual

for TiltView TK17 and beyond

International/English Edition

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Contents

1. Intended Use

The intended use and primary field of application of the IES1400 sensors are in crash testing, thus this document assumes in many cases that the sensors are mounted inside ATDs (Anthropomorphic Test Devices, commonly called crash test dummies).

Of course the sensors can be and are also used elsewhere, but covering all possible applications would exceed the scope of this document.

2. TiltView and the IES1400 components

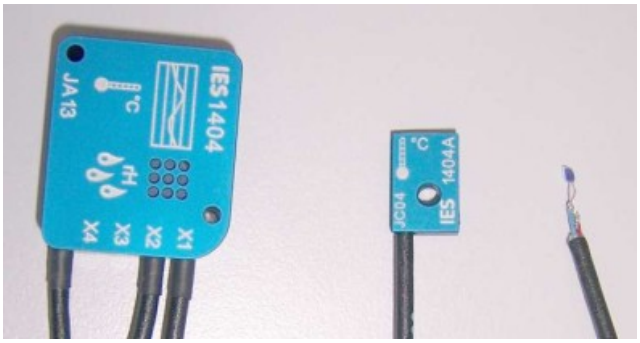
The purpose of TiltView software is to help the user oversee and operate multiple sensors of the IES1400 family.

The available sensors are:

2.1 IES1402 Tilt Sensor (formerly 1401AT)

The IES1402 tilt sensors are very small sized two axis tilt sensors with one additional internal temperature sensor. They can be used to measure various tilt angles inside an ATD, including head, pelvis, torso, legs, etc.

2.2 IES1404 Temperature/Humidity Logger (formerly 1401H)



The IES1404-LC temperature loggers are equipped with an internal temperature sensor. Additionally they may be extended by an external temperature sensor.

The IES1404 temperature and humidity loggers are equipped with an internal temperature and humidity sensor. Additionally they may be extended by up to four external temperature sensors.

The external sensors can be made very small, see pictures and individual data sheets.

The loggers have a built in battery which ensures a life time of at least one year continuous logging. Logging interval can be set up with the TiltView software.

2.3 IES1410 In-Dummy Hub

The IES1410 In-Dummy-Hub is a small interconnect box using the 1404 casing and the same mounting system. It has room for connection of up to four In-Dummy-Sensors, with the benefit of only one cable leaving the dummy, while giving full access to all sensors. Also exist in a ‘big’ version, slightly larger, connects to up to eight sensors.

2.4 IES1401iUSB Interface Cable (formerly -iRS232, -iPPC, etc.)

The IES1401i Interface Cable connects the 1400 family bus to the desired hardware platform. Currently the USB industry standard protocol and sockets are the most common recipients. Exact socket type can be customized.

2.5 IES1401iAna Analogue Interface

The 1401iAna analogue interface generates two analogue output voltages from the digital information on the 1400 family bus. The analogue voltages may be recorded with the user's data acquisition system. Typically the analogue interface is configured such, that actual temperature and humidity from a logger are converted to analogue.

2.6 IES1409 Ethernet Interface

The IES1409 Ethernet Interface connects up to two 1400 family bus groups to the user's Ethernet.

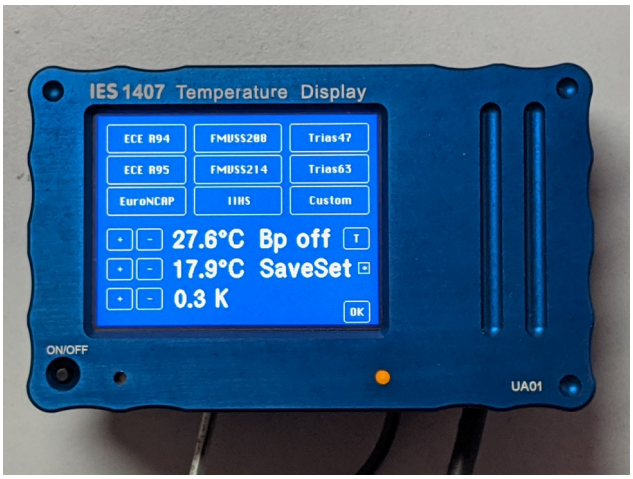
2.7 IES1406 Logger Display

The IES1406 logger display is equipped with an air pressure sensor and can be connected to a 1404 temperature and humidity logger. It then continually shows the current values on its LCD display.

Also has the functionality of a 1401iAna generating analogue outputs for temperature and humidity.

Needs a power outlet for its 12V power adapter and can be mounted to a wall or other structure.

2.8 IES1407 Temperature Display



The IES1407 temperature display can be connected to up to four 1400 family bus groups. The user then can choose which values to be shown on screen via intuitive touch operability.

Also serves as an Ethernet interface, connecting the bus groups to the user's Ethernet.

Has a command output that can be connected to the user's climate control unit to activate if sensor values exceed given boundaries.

Built-in battery should last at least one day given regularly nightly recharge.

2.9 Discontinued or planned but never released

- IES1405 Distance Sensor: the button in the TiltView software wrongly indicates the existence of this sensor, but it never evolved beyond planning stage.
- IES1403 Belt Tension Interface: one unit was shipped, hence the button in the software exists.
- IES1408 Wireless ATD Monitor: unfinished/discontinued

3. Getting Started

You need the following:

- at least one IES1400 family sensor of any kind
- the corresponding peripherals to connect the sensor to your PC
- PC with Win7 or newer
- the TiltView.zip downloaded from the IES website

3.1 Installation and Registration

Unpack the TiltView.zip into a folder of your choice.

Do not start TiltView out of the archive!

Beware: The user needs to have write privileges in that folder, hence ‘C:\Program Files\...’ wont work out.

Make sure the TiltView.ini is not write protected and in the same folder as the TiltView.exe.

Run the TiltView.exe with admin rights by right-clicking on it and choosing ‘Run as administrator’. **Beware: You will have to do this exactly that way even if you are already logged in as admin!**

A pop-up will prompt you to complete a code. Send an email to our office under Office@IES-elektronikentwicklung.de with your half of the code and you will get a reply with the other half.

Complete the code and confirm.

The TiltView main window should show up.

Close it for now, registration is complete and you can open TiltView under normal user rights just by double-clicking the TiltView.exe from now on.

3.2 Basic Configuration

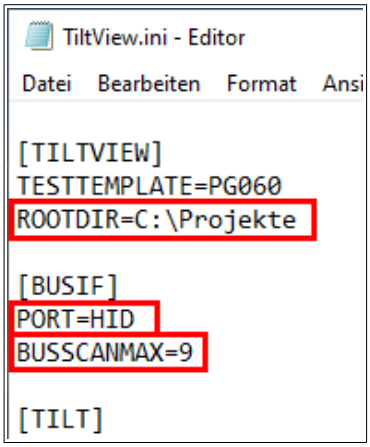
Open the TiltView.ini with a text editor, e.g. Notepad.

Set the value of the ‘`ROOTDIR=`’ key to the parent directory for any stored data.

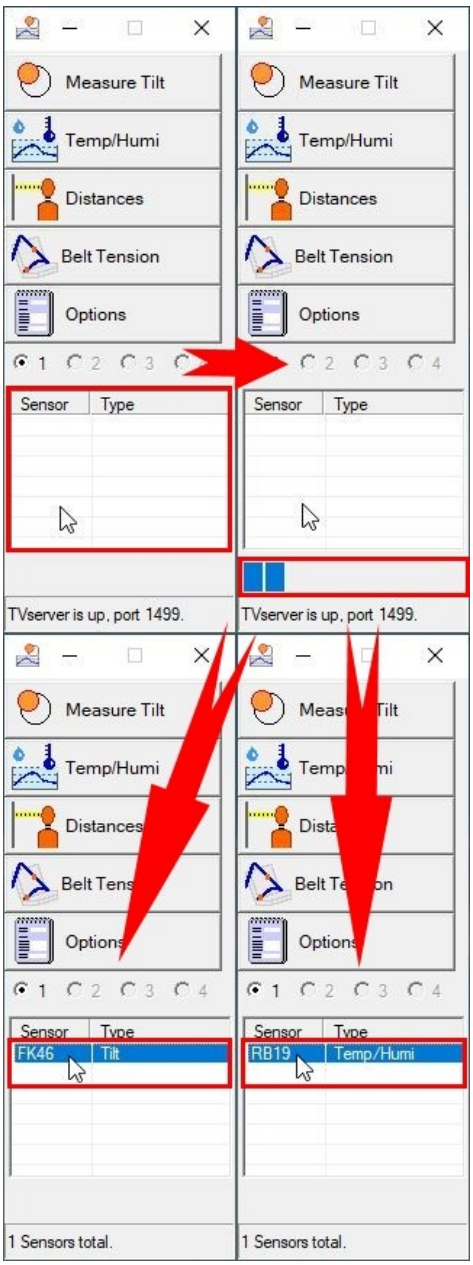
Set the value of the ‘`PORT=`’ key to your type of interface, e.g. ‘`PORT=HID`’.

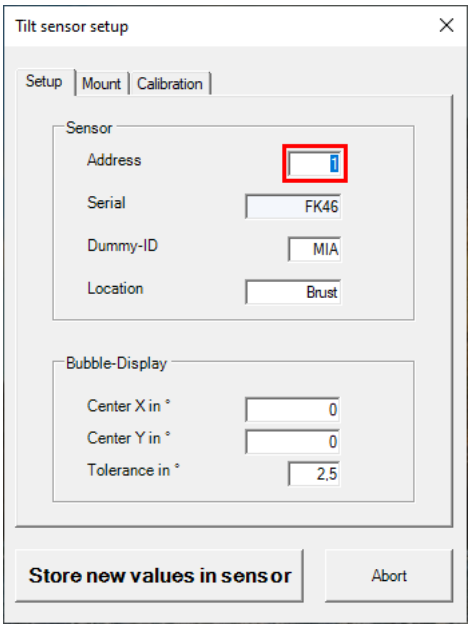
Make sure the value of the ‘`BUSSCANMAX=`’ key is set to ‘9’.

Save and close.



3.3 Setup





Make sure the TiltView.ini is no longer open in another program.

Connect exactly one sensor to your PC via the specified interface.

Open TiltView by running the TiltView.exe.

The TiltView window will show up after a few seconds.

Click into the table in the lower half of the window.

TiltView now quickly scans for sensors.

Any detected sensors will show up in the table now.

These steps are also shown in the image to the right.

Ideally there will be just the one sensor found you connected to your interface before.

If multiple sensors show up, recheck your interface and remove surplus sensors.

If no sensors show up check if you exactly followed the instructions in this chapter. If the issue still remains try a different sensor if available and continue, you can get the undetectable sensor running later, see Chapter 6.2 Troubleshooting.

If you found your sensor, click on its entry row in the table, see image.

The sensor setup window will show up.

Go to the setup tab (first for tilt sensors, third for loggers), the top entry is the ‘Address’ or ‘Bus Address’ value, see images.

Set to a number of your choice from 1 to 9, maybe you want to write it down somewhere.

Store that by clicking the button at the bottom.

The window should close and a confirmation pop-up should appear, click ‘OK’ there.

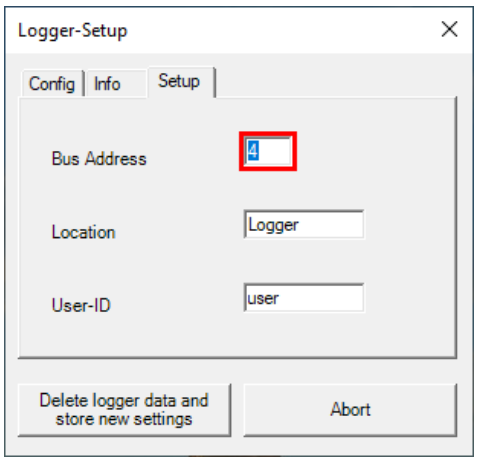
You should be back to the main window now.

Remove the sensor from the interface.

Connect a different sensor to the interface.

Click on an empty part of the bottom table in the main window.

TiltView should perform a new scan, find the new sensor and refresh the table.



Repeat the steps from above for all your sensors (up to nine), assigning a different address value to each of them.

Finally connect all the sensors you want to use at once to your interface.

Perform a new scan to refresh the table.

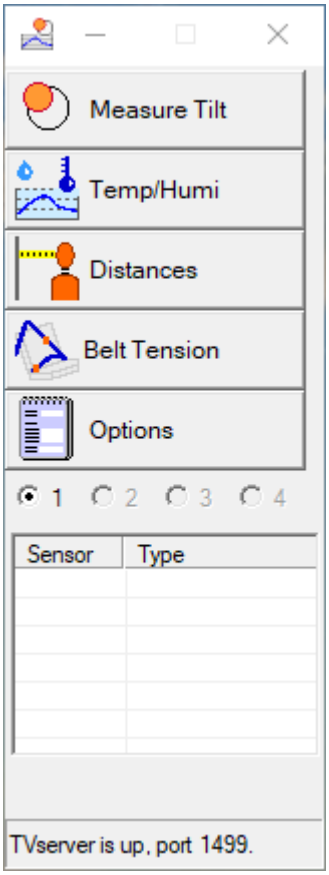
Check if TiltView correctly found all your sensors under different addresses.

If not, repeat the steps from above to assign different addresses to your different sensors.

If TiltView found everything correctly you can now start using TiltView.

4. Using TiltView

4.1 The Main Window



After loading TiltView displays the main window, consisting of three parts.

In the upper half of the window there are 5 big rectangular buttons:

- The ‘Measure Tilt’ button to open/close the ‘Bubble Display’ window to operate tilt sensors
- The ‘Temp/Humi’ button to open the ‘Temperature & Humidity’ window to operate Temp/Humi loggers.
- The ‘Distances’ button is without function as the corresponding distance sensors never became realised, in case you clicked it just click it again to make it pop out again
- The ‘Belt Tension’ button to open/close the window to operate belt tension sensors, which are highly uncommon and thus not further explained in this manual
- The ‘Options’ button to access the options menu.

In the middle of the window there is a row of four radio buttons to choose the bus group you want to use.

In the lower half of the window is a table that displays a list of all found sensors in the chosen bus group. Clicking into an empty part of it will make TiltView scan the bus for sensors and refresh the list. Clicking at the list table entry of any sensor opens the corresponding setup window. Below the table is an area where a loading bar shows up when TiltView is scanning the bus for sensors indicating the progress.

At the very bottom TiltView displays the total number of connected sensors and sometimes some other useful statistics and informations.

4.2 Tilt Sensor Setup

Clicking at the list table entry of a tilt sensor opens its setup window.

Here there are three tabs: Setup, Mount and Calibration.

The first entry in the Setup tab is the sensor address. Make sure each sensor in a bus group has a unique address, ranging from 1 to 9.

The next entry displays the sensor’s serial number. Cannot be changed.

Third is the Dummy-ID, assuming the sensors are used in ATDs and you place multiple dummies in a test vehicle, you may want to keep track which sensor is in which dummy.

Next it the location inside the dummy. This does not only allow you to identify the sensor but you may also arrange the windows according to the sensor's locations, see Chapter 5. The TiltView.ini.

Next you can adjust or 'zero in' on your target angles, in case they differ from '0°/0°'. Note that the X-angle is the 'roll-angle', positive direction being 'right side down', and the Y-angle is the 'pitch-angle', positive direction being 'nose up'.

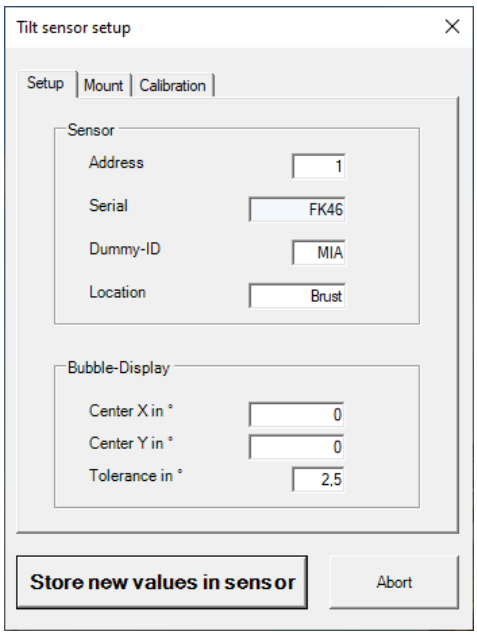
And last you can set how precise you need to hit your target angles.

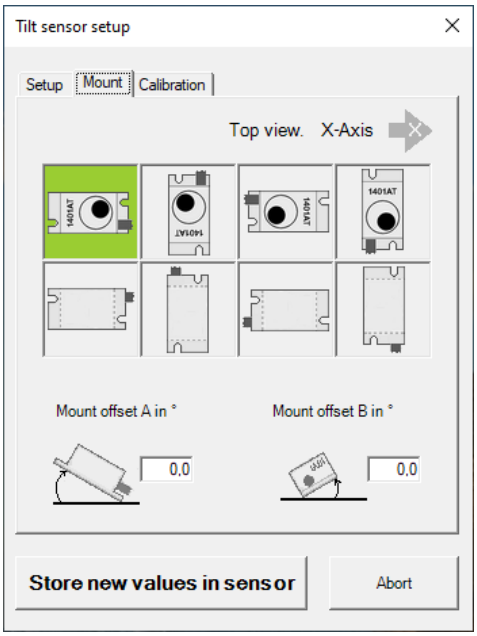
The Mount tab shows various top-down views on possible mounting positions of the sensor with the cable indicated at one end. Pick the one that best corresponds with your situation. Note that the X-direction (driving direction of the vehicle) is to the right, indicated by the small X-arrow. **Be aware that the upside-down positions in the second row require the sensor to be recalibrated in order to give precise measurements.**

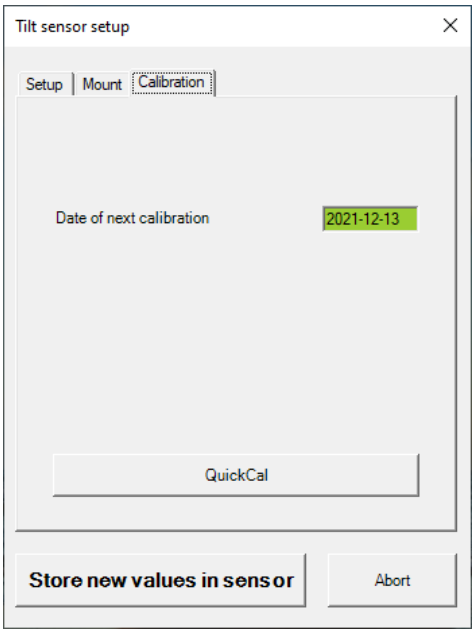
At the bottom you can set the two mounting angles, A for tilt of the long axis on the left, B for tilt of the short axis on the right, in case your sensor is mounted in an already tilted position. **Note that A and B are fixed relative to the sensor, while X and Y are fixed relative to the vehicle, so which mounting angle offsets which tilt axis depends on the mounting position chosen above. Also note that the little arrow in the picture for A points in the wrong direction, that would be a negative A value.** The one for B is correct.

Important note on target angles and mounting: Be aware that the tilt sensors only work at maximum precision when exactly upright (or exactly upside-down). A high tilt in one axis disturbs the measurement of the other axis. For optimal results refer to Chapter 4.3 Target Angles and Mounting.

Finally there is the Calibration tab. Here the date of the next calibration is displayed, in red if it has already







passed. The sensor remains fully functional, aside from a reminder popping up every now and then.

Also there is the QuickCal button. It opens the QuickCal window. It is password protected, you can get the password from us upon request. Most options there are disabled anyway, you can only adjust the temperature and set a new date of calibration. Better do not touch it!

At the bottom of the window you have the option to either store your new settings in the sensor or to cancel your changes by clicking the respective button. Saving the settings is acknowledged by a pop-up. Either button will close the window.

4.3 Target Angles and Mounting

For best i. e. most precise measurements it is advised to ensure that the final position of the sensor is as upright as possible (or upside-down).

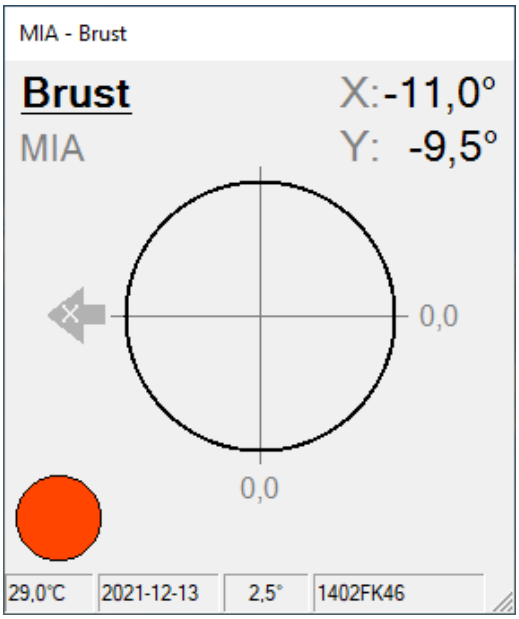
Example: You want to adjust your device to X=40°,Y=0°. You could do that just by mounting the sensor in a 0°,0° position, but because of the huge X tilt the measurement of the Y value will be rather imprecise. Installing a mounting with -45° on the X-axis and correctly setting it up results in an identical Bubble Display window, everything seems to work the same, except that the absolute value of the actual tilt angle of the sensor has been reduced by 35° and the Y-axis measurements are way more precise.

We recommend keeping the final position of the sensor between -30° and +30° on both axis for reliable and precise measurements.

4.4 Using Tilt Sensors

Click the ‘Measure Tilt’ button in the main window.

TiltView will perform a bus scan for tilt sensors and then open the ‘Bubble Display’ window, given it actually finds a sensor.

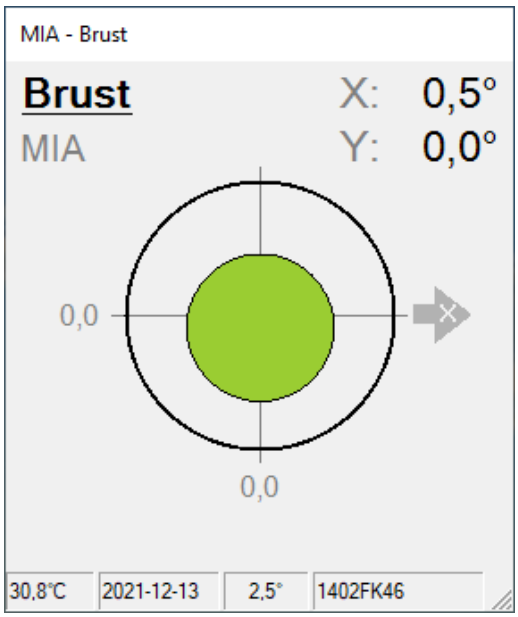


In the header and in the top left corner the Dummy ID and sensor position are shown.

In the top right corner the current values of the X- and Y-angles are continually displayed.

In the middle there is the ‘Bubble Display’, consisting of some cross hairs and a small coloured circle, the ‘bubble’. The bubble visualizes to the user the current offset amount and direction of the sensor. It becomes bigger the closer to the centre it is, also it switches from red to green once inside the measurement tolerance around the target angles.

The cross hairs show the target angles near the corresponding axis, X-angle near the X-axis, Y-angle near the Y-axis.



Also there is a small X-arrow, it shows the direction of travel of the vehicle, the same X-arrow that was shown in the Mount tab of the setup window. Clicking on it will make it switch sides and rotate the entire Bubble Display by 180°, this is useful to have the display correspond to your angle of view when adjusting ATDs from the driver's or passenger's side of a vehicle respectively.

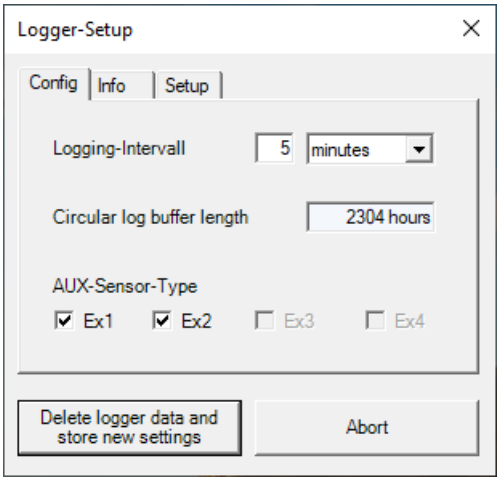
At the bottom of the window there are the sensor's temperature, the date of the next planned calibration, the chosen tolerance of the target angles, and the sensor's type and serial number displayed. This can be deactivated in the TiltView.ini in case the user finds these informations distracting.

You can close the 'Bubble Display' window by clicking the 'Measure Tilt' button in the main window.

4.5 Temp/Humi Logger Setup

Clicking at the list table entry of a logger opens its setup window.

Here there are three tabs: Config, Info and Setup.



The first entry in the Config tab is the logging-interval, the time between acquisition of data points. It can be set to any one- or double-digit value in hours, minutes or seconds. The minimum is 10 seconds. It is wise to set the unit first, as hence to the 10 second minimum single digit values are prone to be set to 10 by the software.

The next entry displays the calculated circular buffer length. It depends on the number of sensors and the length of the logging-interval when memory is full and old data will be overwritten.

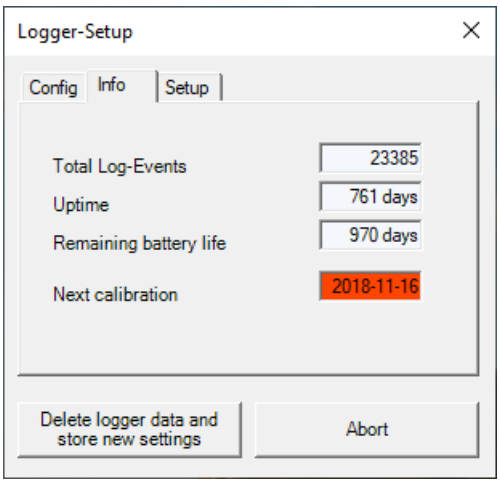
Last entry of this tab shows available external sensors. Note that for pure temperature loggers 'Ex1' will always show as existing although it is not, the optional external sensor is 'Ex2'. For Temp/Humi loggers the display correctly corresponds to the number of external sensors. **Important note: Some older loggers fail to set this entry to 'display-only' (they do not grey it out although they should). Do not check/uncheck the checkboxes even if you can!**

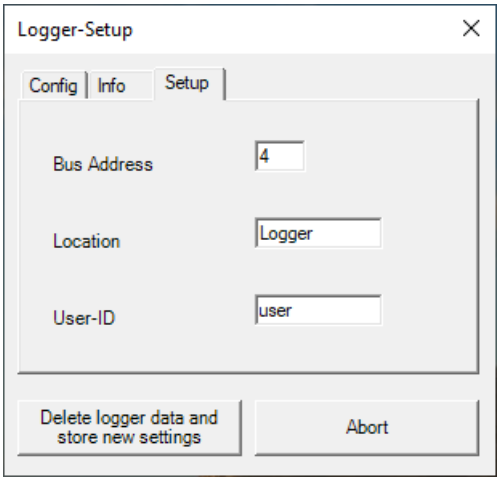
The Info tab displays the number of total log-events, the uptime, remaining battery life and the date of the next planned calibration of the sensor for your convenience.

The first entry in the Setup tab is the sensor's bus address. Make sure each sensor in a bus group has a unique address, ranging from 1 to 9.

Last are the location and user-ID entries, actually you can write in whatever is convenient for you, those values are displayed in the logger window so you can identify the logger in case you use multiple.

At the bottom of the window you can either store the new settings or cancel the changes. **Beware: Storing new settings will also erase all existing data!**





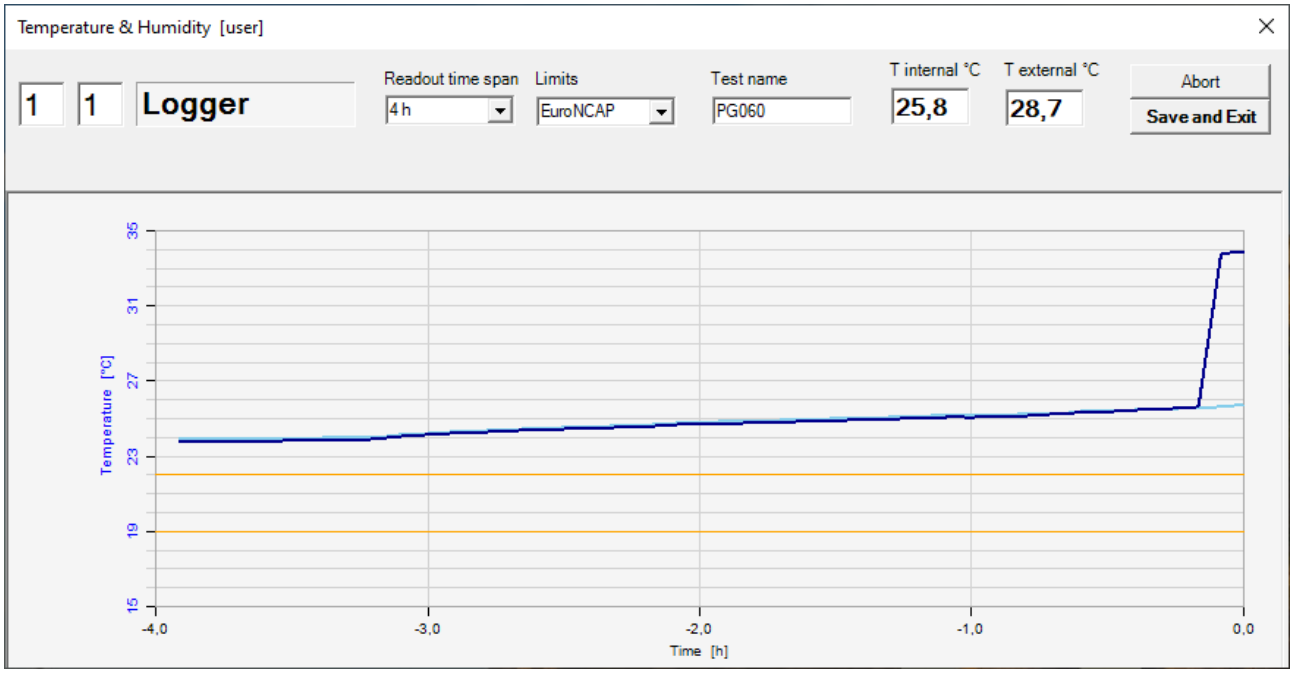
4.6 Using Temp/Humi Loggers

Click the 'Temp/Humi' button in the main window.

TiltView will perform a bus scan for loggers and then open the 'Temperature & Humidity' window, given it actually finds a sensor.

The window mainly shows a huge chart of the data stored in the logger.

Humidity is the black curve, internal temperature is royal blue, Ex1 light blue, Ex2 dark blue, Ex3 pink, Ex4 red. For temp only loggers, as in the picture, internal is light blue and external is dark blue.



In the window header the chosen user from the setup is displayed.

Above the chart on the far left you can set two single digit values for test object number and seat position. These show up in stored and exported data files so you later know what data you are looking at.

Next to those the chosen location from the setup is displayed.

Right next to that you can set the readout time span, configuring the x-axis of the chart, options range from 5 minutes to 7 days.

The limits option will display both an upper and a lower boundary in the chart in orange colour. You can choose from several pre-set testing standards.

Next option is to set a ‘Test name’, this will be used to name the storage folder when saving data, see below.

The next two fields show the current values of the internal and first external sensors, refreshing every 4 seconds.

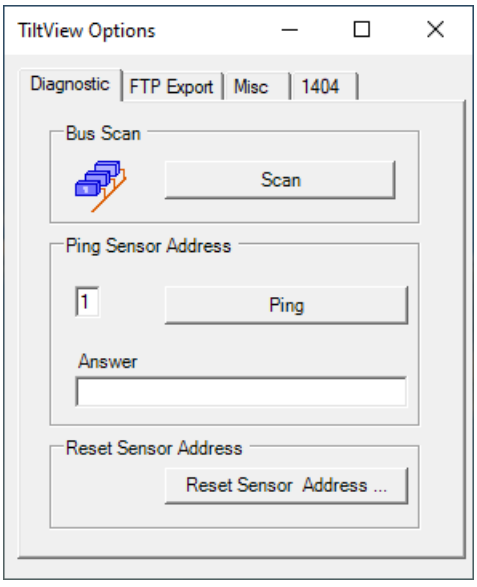
And lastly there are two buttons. The upper will just close the window. The lower will also store the logger data on your hard drive. It will create a new folder named after the chosen ‘Test name’ in the installation folder’s parent directory. In there it will store three files also named after the ‘Test name’ plus a file named ‘[test object number][seat position][location].cvs’. That last one contains your data and can be imported into a spreadsheet program of your choice. Better leave the other three files untouched. **Take note that the current date or time are not used to name or sort files in any way, meaning you are at risk of overwriting old data.**

4.7 Options

Click the ‘Options’ button in the main window.

The ‘TiltView Options’ window will open, containing four tabs: Diagnostics, FTP Export, Misc and 1404.

First up in the Diagnostics tab you can perform a bus scan, just for your convenience, its the same bus scan TiltView performs on various other occasions, refreshes the list in the main window afterwards as usual.



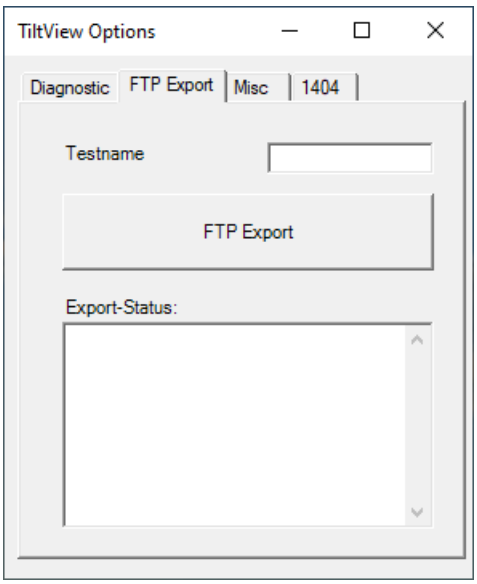
Second you can ping a sensor address. Choose an address from 1-9. If there is a sensor it will answer by identifying itself. You can also choose the address value of ‘0’ to scan the entire bus, useful when you do not know the address value of the sensor, especially useful when for some reason the address value is outside the 1-9 range.

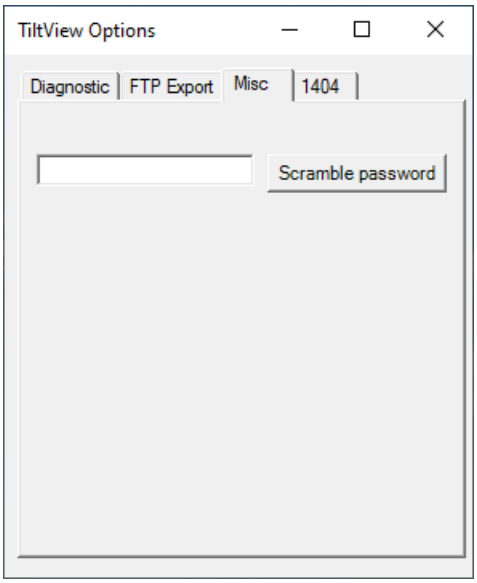
And third you can reset the sensor address. This will send a command to the entire bus to set the devices address to 1. Make sure there is only one device connected to the bus before doing this. Will also pop up a confirmation window with a reminder so you cannot accidentally reset sensor addresses.

The FTP Export tab allows you to directly store data at a remote network location. Correct setup of the FTP server has to be done in the TiltView.ini prior to attempting export, see Chapter 5. The TiltView.ini. **Beware to only modify the TiltView.ini when TiltView is closed.** Chose a 'Testname' to name stored data files, then click the export button. There should be a log running, at the end either confirming success or telling you what went wrong.

The Misc tab is for FTP/SFTP usage, here you can put in your server password and TiltView will store it as a safely scrambled string or apparent randomness, so no one can extract your password from TiltView.

The 1404 tab allows you to read out and save data from a logger. For unknown reasons the language is German here. The 'VO' value refers to the test object number, 'Sitzposition' to the seat number, 'Anzahl Punkte' sets the number of data points you want to store, multiplied with the logging-interval it will correspond to the readout time span you can choose in the Temperature and Humidity window, see above. Clicking on the 'Daten auslesen' button creates a new folder named 'LogData[serial number]' inside your TiltView directory and then saves the data to a file named '[test object number][seat position][location].cvs' which contains your data and can be imported into a spreadsheet program of your choice.





5. The TiltView.ini

There are several advanced options that can be adjusted by modifying the TiltView.ini file. **Make sure TiltView is closed before manipulating the TiltView.ini.** You can open it in any text editor of your choice.

[KEY]=DefaultValue	*Description*
[TILTVIEW]	This section concerns TiltView in general
TESTTEMPLATE=	default ‘Test name’ in ‘Temperature & Humidity’ window
ROOTDIR=	parent directory for data storage
[BUSIF]	This section concerns the bus
PORT=HID	type of interface (+ driver and port), ‘HID’ for USB, e.g. ‘DLL BusCmdInterface.dll COM1’ for COM Interface, e.g. ‘IES1407 192.168.1.39’ for 1407 interface
BUSSCANMAX=9	max value of bus addresses TiltView scans, set to a lower value for faster scanning if you use fewer sensors
[TILT]	This section concerns tilt sensors
CSVRECORDER=OFF	ON records both angles as long as *Measure Tilt* is active, data is written to ‘[ROOTDIR]\TiltRecorder\[location].csv’
CALWARNINTERVAL=1	warnings pop up ‘1’ year after date of calibration, ‘0’ deactivates this feature
[TEMP/HUMI]	This section concerns temperature/humidity loggers
QUICKLOOK=ON	OFF deactivates the graph in the temp/humi window in case you only care about actual data files
DEFAULTREADTIME=4 h	default value of readout time span
CALWARNINTERVAL=1	warnings pop up ‘1’ year after date of calibration, ‘0’ deactivates this feature
[FTPEXPORT]	This section concerns setup for upload to FTP server
HOST=	IP address of FTP server
USER=	username to access FTP server
PASSWORD=	here TiltView stores your FTP server password as a scrambled string, do not edit the value of this key, to set up a password see the misc tab in Chapter 4.7 Options
BASEDIR=	folder on FTP server to store data in
DIRPOSTFIX=	lets you set an affix to your data in case you do multiple measurements during a test, 4 characters

[DUPOS]	This section concerns the DUmmyPOSition software
SERVER=OFF	ON lets TiltView synchronise with your DUPOS server
[BUBBLE]	This section concerns Bubble Window layout
BIGLOCATION=ON	toggles display of location value in window
USERSTRING=ON	toggles display of user value in window and header
BIGDIGITS=ON	toggles display of target angles between window and header
STATUSBAR=ON	toggles display of stats at the bottom
ROUNDSTYLE=0.1	rounding of displayed values, common values range from 0.01 to 0.5
[BUBTOPLEFT]	TiltView remembers the last position of top left corner of bubble display window for the listed sensors; there are some examples given; you can also write your own entries using your chosen sensor location values as the keys
HEAD=100,100	
CHEST=150,200	
PELVIS=200,300	
[BUBFORMSIZE]	TiltView remembers the last size in pixels of bubble display window for the listed sensors; there are some examples given; you can also write your own entries using your chosen sensor location values as the keys
HEAD=300,340	
CHEST=300,340	
PELVIS=300,340	

In case you have to edit your TiltView.ini a lot, note that the semicolon '**;**' indicates a comment, so you can make edits by just moving a semicolon from one line to another.

Do not worry in case any of these keys are missing in your TiltView.ini, TiltView will work just fine using the default values embedded in its code.

6. Problems & Help

6.1 Known Issues

- Read-out of bigger sets of data from loggers sometimes is interrupted and stops. See Troubleshooting below.
- At this time TiltView does not catch address conflicts of sensors. It is upon the user to make sure every sensor has its own unique bus address.
- At this time TiltView does not catch values of variables that are incompatible with the file system when later used in file names for data storage. It is upon the user to make sure the ‘location’ value of his sensors does not contain strings like ‘COM1’, ‘NUL’ etc.
- While TiltView does support both old (1401AT, 1401H) and new (1402, 1404) sensors, mixed usage at the same time on the same bus proves to be problematic as the internal software is different.
- When attempting to read-out data from a logger that does not have acquired any data yet the given error message is not helpful.
- Some parts of TiltView still contain German language instead of English.

6.2 Troubleshooting

Problem: TiltView fails to find a sensor that is correctly connected to the bus interface.

Solution 1: Close TiltView, open the TiltView.ini, set ‘BUSSCANMAX=9’, save & exit, start TiltView, try again.

Solution 2: Connect only the one problematic sensor to your bus. Open the Options tab, go to the Diagnostic tab. Ping the sensor address ‘0’, this pings the entire bus. If your sensor answers, click ‘Reset Sensor Address’ below, confirm the warning. Your sensor now has the address value ‘1’. Close the Options window. Scan the bus. TiltView should find the sensor now and you can edit its address. Make sure your sensors only have address values from the Range ‘1-9’.

If the sensor does not answer to pinging the entire bus it is probably broken or defective.

Problem:	Read-out of data sets from a logger has a tendency to interrupt and stop, multiple attempts are necessary to successfully gather data.
Solution 1:	Try using an IES manufactured cable. User manufactured cables might be too long so signal strength decays too much, or the cable is not correctly shielded and the signal is disturbed by interference.
Solution 2:	Check all cable connections, sometimes connectors are worn out and cause interrupts.
Solution 3:	Check the energy options of your PC, especially on a mobile device. Make sure the port your interface uses always has power.