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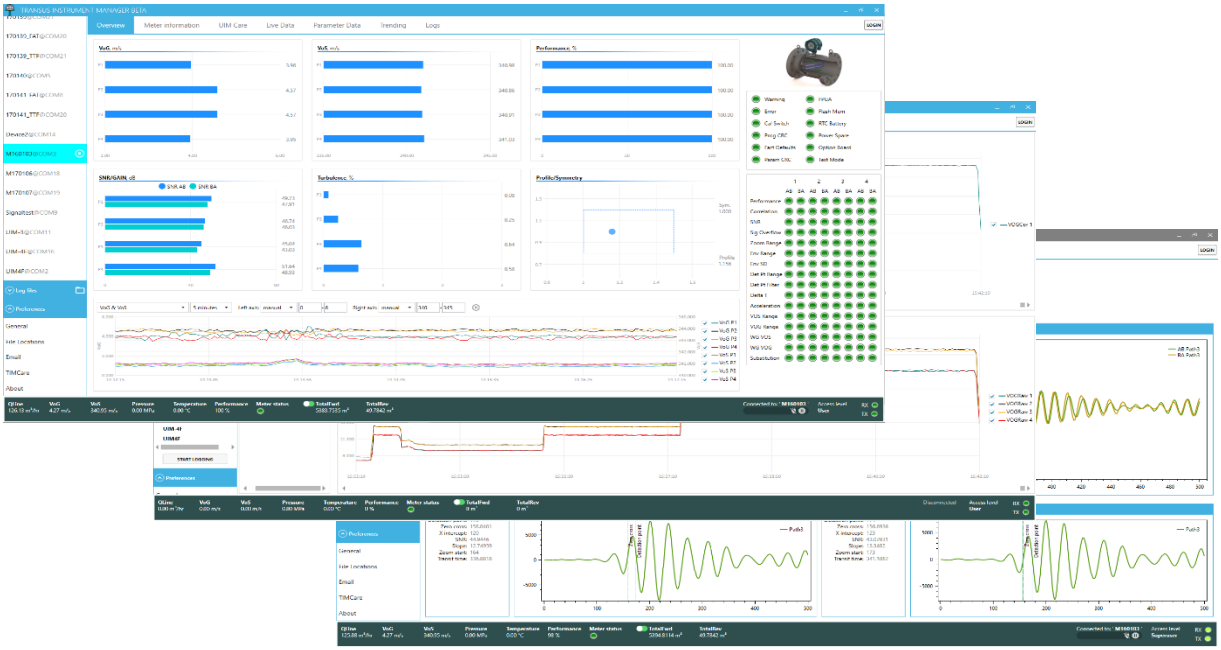
TIM Quickstart manual



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Introduction

This manual provides information for installing and performing the basic functions of Transus Instrument Manager (TIM). TIM is the Microsoft Windows based software to program, run diagnostics and troubleshoot the UIM series ultrasonic gas flowmeter. It contains guidelines for setting up a connection and perform the basic functions in TIM. Before operating the product read and understand this manual. Strictly follow the safety instructions and warnings.

Attention!

In the event of questions or need for additional information regarding specific matters about the UIM Series, please refer to the Installation and operating instructions or contact Transus Instruments via email or telephone.

This Quickstart is based on the latest information at the time of writing. It is provided subject to changes and updates. We reserve the right to change the configuration and/or construction of our products at any time without obligation to update previously shipped products.

The warranty provisions stipulated in our Terms and conditions are applicable to the product. Transus Instruments shall have no obligation in the event that:

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- The equipment, or parts, have been maintained or repaired by other than an authorized representative of Transus Instruments, or have been modified in any manner without prior express written permission of the manufacturer;
- Non-original parts are used;
- Equipment is used improperly, incorrectly, carelessly or not in line with its nature and/or purpose;
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1 Contents of this manual

This manual contains several sections, covering various aspects of TIM.

Chapter 1 This chapter
Chapter 2 Installation
Chapter 3 Devices
Chapter 4 General information

Chapter 5 Operating TIM
Chapter 6 Trending and logs
Chapter 7 Diagnostics
Appendices

1.1 Conventions

The following symbol and indication conventions are used throughout this manual.

Warning!
A warning indicates hazards or unsafe practices that could result in severe personal injury or death.

Attention!
This sign indicates potential hazardous or unsafe operations that could result in minor personal injury or damage of product or property. It is also used to indicate operations or practices that could cause the product to operate in an unexpected way or provide results outside its specification.

1.2 Related documents

The last version of the referenced document is leading, unless otherwise specified.

[1] UIM Series Safety instructions

Author Transus Instruments
Document Code: TI2_UIM_GEN7_Safety_instructions

[2] UIM Series installation, operating and maintenance

Author Transus Instruments
Document Code: TI2_UIM_GEN6_installation_operating_maintenance

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1.3 Abbreviations

The following abbreviations may be used throughout the document:

ATEX	ATmosphère Explosive
CSA	Canadian Standards Association
EMC	Electromagnetic Compatibility
FM	Factory Mutual
IEC	International Electrotechnical Commission
IECEx	International Electro technical Commission certification scheme for Explosive atmospheres
IS	Intrinsic Safety
ISO	International Organization for Standardization
LCD	Liquid Crystal Display
OIML	Organisation Internationale de Métrologie Légale
PCBA	Printed Circuit Board Assembly
RTF	Rich Text Format
SPU	Signal Processing Unit
TIM	Transus Instrument Manager
USM	Ultrasonic Flowmeter

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2 Installation

This chapter describes the minimum system requirements and instructions for the installation of TIM.

2.1 Minimum system requirements

The minimum system requirements necessary to run Transus Instrument Manager are:

- Windows 10 or higher
- Installation requires Local Administrator Rights
- Free disk space with a minimum of 1 GB
- 8GB RAM
- Screen resolution of 1366x768 or better for optimum viewing experience

2.2 Installing TIM

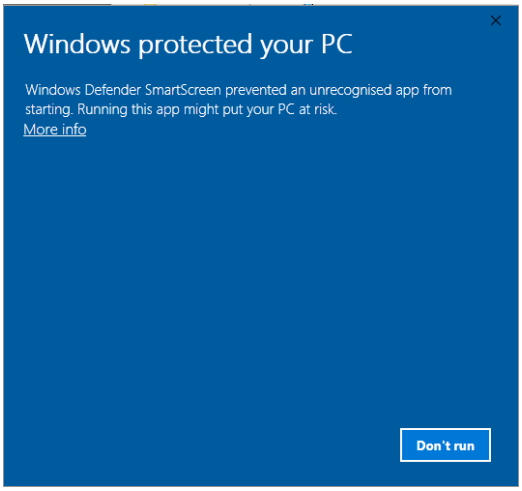
In order to be able to install TIM, the user should have administrator rights.

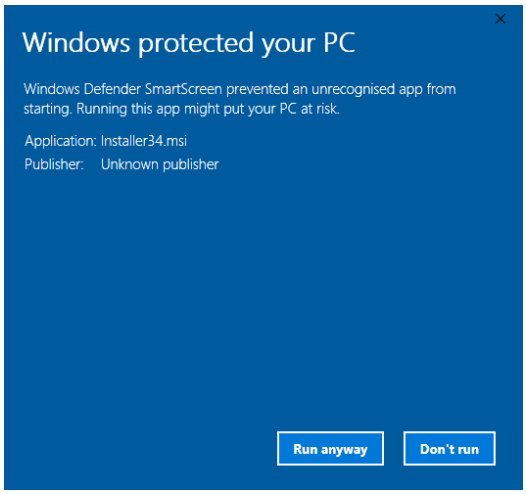
Attention!

We recommend installing TIM under the account of the user that will use TIM. The user will need to have administrator rights to install TIM.

Go to the Transus Instruments website download section and download the latest version of TIM. Save it to your downloads folder. When the download is complete, open the installer package and follow the steps below to complete the installation.

1. Run the TIMinstaller.msi. Windows may give you a warning message when trying to install an older version of TIM when it doesn't recognize the application Click <More Info> and click <Run anyway> to proceed.





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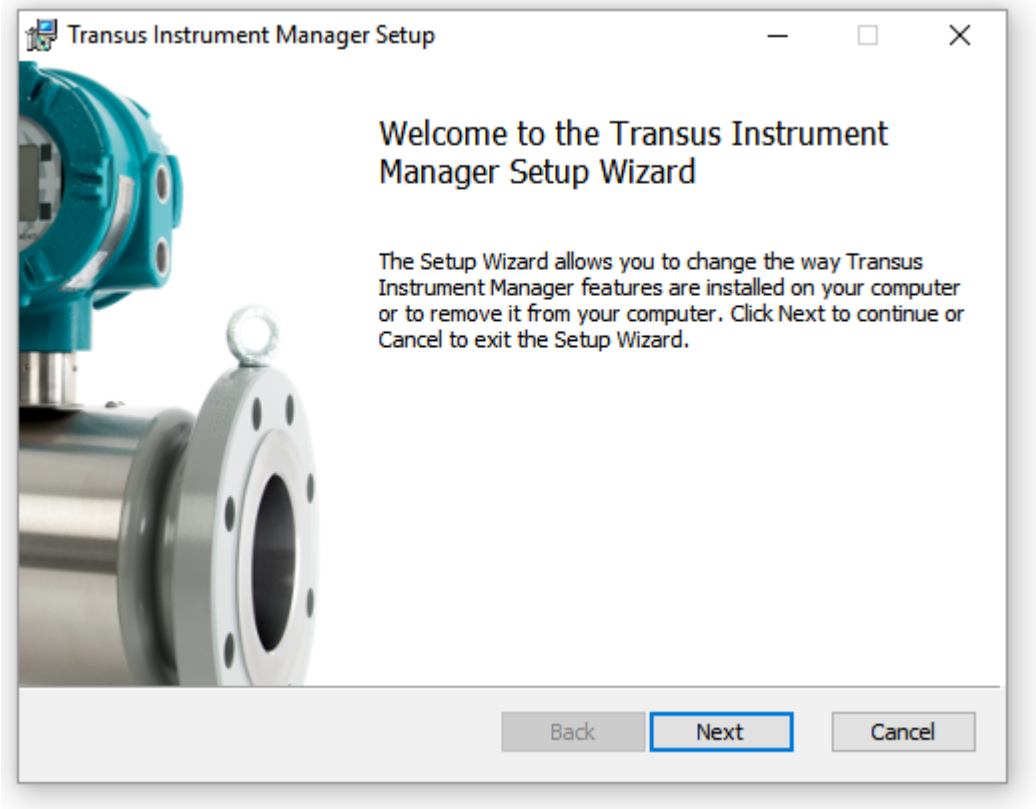
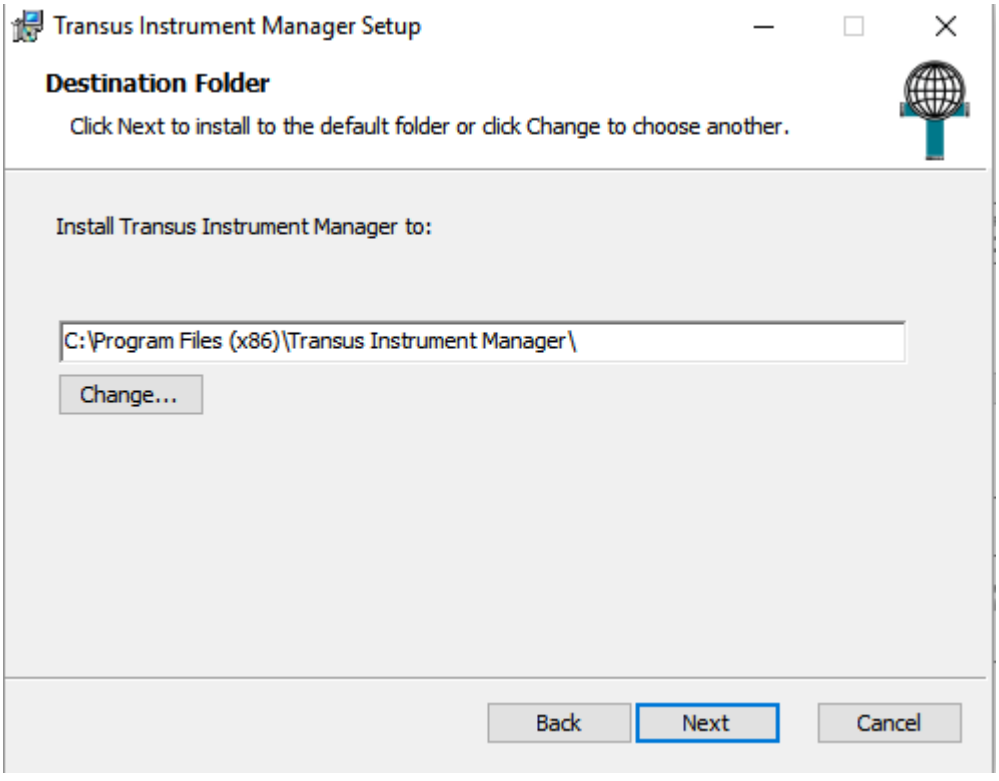
2. Click next in the following screen



3. Click next to accept the default installation folder or press <Change> to change the destination folder.



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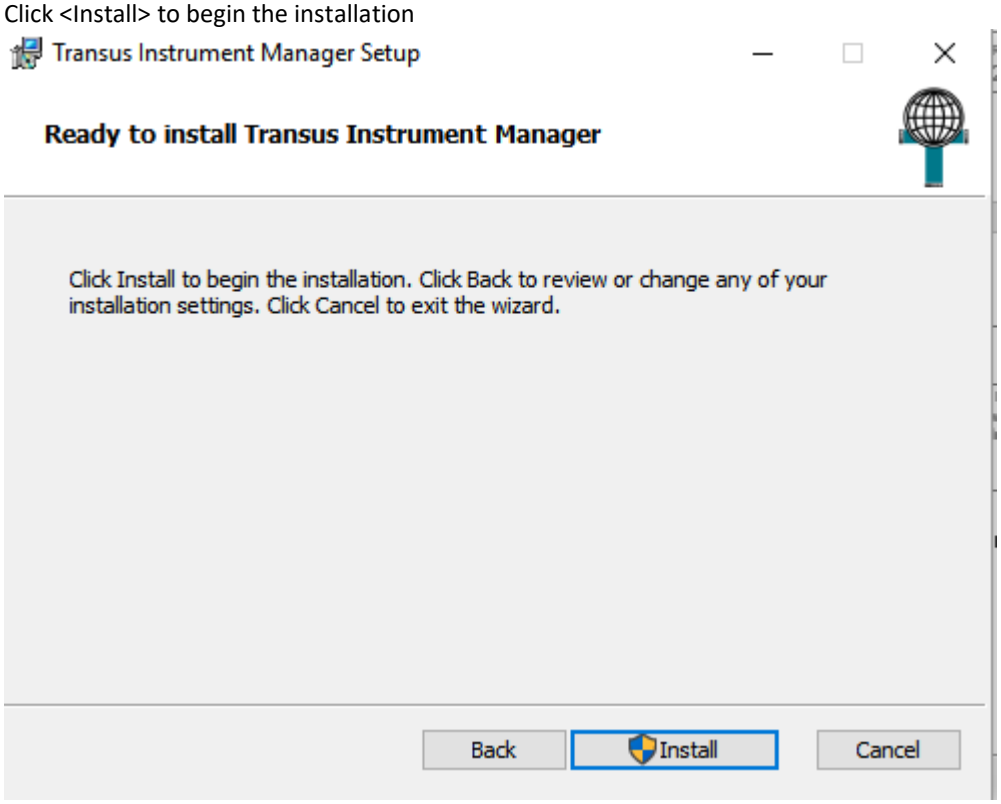
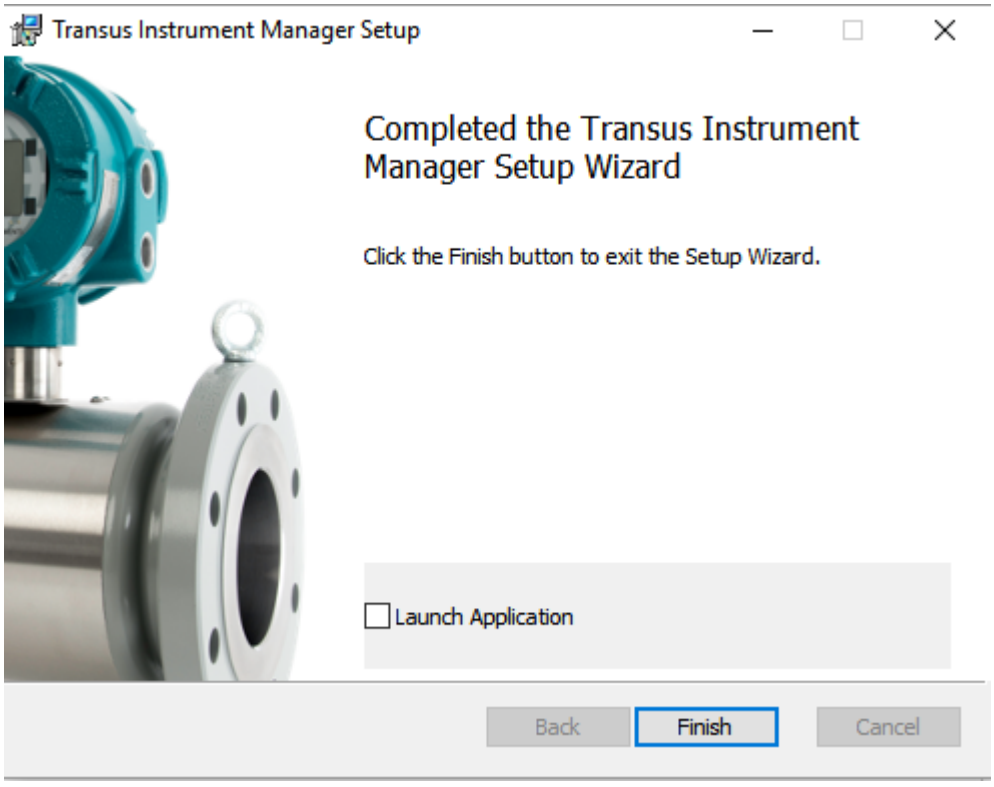
4. Click <Install> to begin the installation



When Windows asks you to confirm the installation, click <YES> to proceed with the installation

5. The following screen shows when the installation completed successfully. Press Finish to complete the installation



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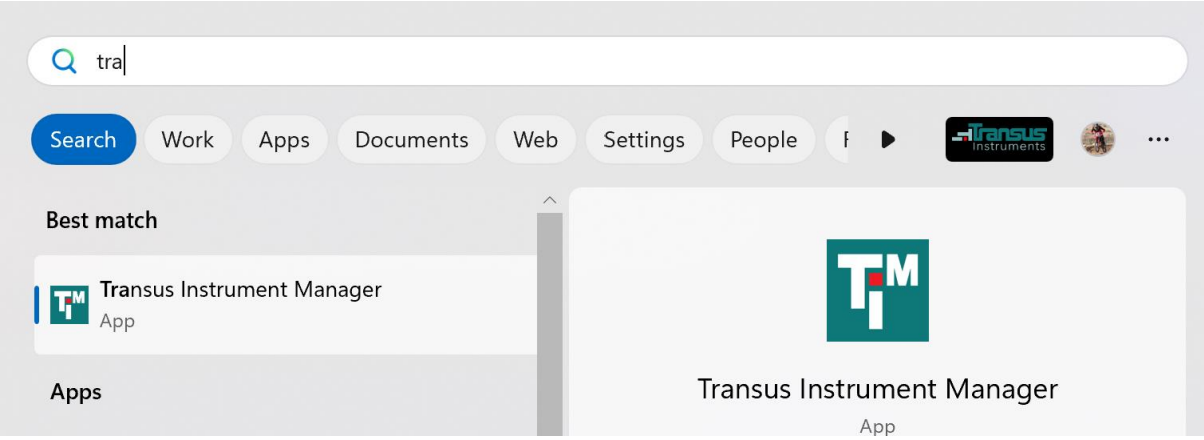
2.3 Running Transus Instrument Manager

A shortcut is created in the windows start menu. Click on the windows button and search for Transus Instrument Manager. For easy access its recommended to create a shortcut on the desktop or pin it to the taskbar.



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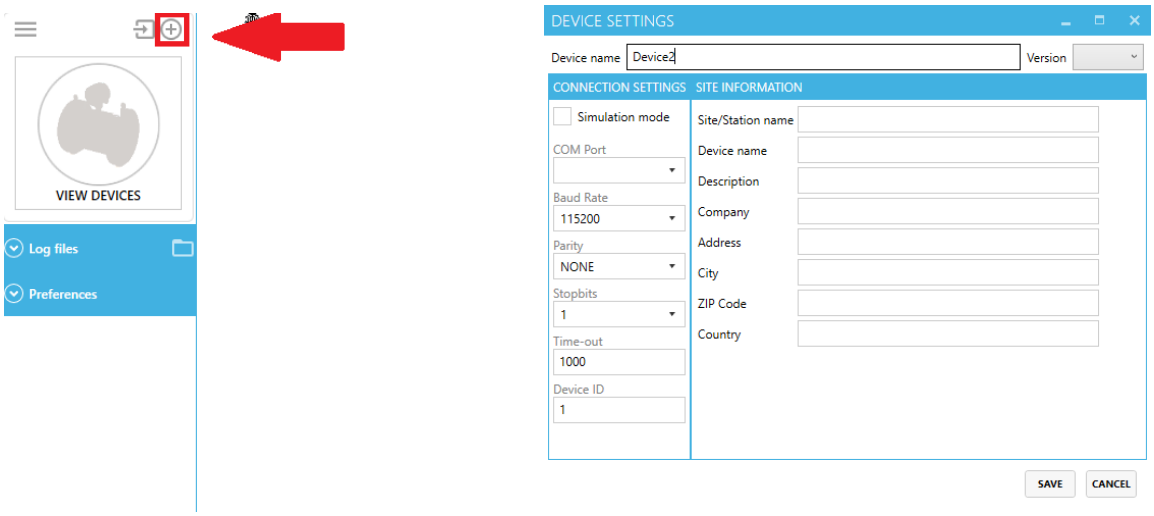
3 Devices

3.1 Adding a device

To add a device, press the + button to bring up the device settings dialog



Enter a device name for the device you are connecting to. Configure the COM port settings. Factory default settings for the UIM Series flowmeters are:

USB Port 115200, No parity, 1 stopbit, Device ID = 1
RS485 port 38400, No parity, 1 stopbit, Device ID = 1

Choose the version of the parameter file you want to use.

Attention!

When unsure what parameter version to use, check on the device's local LCD, navigate to system info.

Optionally provide site information. This information is used in reports such as a parameter report.

Press SAVE to complete the process and add the device to the devices list

Attention!

All properties entered for a device and data collected with Transus Instrument Manager is stored locally on the PC, not on the device itself.

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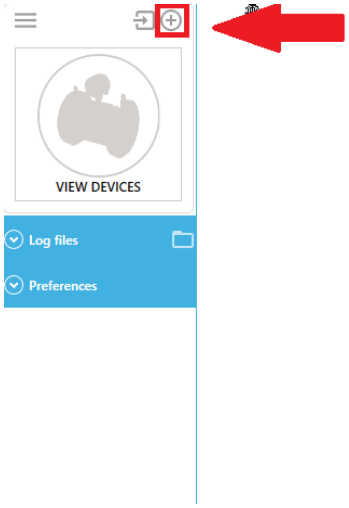
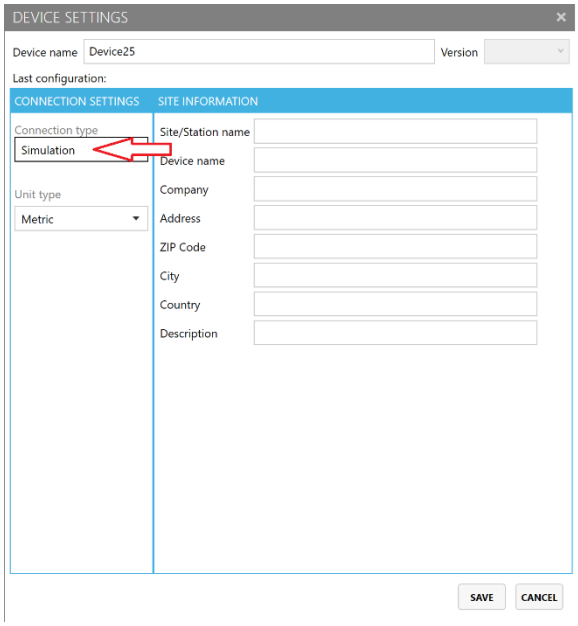
3.2 Adding a device for demo mode (simulation mode)

To add a device press the + button to bring up the device settings dialog



In the Connection type, select Simulation, select the desired units and then save the device



This device can now be used as if connected to a normal device, when connected to the simulation mode device it will play a default log file and simulate a UIM Series flowmeter measuring flow.

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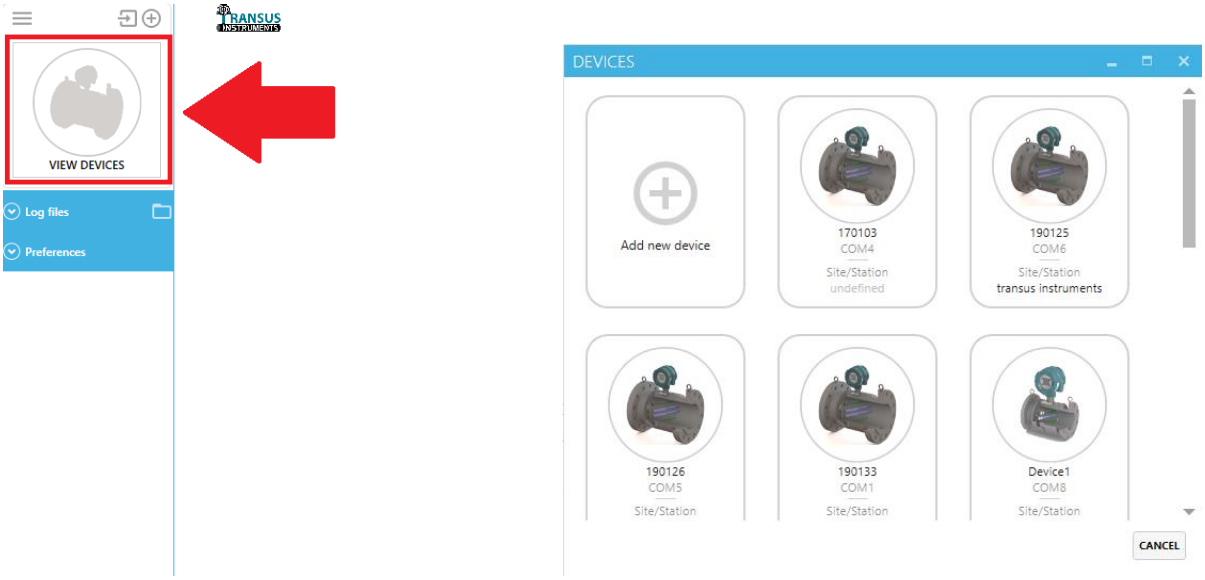
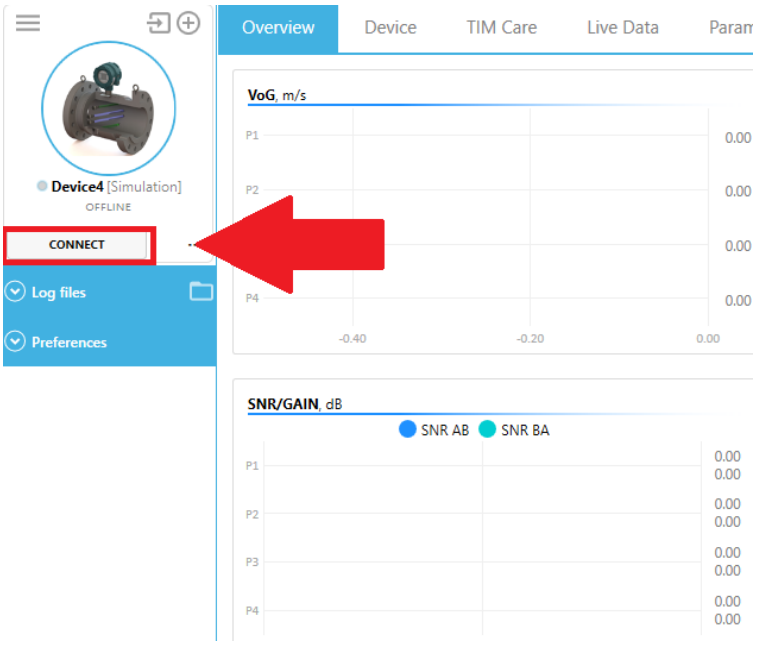
3.3 Connecting to a device and demo device

In order to connect to a device, click on the VIEW DEVICES item. A screen with all your devices will show up, click on the device you want to connect to. It then reads the last known parameters. When connecting for the first time a screen shows up and asks to connect to read the parameters. if you have been connected before, below the device the CONNECT button is shown, press this button to connect. TIM will read the parameters from the device and starts to read real time data from the device.





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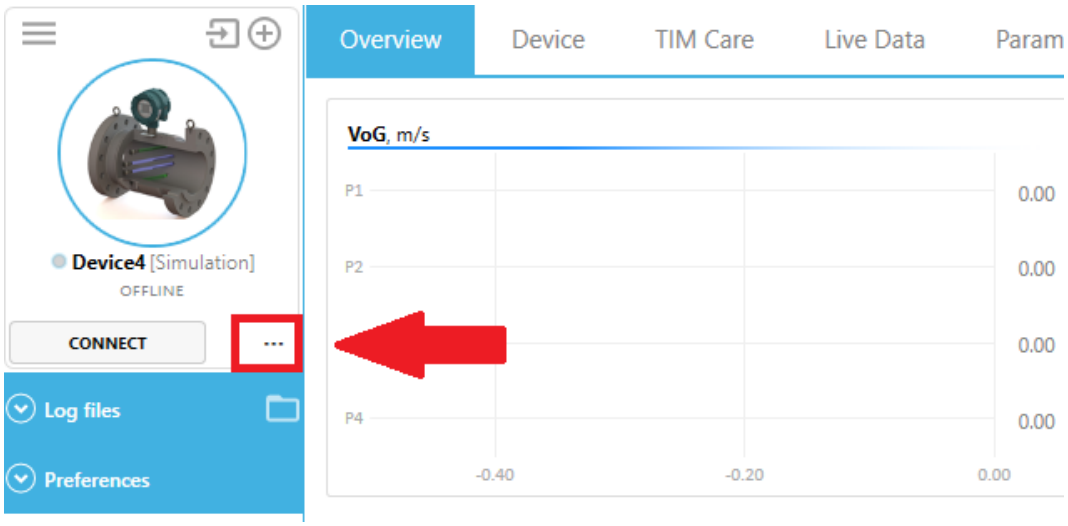
To work offline on select a device from the DEVICES list, TIM then loads the last saved parameters from the computer to allow editing the device parameters without being connected. you could save the edited parameters in an xml parameter file or connect to the device and write the new parameters to the device.

Attention!

In order to work with a device in offline mode, TIM needs to be connected to the device at least once.

3.4 Changing device properties

In case certain properties or connection settings of a device need to be changed, click on the three dots symbol next to the CONNECT button and select <PROPERTIES>



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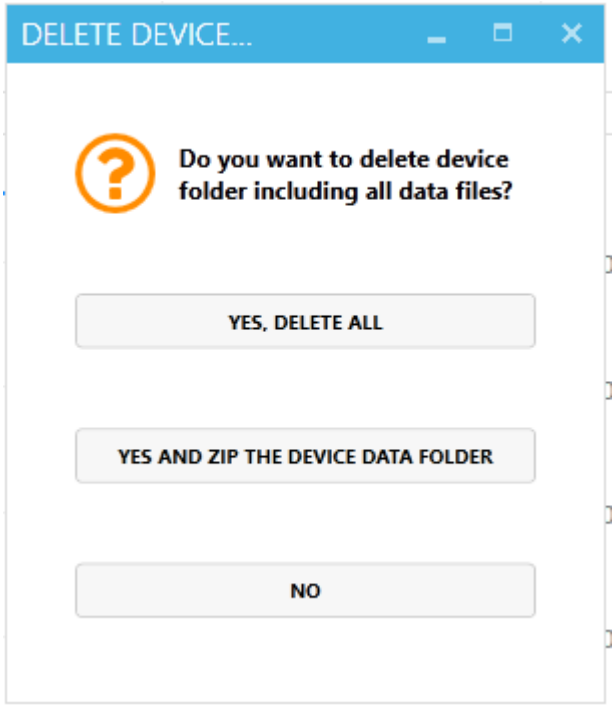
3.5 Deleting a device

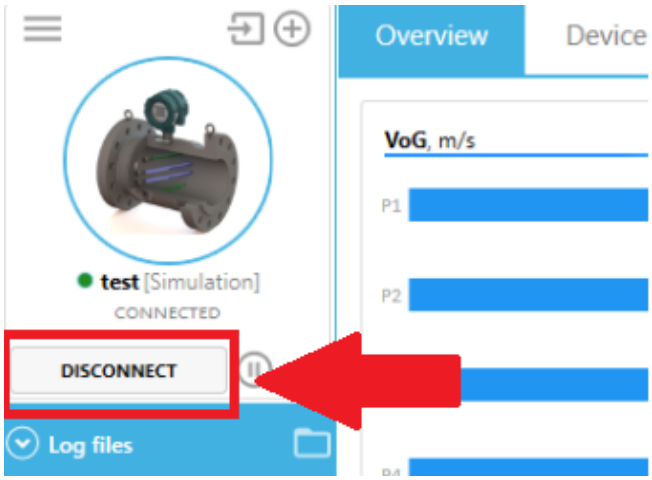
In the event you want to remove a device, , click on the dots right of the CONNECT button and select <DELETE>.

1. <YES, DELETE ALL> - This option deletes the device and all data from the PC
2. <YES AND ZIP DEVICE DATA FOLDER> - This option collects all data from the device and compresses it in a ZIP file. The device and folders will then be deleted.
3. <NO> - This cancels the operation and returns to the previous screen



3.6 Disconnecting from a device

In order to disconnect from a device, click on the Disconnect button on the left side of the display.



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4 General information

4.1 User interface

After TIM starts up the OVERVIEW screen will appear. This is the main screen for viewing live data and allows to easily observe the device status. The screen is divided in four main sections

1. Left side navigation pane
   This section of the screen contains the devices list, logfile list and preferences options
2. Main information section (middle part)
   This section contains bar graphs and charts of the main diagnostics
3. Diagnostic status section (right hand side)
   This section shows real time device status information.
4. Status bar
   The status bar shows general information from the device as well as connection information

4.2 TIM Preferences

Preferences and general information about TIM can be accessed under Preferences in the left navigation pane.

- GENERAL
  Preferences and settings for device connection and properties settings can be set here
- FILE LOCATIONS
  Default file location folder settings can be found here
- EMAIL
  Default email address settings can be found here
- TIMCare
  Settings and preferences for TIMCare can be found here
- ABOUT
  Information about Transus Instrument Manager

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4.3 User levels

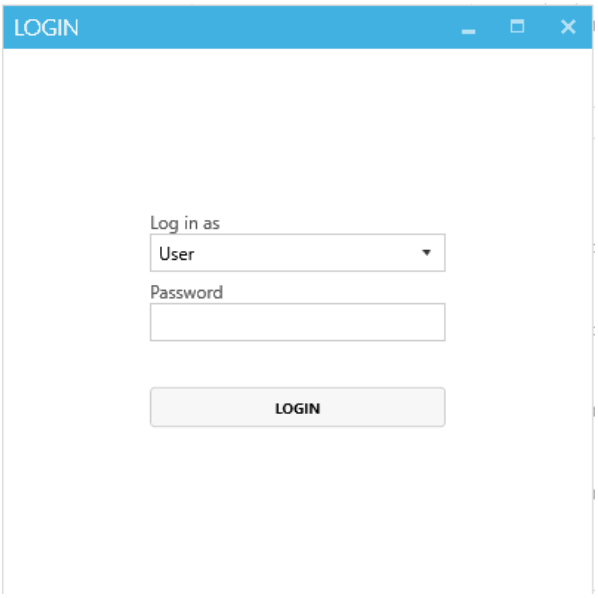
There are three user levels in Transus Instrument Manager.

1. User – This is the entry level and requires no password.
2. Service – this is the user level for general commissioning, service and troubleshooting activities
3. Superuser – this level allows to edit all parameters of the UIM Series flowmeter

Attention!

Regardless of the user level, the parameter access in the UIM Series flowmeter is controlled by the calibration switch on the device. When this is closed, only parameters that do not affect the metrological performance can be changed.

Transus Instrument Manager starts up at the <User> user level. No login is required for this level. To change the user level click on the <LOGIN> button in the upper right corner of the window. The login pop-up window appears. Select the desired user level, enter the password and click <LOGIN> to change to that user level.



The active user level is shown in the status bar on the right.

Depending on the user level several menu items or tabs are available.

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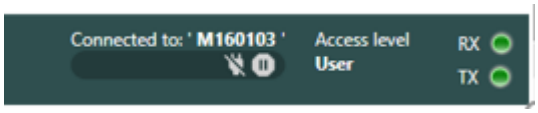
4.4 Pausing a connection

A connection to a device can be paused. Press the pause button on the bottom status bar in order to temporarily stop polling data from the device until the pause button is pressed again.



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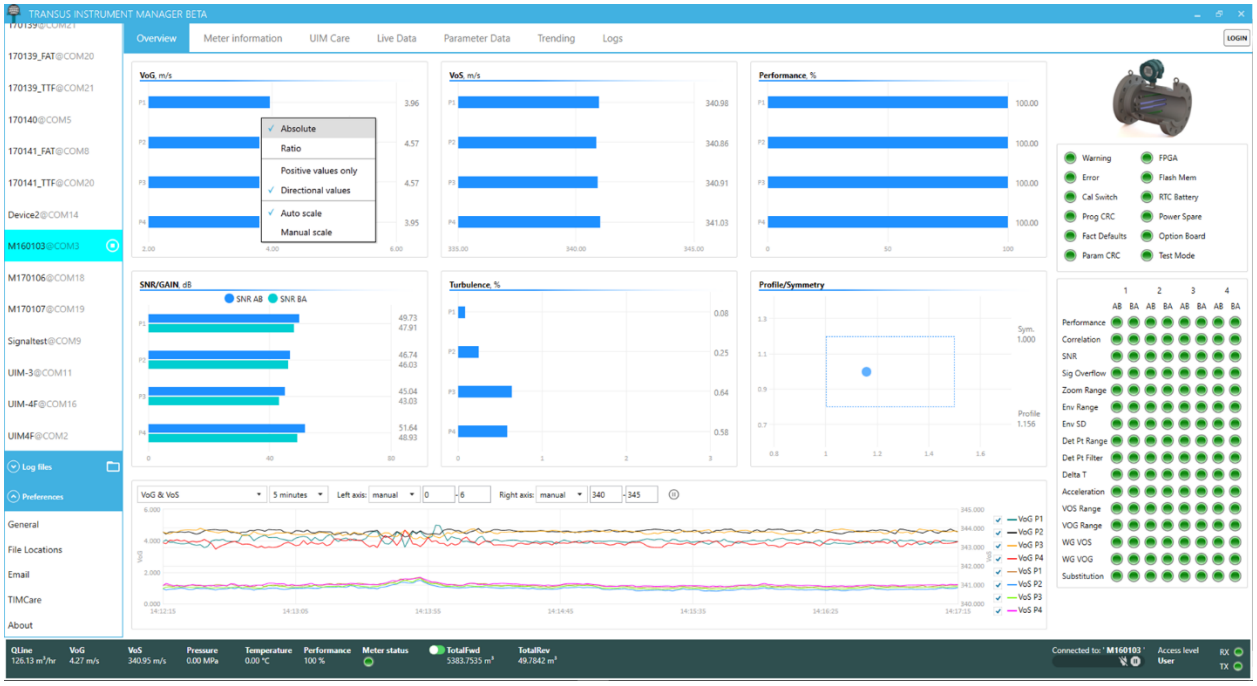
5 Operating TIM

5.1 Overview screen

The overview screen is the default screen when starting up Transus Instrument Manager. Several bar charts and a trending window are available to view diagnostic information about the operating conditions of the device and its application. Several options for each bar chart are available, such as scaling and other settings. Click on each bar chart using the right mouse button to open the options pop up menu and to adjust the graph as required.

The Trending area has several pre-configured trace sets to easily display combinations of diagnostics over time. Two Y-axes are used, one on the left and one on the right. Both are auto-scale by default. Each Y-axis can be set to a manual range if required.



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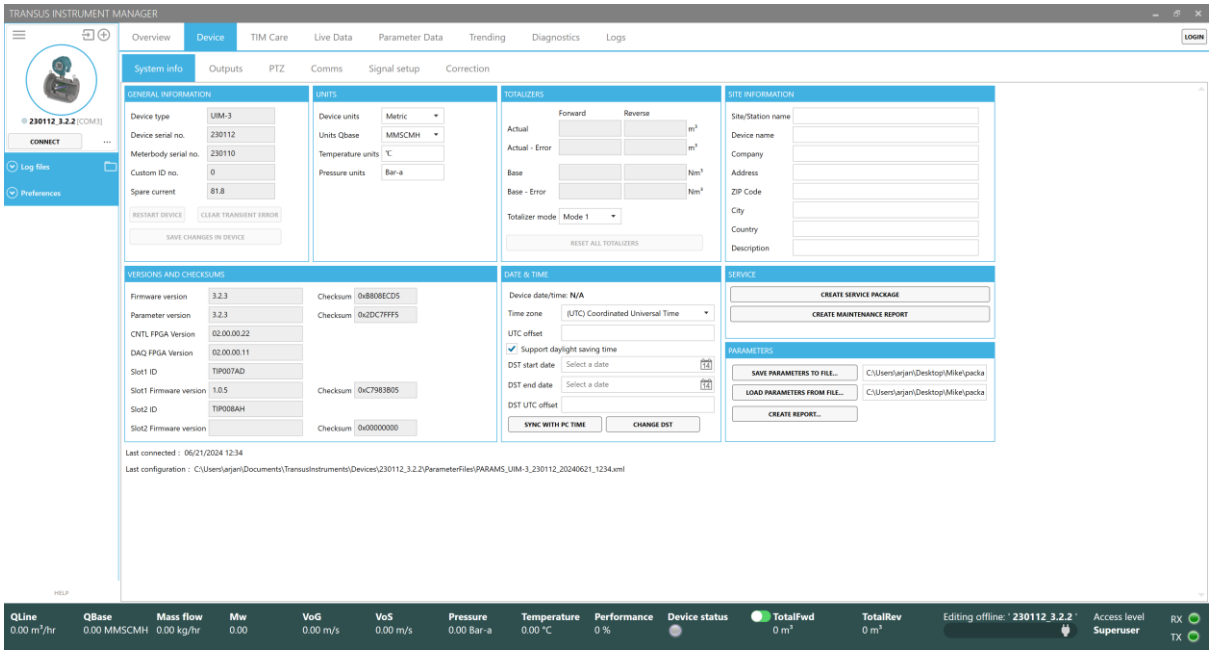
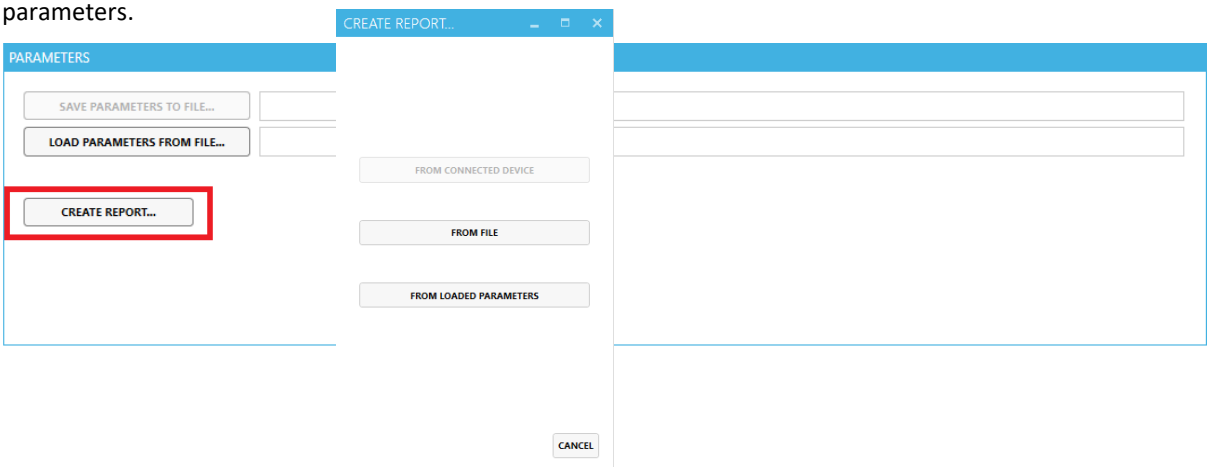
5.2 Device information screen

The device information screen provides essential information about the device such as serial numbers, software versions and checksums. It also shows the totalizer values (volume counters).



5.2.1 Creating a parameter report

To create a parameter report from a connected device or a saved parameter file of another device click <CREATE REPORT> on the METER INFORMATION tab. A pop-up dialog will appear to select from which source to create the report. Select <FROM CONNECTED DEVICE> to create a report of the connected device's parameters.



Next, a window will open with a preview of the report. Select SAVE AS.. to save the report as an .RTF file. This file can be opened in Microsoft Word. Click <CANCEL> to cancel the operation.

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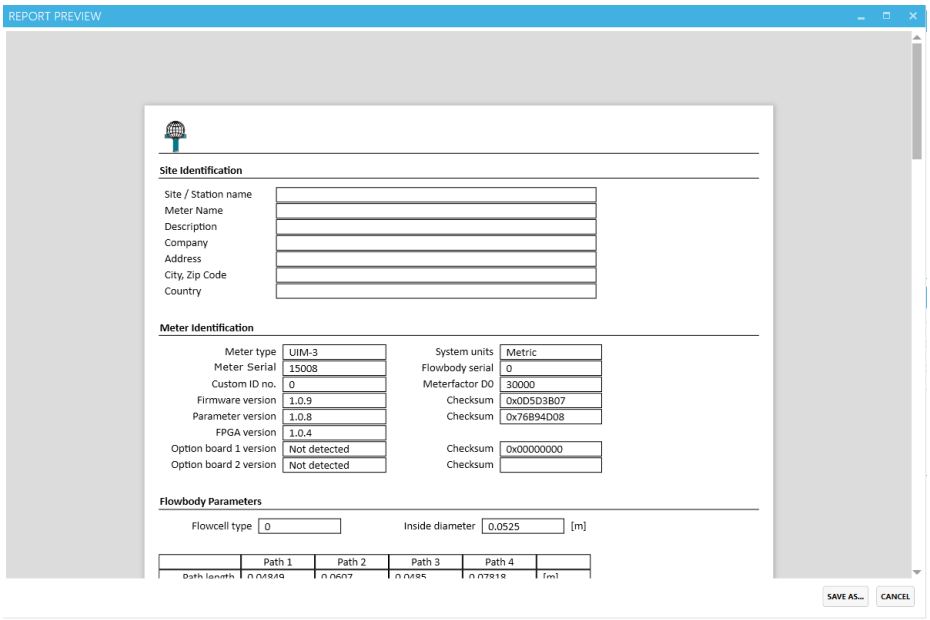

5.2.2 Saving a parameter set to file

The parameters of the device can be written to an XML file by pressing <SAVE PARAMETERS..> on the DEVICE INFORMATION tab. This file can be used later to easily write the same parameters to a device again.

5.2.3 Writing a parameter set to a device

In case a device needs to be reprogrammed with a previously saved parameter set (for example after swapping out electronics) the parameters can be written to the device by pressing <LOAD PARAMETERS...>. An “open file” dialog window will open to browse to the desired XML parameter file. After opening, an orange popup message will appear on the bottom status bar to select the required operation. Select <WRITE PARAMETERS TO DEVICE> to write the parameter set to the device.

Attention!

TIM verifies the parameter file version is compatible with the connected device parameter version. When the version is not compatible it will not write the parameters to the device.

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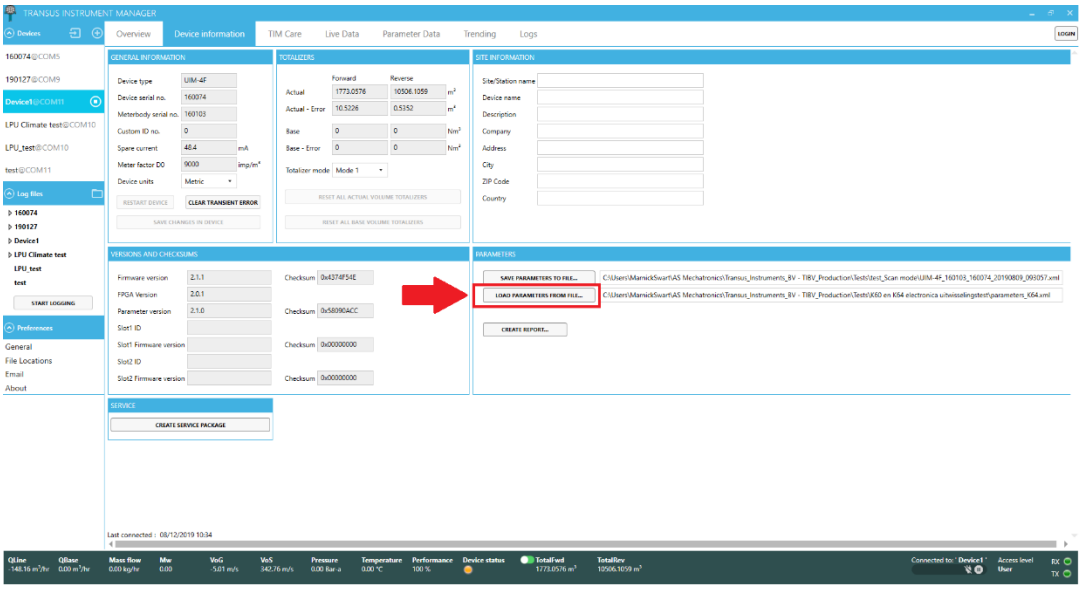

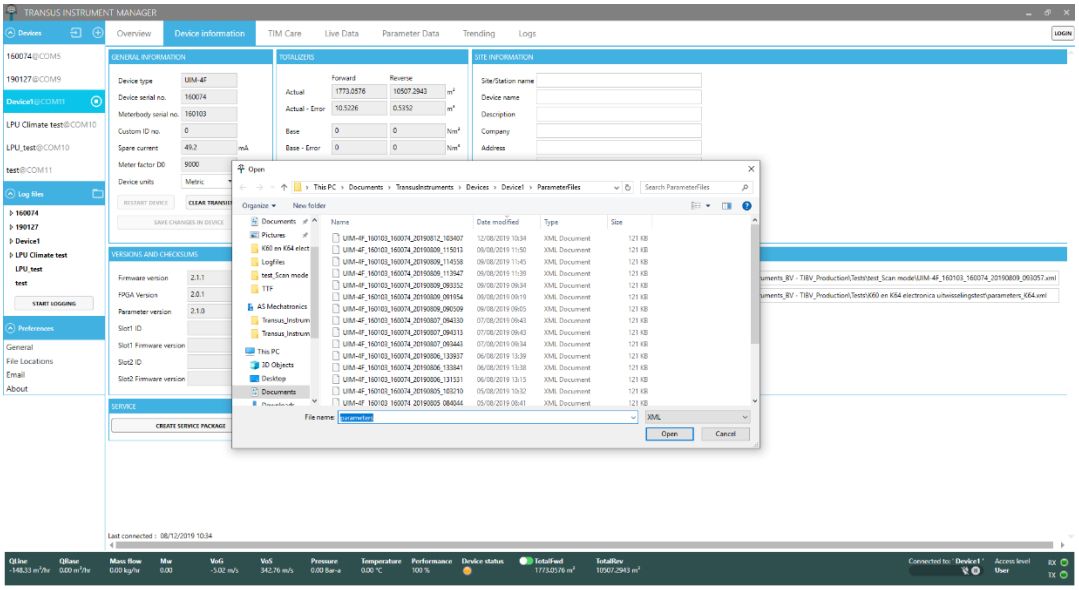

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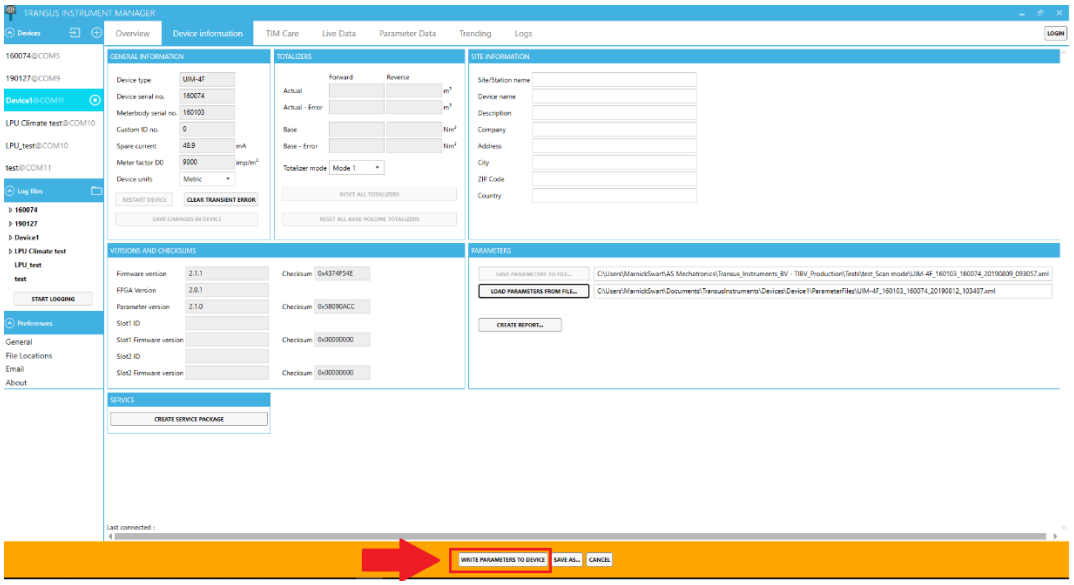

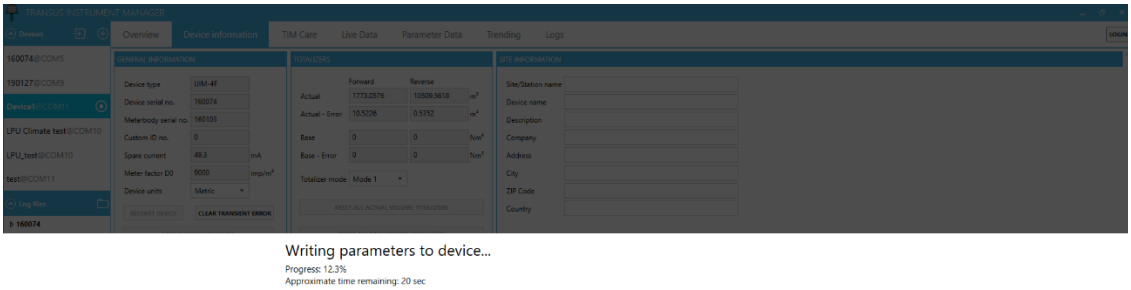

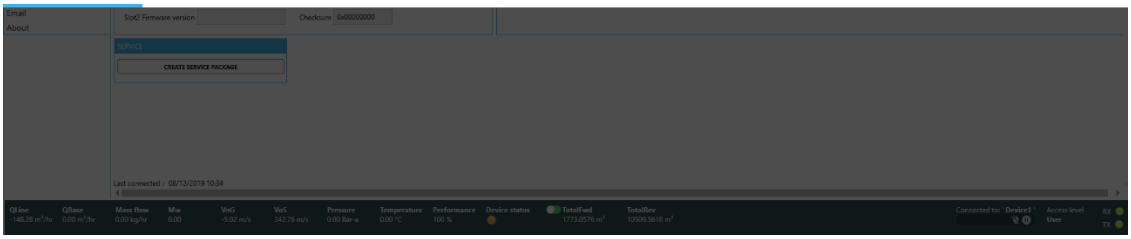

5.2.4 Loading older revision parameter file into device

It is possible to load parameter files of an older version into a device running newer firmware. To do so follow the steps below.

1. first connect to the device, once TIM has successfully made a connection you can disconnect again. This ensures TIM has determined the firmware version of the device you want to write to.
2. Enter “Edit Offline” mode (for this click on the three dots next to the CONNECT button (chapter 3.4)
3. Now load the parameters in TIM, after loading the parameters go to the Parameter tab. Parameters that were not loaded from the file are identified in red and can be manually updated. Refer to the examples shown below in this chapter.

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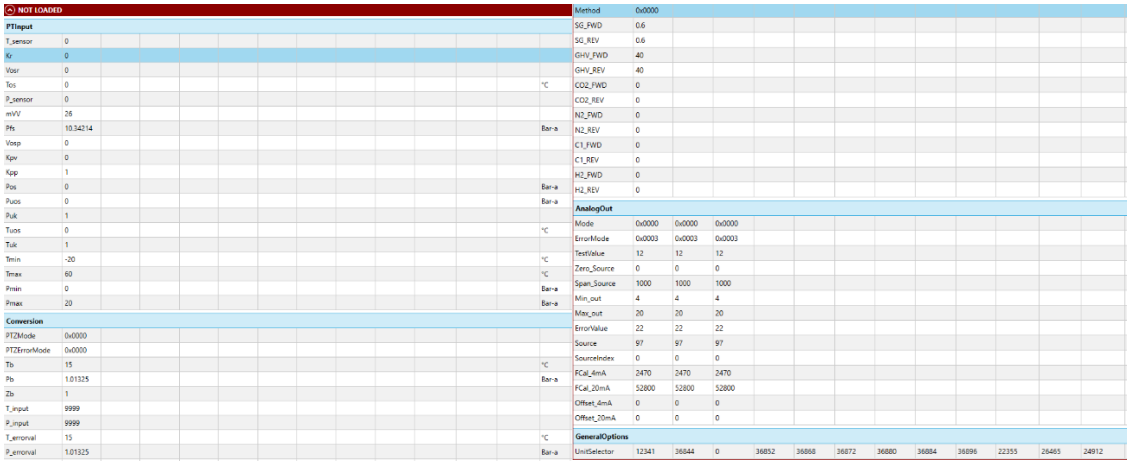
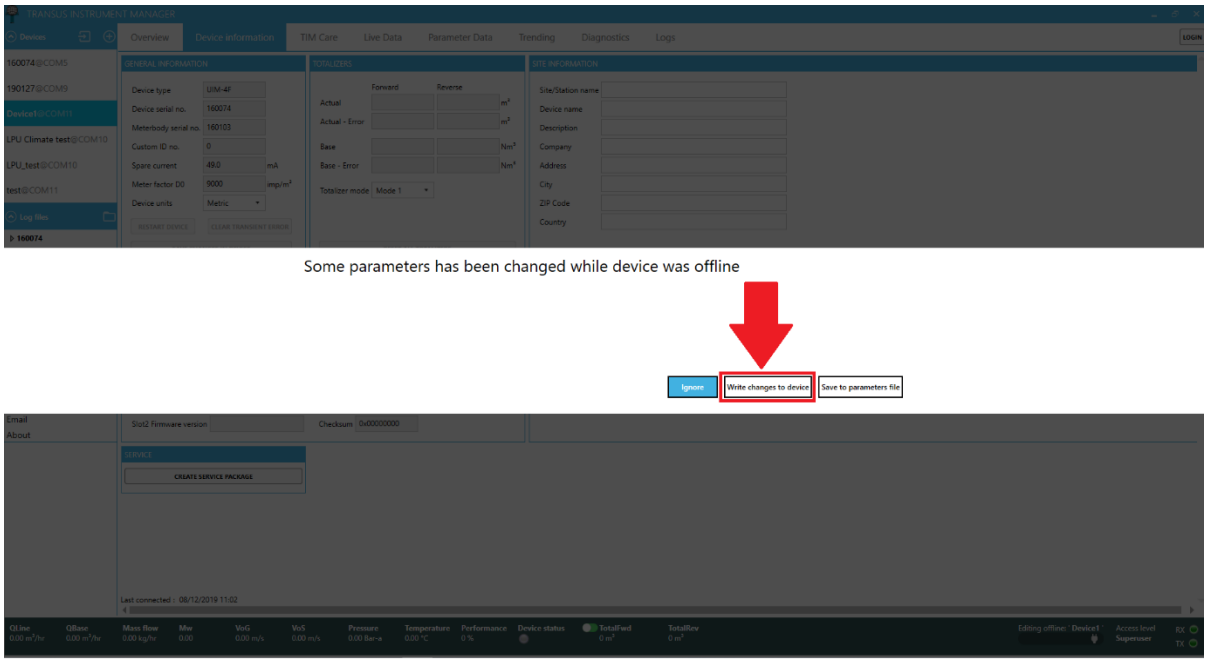


4. Then connect to the device, TIM prompts to alert the user that some parameters were changed. To use the new parameters, choose “Write changes to device”. Another warning message shows up to alert the user that all parameters in the device will be overwritten, choose “Yes” to confirm.

Attention!

Newer parameter files may have more parameters; these are not read from the old parameter file and their values remain at factory default values. Verify these parameters to ensure they are all set to the required values.



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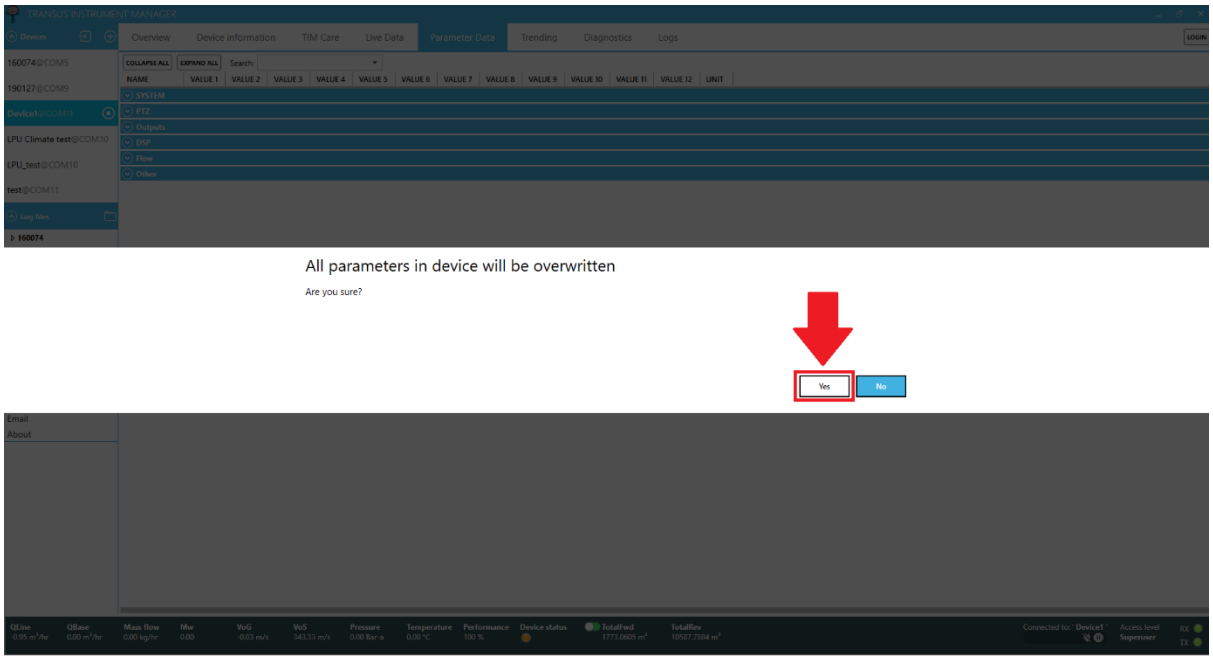

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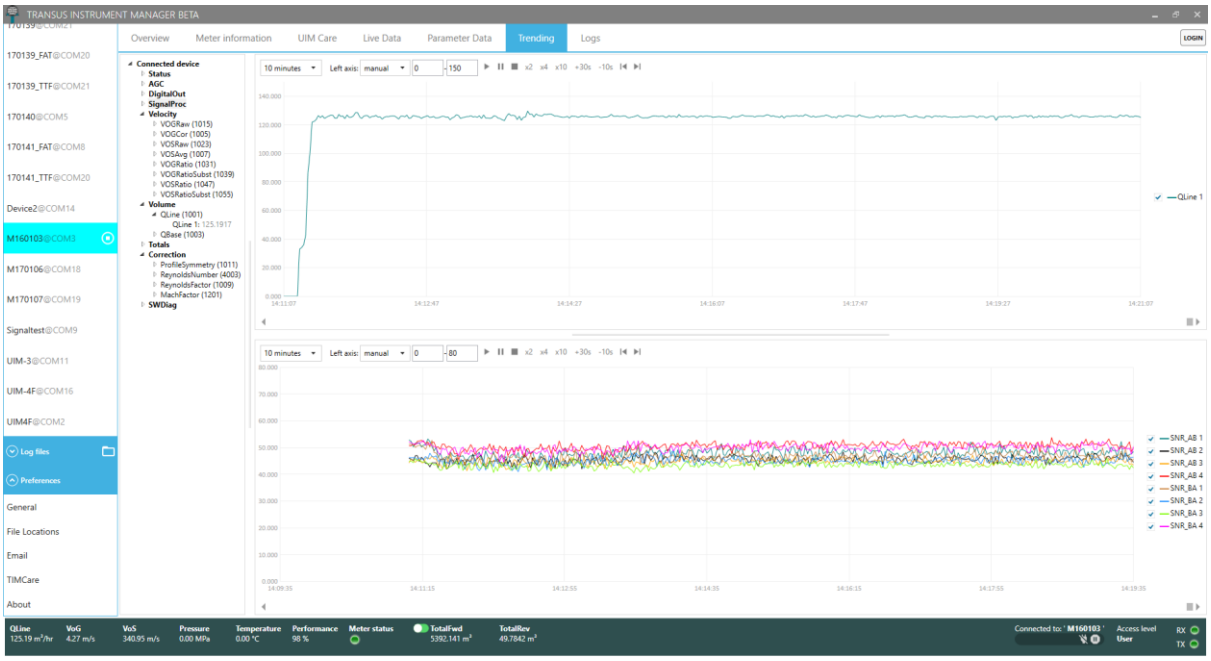
Trending and logging

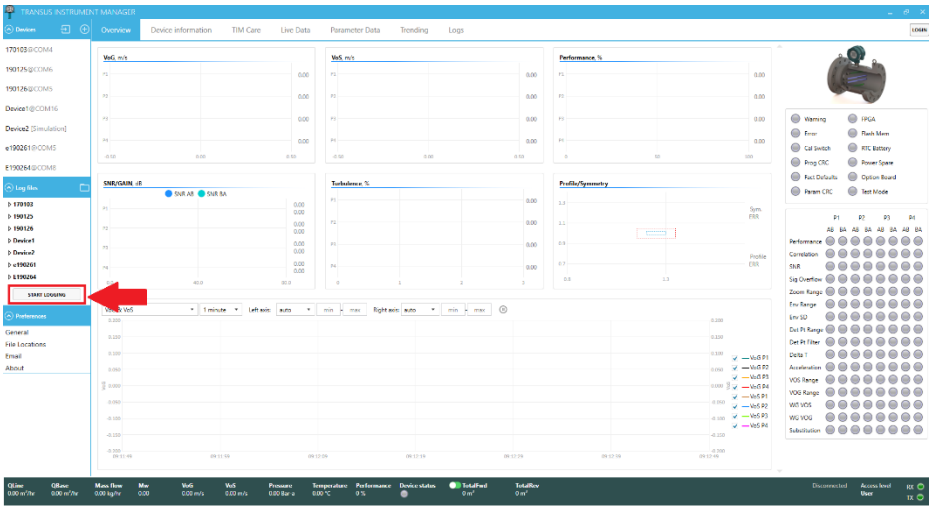
5.3 Trending live data

When connected to a device, using the Trending tab it is possible to display any result parameter over time. The parameters can be selected by the “drag and drop” principle. Drag a parameter from the parameter tree left of the chart areas and drop it in the chart area to plot the values. Up to 8 parameters (traces) can be trended at the same time. Traces can also be removed again from the trend area. Right click on the trace name in the legend to the right of the trend, a pop up dialog will appear to select the desired option.



5.4 Logging data to a file

Logging data on the PC can be started at any time when connected to a device. Press the <START LOGGING> button on the left navigation pane. A dialog window will pop up to provide a file name. Logs are saved in CSV (Comma Separated Values) format. Log files can be easily imported in a spreadsheet editor for further analysis if required, logs can be paused and started at any time with the pause button located on the bottom-right of the status bar.



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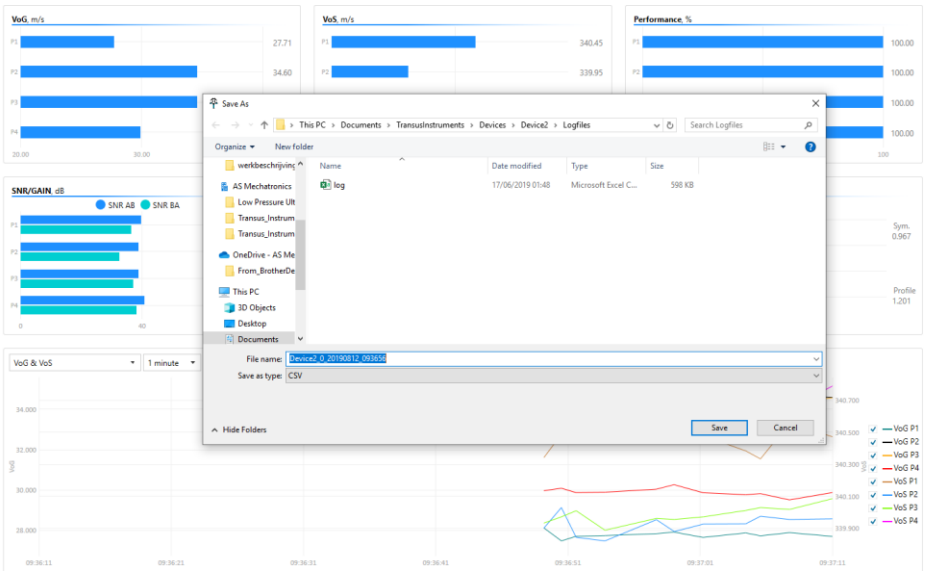
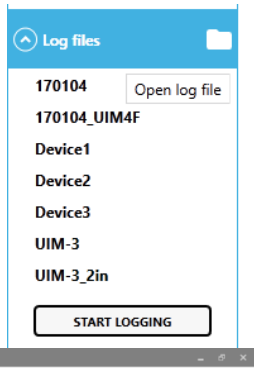
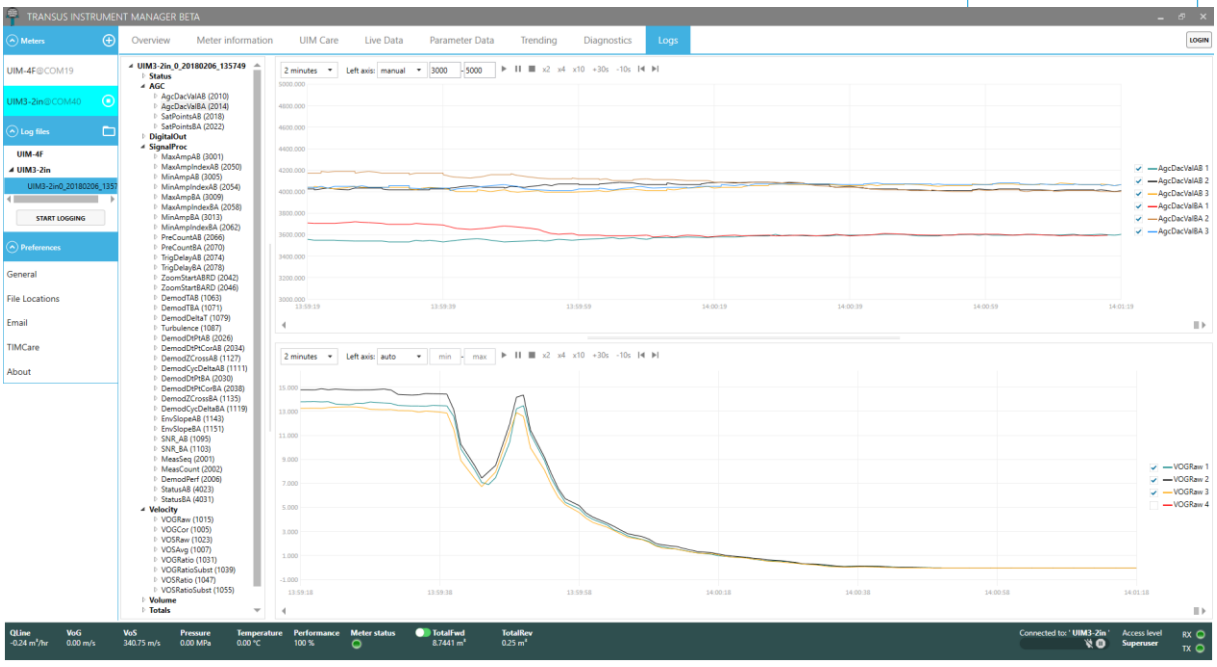


5.5 Playback of logged data

TIM can open and play back previously created log files. Log files can be selected from the left hand navigation pane in the Logs tree, or when the log file is not present in the tree list, opened using the “Open log file” button as shown to the right.



The trend windows work exactly the same as the live trend tab. Furthermore additional controls can be used such as fast forward, faster playback. These buttons are available in the trend window.



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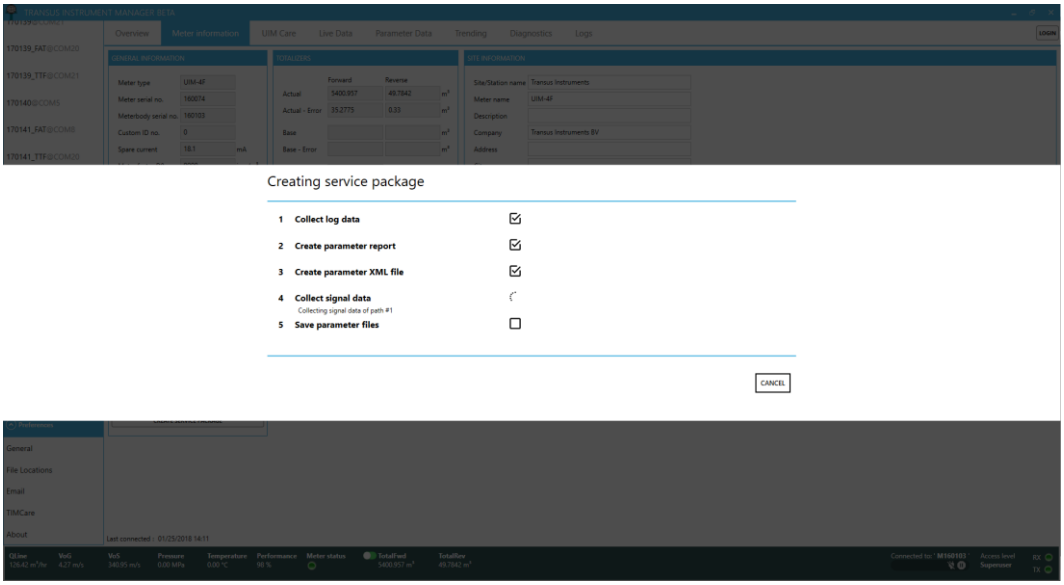
6 Diagnostics

When logged in under Service or Super user level the diagnostics tab is available. This tab allows to view the received signals of the transducers. Signals can be viewed directly from the connected device. Previously saved signal sets can also be loaded in TIM for further analysis when offline from the device.

6.1 Create Service package

For trouble shooting purposes a dedicated function is available to create a “Service package”. This feature collects data from the device and compresses it in a ZIP file. The zip file can be sent to an expert at Transus Instruments or your sales representative for further analysis. The package contains a short log file, parameter data and signal data.

Press the <CREATE SERVICE PACKAGE> to start collecting the data. The following screen appears, wait until TIM has completed all 5 steps. Note that this process takes several minutes to complete.



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6.2 Reading signals from device

To read signals select the Path to read in the <CHANNEL SELECTION> area. Enter the number of signals to read (TIM can store several signals in one file, this may be useful for observing dynamic behaviour of the signal). Default number of signals is one. Press <READ> to read the signals, this takes several seconds, when completed the signals appear on the chart areas.

RAW Signal	This chart area shows the raw signal (BCW processed)
ZOOM AB	This chart area shows a zoom in of the AB direction (signal travelled downstream)
ZOOM BA	This chart area shows a zoom in of the BA direction (signal travelled upstream)

To save the signal to a file, press <SAVE>. In case signals are already loaded from the device a pop up dialog appears to select to load new signals or save the signals that were already loaded.

To load a signal from file, press <LOAD> and select the file to load. The signals will appear in the chart areas.

To continuously request signal information from the device, click <CONTINOUS> to enable TIM to continuously get signal data from the meter. Press <STOP> to stop requesting data. Note that requesting continuous signal data may slow the response of the device down.

Attention!

Instead of saving separate signals it is recommended to use the <CREATE SERVICE PACKAGE> feature. Using this feature a complete set of data is collected including a short logfile, signal file and parameter data.

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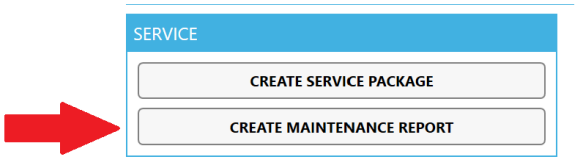
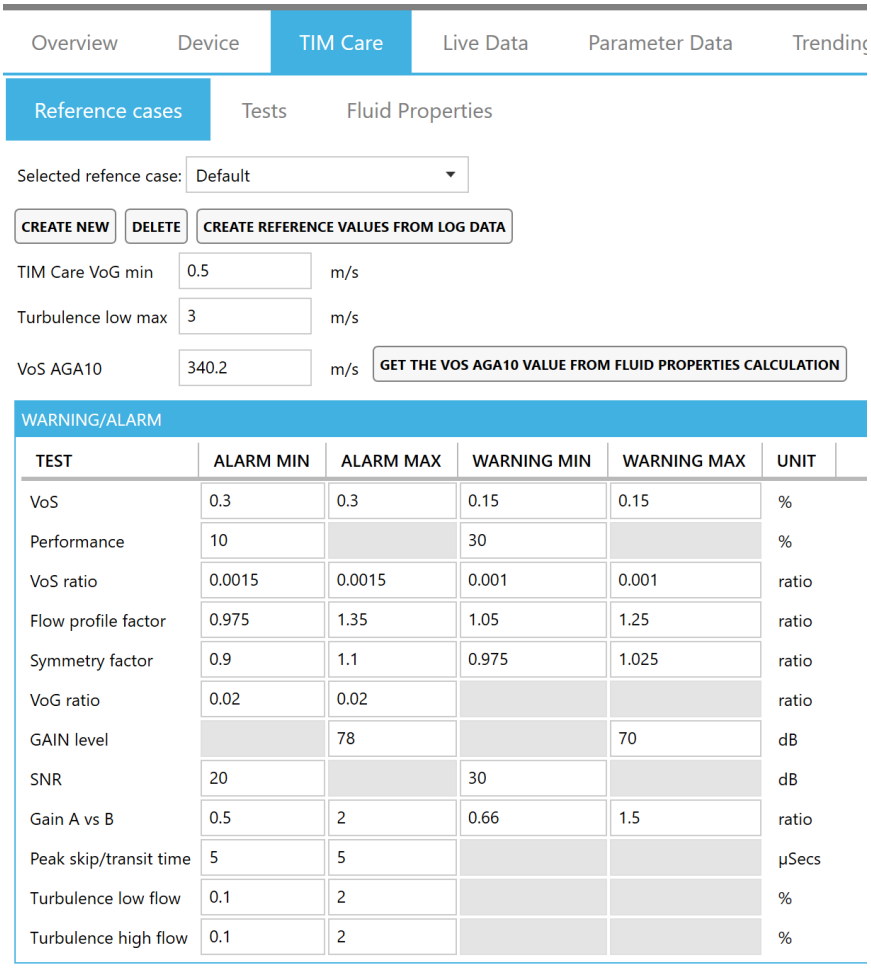
7 Maintenance report

The maintenance report function enables a quick and easy way to verify the operation condition of the flowmeter. A report will be created based on 2-minute logged data. The maintenance report will also show warning and alarm levels. The limits are defined in the TIMCare Warning/Alarm settings, factory default values can be used when no specific limits are known.

To create a maintenance report press <CREATE MAINTENANCE REPORT> under <Device>, < System Info>



If required, the warning and alarm limits can be configured under <TIM Care> → <Reference cases>.



TEST	ALARM MIN	ALARM MAX	WARNING MIN	WARNING MAX	UNIT
VoS	0.3	0.3	0.15	0.15	%
Performance	10		30		%
VoS ratio	0.0015	0.0015	0.001	0.001	ratio
Flow profile factor	0.975	1.35	1.05	1.25	ratio
Symmetry factor	0.9	1.1	0.975	1.025	ratio
VoG ratio	0.02	0.02			ratio
GAIN level		78		70	dB
SNR	20		30		dB
Gain A vs B	0.5	2	0.66	1.5	ratio
Peak skip/transit time	5	5			µSecs
Turbulence low flow	0.1	2			%
Turbulence high flow	0.1	2			%

Attention!

For certain applications the default minimum and maximum limits may not always apply. The limits can be adjusted as required.

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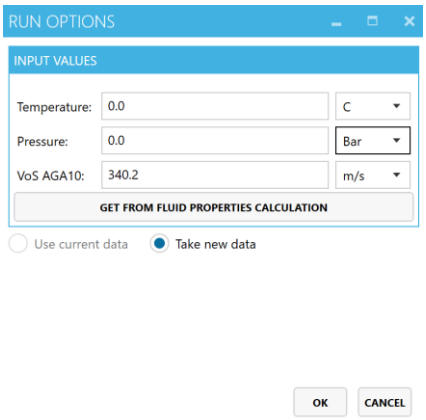
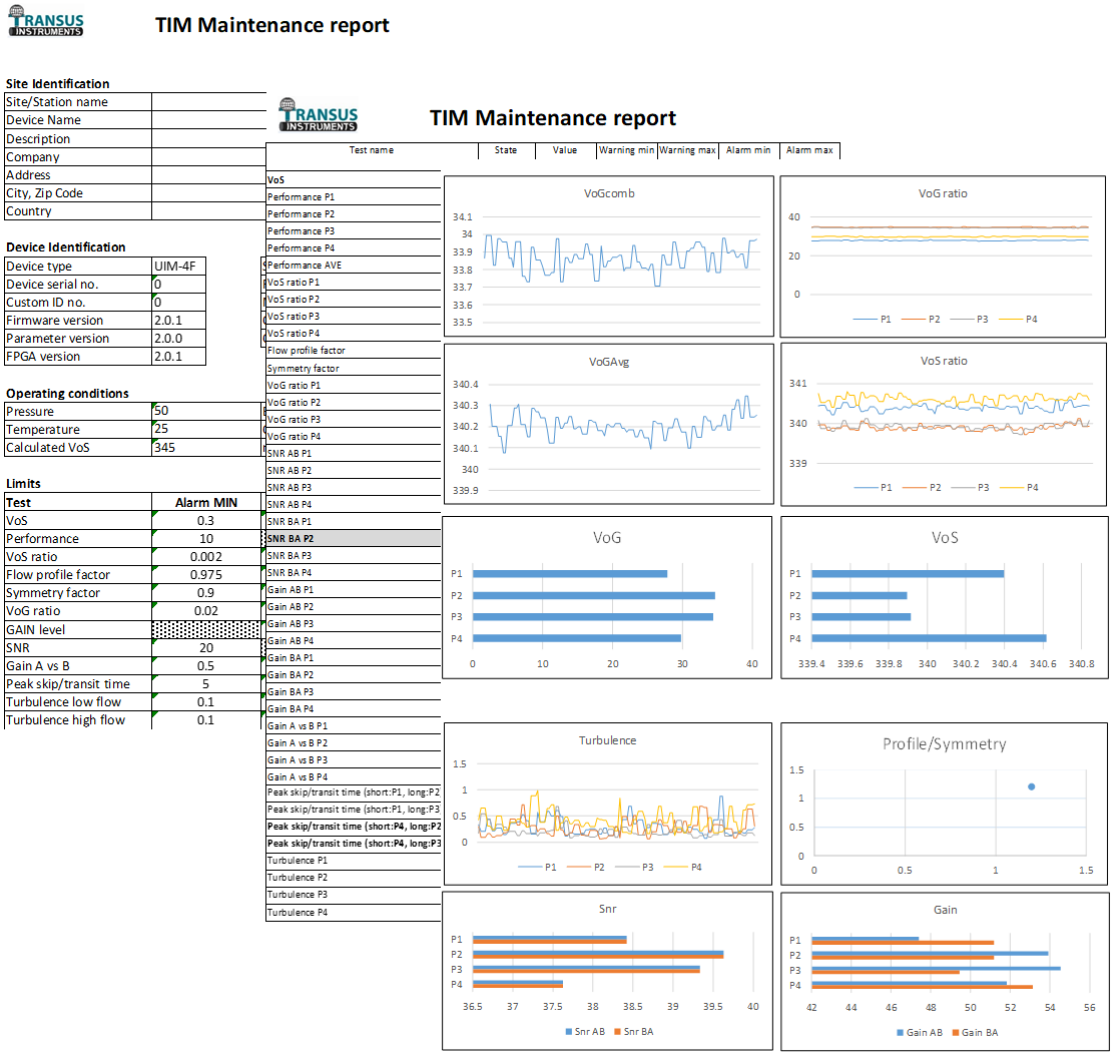
TIM will show a pop-up dialog asking for pressure, temperature and theoretical VoS value. The built-in gas properties calculator can be used to calculate the theoretical VoS when the gas compositions is known.



A maintenance report will be generated after the data has been collected by TIM. Following picture shows an example of the contents of the maintenance report. The maintenance report and the collected data is stored as an Excel file.



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8 TIMCare

In addition to the maintenance report function, using TIMCare it is possible to monitor and report your device's performance over its entire application lifetime starting at its first calibration. Using TIMCare it is possible to record well known situations for the device. Situations such as first calibration, first flow of gas installed in customer situation, recalibration etc. These well-known situations are referred to as reference cases. Up to 6 reference cases can be created for each device. Each reference case can contain reference values at different velocities (forward and reverse direction).

Reference cases are created by logging 2-minute data and calculating average values on the parameters required for the Diagnostic tests. Most parameter values are affected by the gas velocity and therefore a set of reference values can contain reference values at 20 different velocities (10 forward and 10 reverse). In other words the user can create 20 sets of reference values at different velocities.

When at least one reference case has been recorded it is possible to perform a TIMCare diagnostic test. This may be done daily, weekly, monthly or on any interval required. The actual diagnostic tests are done by taking a 2minute log at any given time, average values are calculated, and the results are compared against a selected reference case. A built-in report can be generated to present the results in an organized way.

- The following is a list of key diagnostics used in TIM Care calculations

1) SNR – SNR is the signal to noise ratio of the received signal in dB. The higher the SNR the lower the noise amplitude is compared to the receive signal amplitude. The lower the SNR the more noise in the system. The SNR is dependent on pipe size, gas composition, pressure, temperature, velocity and installation. A pressure regulator in the system can cause high noise levels in the system. This is typically cancelled by using BCW (coded) signal detection. The SNR is typically greater than 30 dB.
2) Gain level – Gain is amount of amplification in dB needed to increase the raw signal voltage to a useable voltage in the meter. There are two gain values per channel gainAB and gain BA. The lower the gain the stronger the raw receive signal the higher the gain the weaker the raw receive signal. The gain is dependent on pipe size, gas composition, pressure and temperature. The gain is typically below 70 dB.
3) Velocity (VoG) – The per path velocity measured by the meter based on travel times and programmed parameters.
4) Soundspeed (Vos) – The per path Soundspeed measured by the meter based on travel times and programmed parameters.
5) Performance – Meter performance is calculated based on the number of good readings per second / the number of readings made per second.
6) VoS Ratio - The Vos Ratio is calculated as VoS $path_n$ / VoS average. The VoS ratio is typically 1.000 +/* 0.0015
7) Flow profile factor – The profile factor is the ratio of the average velocity of the inner paths (2&3) / the average velocity of the outer paths (1&4). The profile factor is typically 1.15 +/- .05 but can be dependent on flow velocity and/or installation.
8) Symmetry factor - The symmetry factor is the ratio of the average velocity of the upper paths (1&3) / the average velocity of the lower paths (3&4). The profile factor is typically 1.0000 +/- .05 but can be dependent on flow velocity and/or installation.
9) VoG Ratio - The VoG Ratio is calculated as VoG $path_n$ / VoG average. The VoG ratio is dependent on path location. The outer paths (1&4) are typically 0.900 +/* 0.0015. The inner paths are typically 1.05 +/- 0.015. In both cases the ratio can be dependent on flow velocity and/or installation conditions.
10) Turbulence – The meter calculates the flow turbulence based on the standard deviation of the velocities read per second. The meter typically will make 8-16 measurements per second. The turbulence increases as the flow velocity decreases. Turbulence is calculated when the meter velocity is above 0.5 mps.

There are 3 subtabs in the TIM Care tab.

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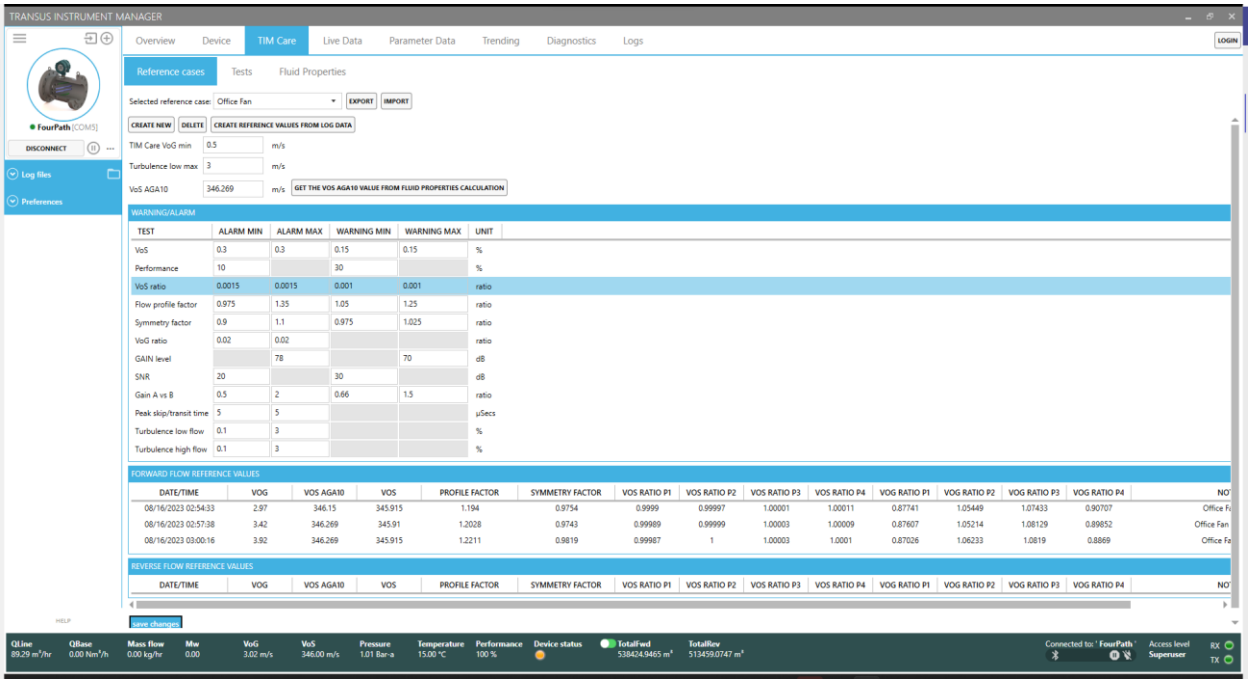
8.1 Creating reference cases and reference flow data

Reference cases – Is used to set criteria of the TIM care health tests.



- The user can import or export reference case files. A reference case file is not needed to perform tests and is typically only needed when there are installation conditions that are not typical AGA9 conditions (5D/FC/10D/USM/5D) or the user wants to customize the settings based on meter velocity.
- The user can set the limits for min/max warning/failure for each of the tests.
- The user can create reference cases based on meter data.
- The user can set the minimum velocity that health tests can be run. Below 0.5 mps the velocity health tests will give unpredictable results because of low velocity ratios.

To create a reference case, press <CREATE NEW> button and name the reference case. Review and edit the parameters for the reference case. Review and edit the warning and alarm limits as described in chapter 8.2. Below table shows the basic settings to run TIM Care.

Parameter	Default value	Description
TIMCare VoGmin	0.5 [m/sec]	Minimum gas velocity for TIMCare to perform tests or create reference cases
Turbulence low max	3 [m/sec]	Switch point for Turbulence low/high regime
VoS AGA10	n/a	Theoretical velocity of sound (soundspeed) value. Calculate using the Fluidproperties tab or enter manually.

Press <CREATE REFERENCE VALUES FROM LOG DATA> to start collecting data from the flowmeter.

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8.2 TIMCare warning and alarm limits

The warning and alarm limits for each test can be entered in the table. Default values are suggested for each test. However, for specific applications it is recommended to narrow down the warning and alarm limits to enable early detection of potential problems occurring.

WARNING/ALARM

TEST	ALARM MIN	ALARM MAX	WARNING MIN	WARNING MAX	UNIT
VoS	0.3	0.3	0.15	0.15	%
Performance	10		30		%
VoS ratio	0.0015	0.0015	0.001	0.001	ratio
Flow profile factor	0.975	1.35	1.05	1.25	ratio
Symmetry factor	0.9	1.1	0.975	1.025	ratio
VoG ratio	0.02	0.02			
GAIN level		78		70	dB
SNR	20		30		dB
Gain A vs B	0.5	2	0.66	1.5	ratio
Peak skip/transit time	5	5			µSecs
Turbulence low flow	0.1	2			%
Turbulence high flow	0.1	2			%

8.3 Running a TIMCare test

To start the health tests the user pushes the RUN TIMCARE TEST button. TIM is always collecting data from the meter so it will ask the user if you want to use the current data or if you want to take new data. The results of the tests above are based on a 2-minute average from the meter. If the meter has been connected for more than 2 minutes and the flow rate was stable then you can use the current data. If not then it is recommended to take new data.

The user can select the reference case that it wants to use for the test. The reference case selected in the reference cases tab is selected by default.

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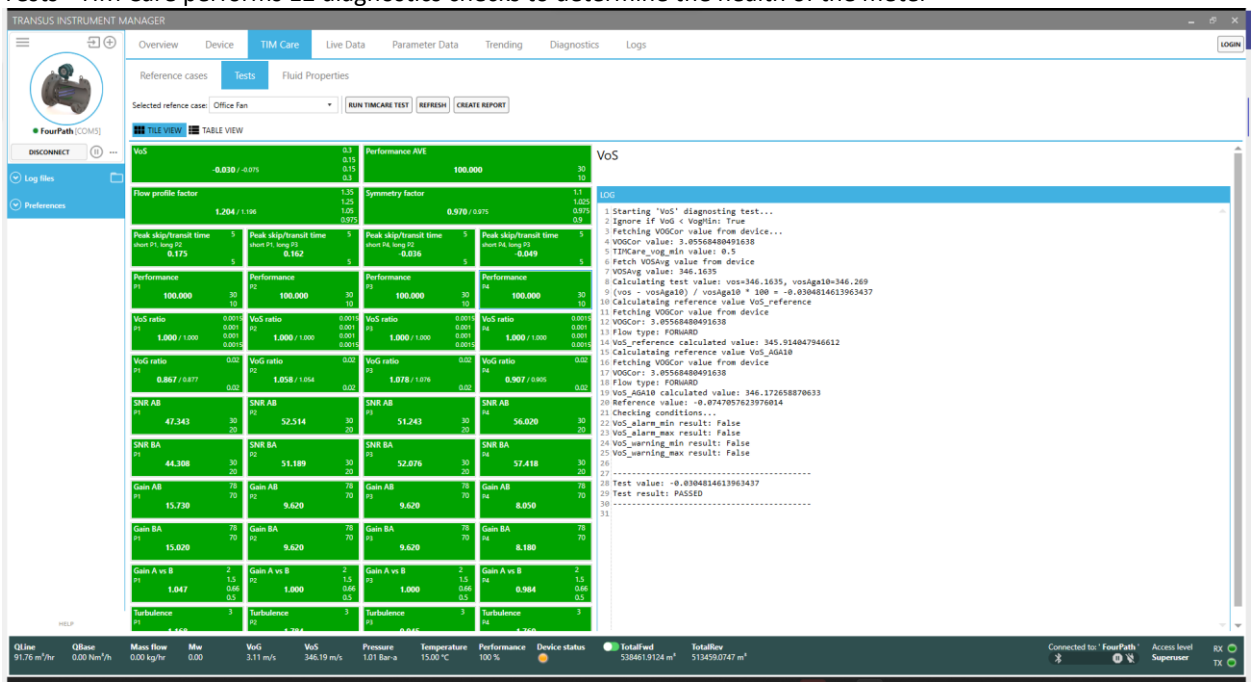
Tests - TIM Care performs 12 diagnostics checks to determine the health of the meter



1) AGA speed of sound test – TIM calculates the speed of sound (VoS) based on gas composition, pressure and temperature. The AGA VoS is compared to the meter VoS average. The typical value is 1.0000 */- .015.
2) Performance – The performance of the meter is verified. Meter performance is calculated based on the number of good readings per second / the number of readings made per second.
3) VoS Ratio - The VoS ratio of each path is check versus the average VoS reading. The Vos Ratio is calculated as VoS $path_n$ / VoS average. The VoS ratio is typically 1.000 +/* 0.0015
4) Flow profile factor – The flow profile factor of the meter is checked versus reference value. The profile factor is the ratio of the average velocity of the inner paths (2&3) / the average velocity of the outer paths (1&4). The profile factor is typically 1.15 +/- .05 but can be dependent on flow velocity and/or installation.
5) Symmetry factor - The symmetry factor of the meter is checked versus reference value. The symmetry factor is the ratio of the average velocity of the upper paths (1&2) / the average velocity of the lower paths (3&4). The profile factor is typically 1.0000 +/- .05 but can be dependent on flow velocity and/or installation.
6) VoG Ratio - The VoG ratio of each path is check versus the average VoG reading. The VoG Ratio is calculated as VoG $path_n$ / VoG average. The VoG ratio is dependent on path location. The outer paths (1&4) are typically 0.900 +/* 0.0015. The inner paths are typically 1.05 +/- 0.015. In both cases the ratio can be dependent on flow velocity and/or installation conditions.
7) SNR – SNR is the signal to noise ratio of the received signal in dB. The higher the SNR the lower the noise amplitude is compared to the receive signal amplitude. The lower the SNR the more noise in the system. The SNR is dependent on pipe size, gas composition, pressure, temperature, velocity and installation. A pressure regulator in the system can cause high noise levels in the system. This is typically cancelled by using BCW (coded) signal detection. The SNR is typically greater than 30 dB.
8) Gain level – The gain level of each transducer is checked in the meter. Gain is amount of amplification in dB needed to increase the raw signal voltage to a useable voltage in the meter. There are two gain values per channel gainAB and gain BA. The lower the gain the stronger the raw receive signal the higher the gain the weaker the raw receive signal. The gain is dependent on pipe size, gas composition, pressure and temperature. The gain is typically below 70 dB.

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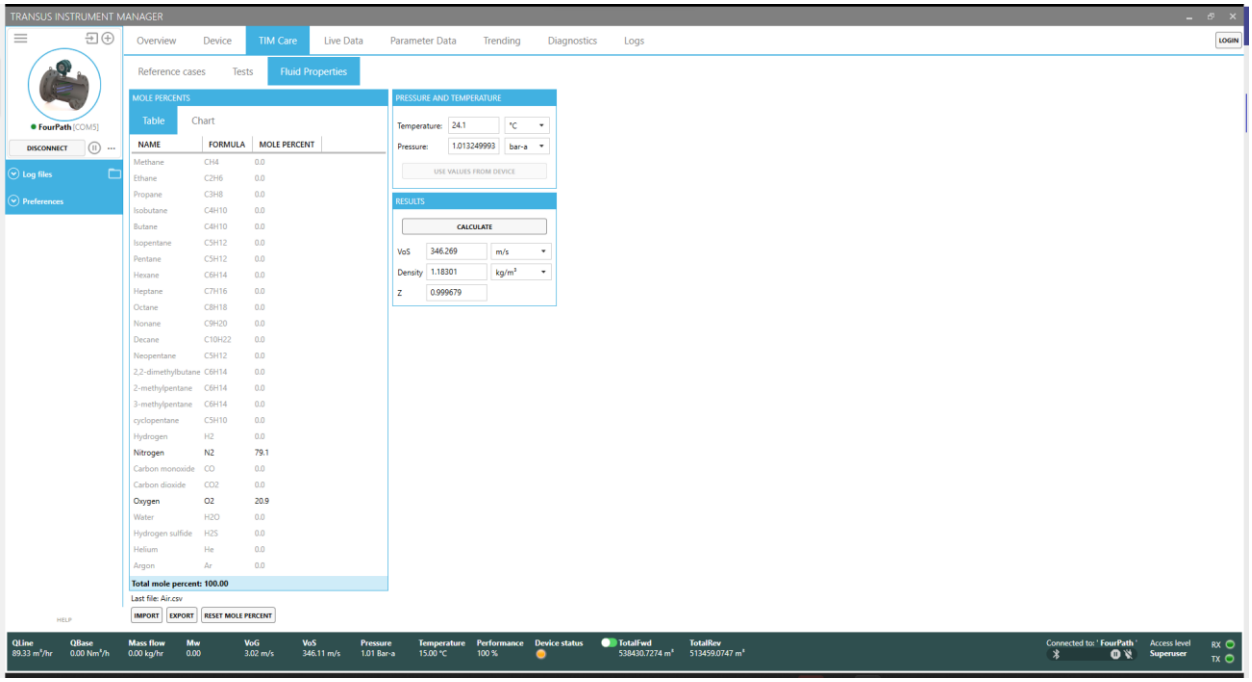
9) Gain mismatch – The gain of the signal in the AB direction is checked versus the gain in the BA direction. This ratio is typically 0.66 to 1.5.
10) Peak skip – The peak skip test checks the relative timing of the long paths (2&3) versus the short paths (1&4). Relative timing is based on the ratio paths VoS reading and the programmed path length. The typical value should be less than 5 usecs.
11) Low Flow turbulence test – The meter calculates the flow turbulence based on the standard deviation of the velocities read per second. The meter typically will make 8-16 measurements per second. The turbulence increases as the flow velocity decreases. This test is run when the meter is between the TIM Care minimum velocity (0.5 mps) and the turbulence low max velocity (3 mps).
12) High Flow turbulence test – The meter calculates the flow turbulence based on the standard deviation of the velocities read per second. The meter typically will make 8-16 measurements per second. The turbulence increases as the flow velocity decreases. This test is run when the meter is greater than the turbulence low max velocity (3 mps).

8.4 Fluid Property calculator



Using the fluid property calculator, it is possible to calculate the theoretical VoS for the gas mixture of your application. The user can manually enter gas composition or import from a variety of GC file formats. The values can be exported to be saved for later use. The user can manually enter the pressure and temperature of the gas or if the meter is equipped with a pressure and temperature sensors, they can use the values from device. The calculated AGA speed of sound value can be used for verify the health of the meter. The VoS, density and compressibility are calculated when pressing the CALCULATE button.