

Ruptela tachograph solution: Installation and configuration instructions for FM-Tco4 HCV

Introduction

The tachograph solution offers a fast and reliable way to read the driver card data and tachograph DDD files. This functionality is available for the FM-Tco4 HCV device. This document explains how to install and configure the device in order to read the tachograph data.



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Document change log

Date	Version	Change details
2014-10-01	1.0	Initial draft.
2015-07-02	1.1	Workflow summary added.
2016-02-03	1.2	Branding changes.
2016-05-12	1.3	Tachograph IO parameters from different sources, tachograph IO parameters filtering described.
2017-01-30	1.4	EFAS digital tachograph support, "Keep TCO parameter values when engine is OFF" described.
2017-02-02	1.5	EFAS digital tachograph support exceptions added to the description.
2017-02-14	1.6	Supported EFAS tachograph versions mentioned.
2017-03-23	1.7	ATOL "Drive Smart" tachograph support.
2017-09-27	1.8	Tachograph reading from front function.
2018-03-14	1.9	Direct tachograph connection schematic updated. Configuration examples updated. Link to TrustTrack tachograph file download instructions added.
2018-07-31	1.10	Additional condition added for tachograph connection from the front interface.
2018-10-25	1.11	Added list of supported tachographs via front interface (Appendix A). Updated unsupported tachograph list (Appendix B).
2019-01-17	1.12	Updated version and series number image example for Siemens VDO tachographs. Updated workflow summary flowchart.
2019-07-25	1.13	Removed ATOL tachograph support.
2019-09-13	1.14	VDO and Stoneridge second generation tachographs are now supported.



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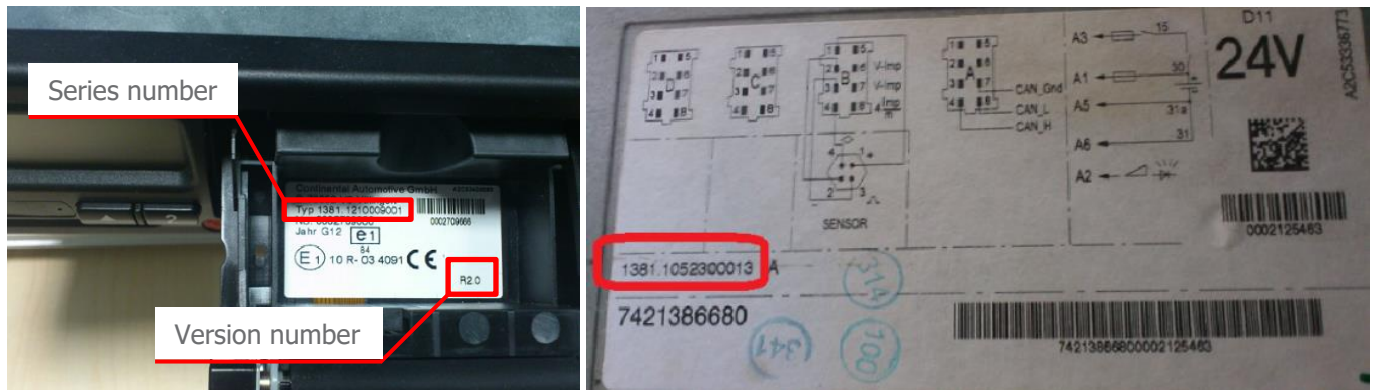
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1. Compatibility

Siemens VDO

Not all tachographs can be read by FM devices. For instance, **SIEMENS VDO 1381** tachograph version must be higher than 1.3A (including). An example of a supported tachograph version is shown in the picture below on the left.

The version number is not the only important feature of the tachograph. Not all series of tachographs are supported. The series number and the places where you can find it are shown in the pictures below.

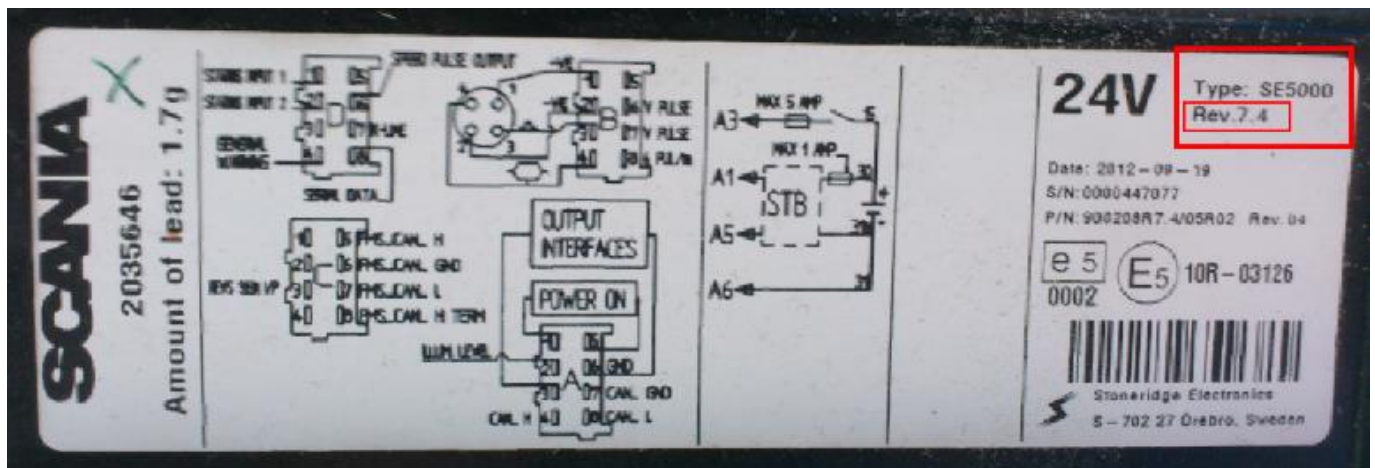


Note

For the complete unsupported tachographs list refer to the end of this document – [Appendix B: Unsupported tachographs list.](#)

Stoneridge

Stoneridge tachographs must be version 7.0 and above. Tachographs with lower versions are not supported. The Stoneridge tachograph series number and the place where you can find it is shown in the picture below.



Note

Siemens VDO and Stoneridge 2nd generation tachographs are also supported. The connection and configuration remain the same as for 1st generation tachographs.

EFAS digital tachograph

Ruptela FM device can be connected to **EFAS-4** tachographs or newer EFAS tachograph versions. Only these devices support communication with third party devices via their CAN-bus port C.



Note

FM-Tco4 HCV device does not support K-Line data reading from EFAS tachographs.

Common rule for all tachographs

Warning!

Tachographs can be connected to and read by a single device only. In other words, it is strictly a point-to-point system. There cannot be a default telematics system (preinstalled by manufacturer) or other third party devices connected to the tachograph. FM-Tco4 HCV has to be the only device communicating with the tachograph to ensure a successful tachograph reading process.



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2. Tachograph connectors

Siemens VDO, Stoneridge, EFAS digital tachograph

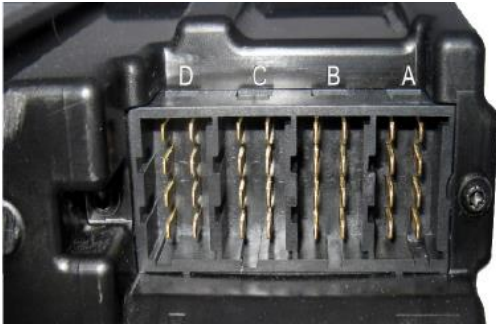
These tachographs have four connectors:

- [A] CAN-bus A
- [B] Speed sender
- [C] CAN-bus C
- [D] Serial output

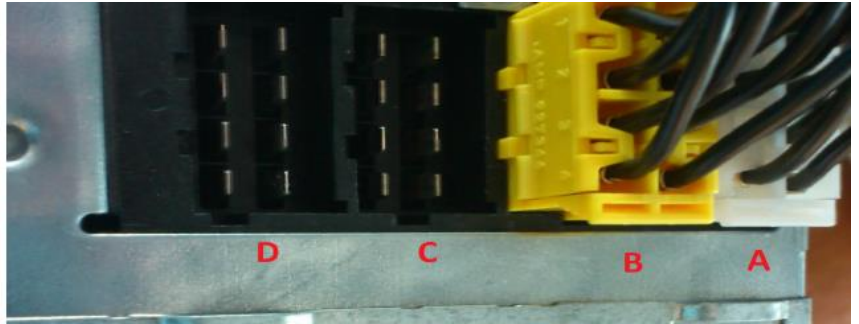
We will use **C** and **D** connectors.

If C and D connectors are sealed, tacho reading can be done without a physical connection to the tachograph. Tachograph data should come through the FMS line, the same line where CANbus data from the vehicle's on-board computer is received. Please refer to section [3.1. Tachograph reading via FMS](#).

Unplug them only when the ignition is off. This is important! For connection and configuration instructions please refer to sections [3.2. Direct Tachograph connection using 2nd CAN](#) and [3.3. K-line \(D8\) connection to the FM-TCO4 HCV](#).



General view of Stoneridge connectors



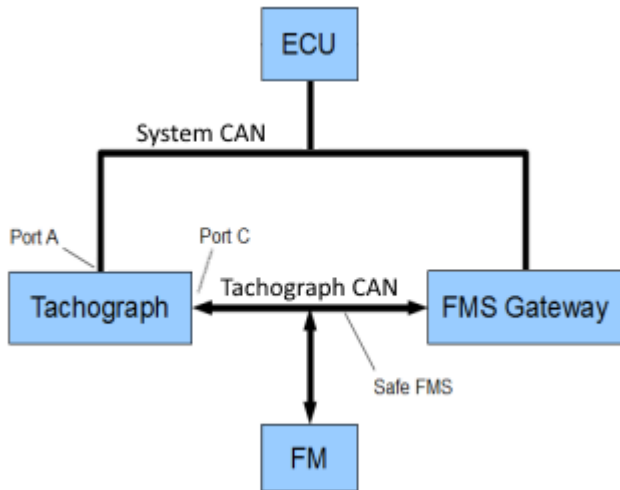
General view of Siemens VDO connectors



3. Tachograph connection to the FM-Tco4 HCV

3.1. Tachograph reading via FMS

In most of new vehicles, basically starting from 2010, it is impossible to connect the FM device directly to tachograph port C. Tachograph port C is connected directly to the FMS gateway, as shown in the diagram below:



If the connectors on the tachograph are sealed, you can try to connect your FM device to the vehicle's FMS gateway. This might not be possible, if a default telematics system* is used. If this is the case, refer to the truck dealer for the option to free tachograph port C and prepare the tachograph:

1. 2CAN activation
2. Parametrization of Tacho: telematics CANbus "Low speed CANbus"

*Mercedes Benz – "FleetBoard", Scania – "Scania Communicator", Volvo – "Dynafleet", Renault – "Optifleet Drive", Iveco – "Ivecoconnect", MAN – "MAN Telematics", DAF – "DAF Telematics", etc. If you are not sure, whether a default Telematics System is used, please refer to your truck dealer.

If there is no default telematics system in use, connect the FM device to the vehicle's FMS gateway (CAN connection) and prepare it to read CANbus data. This should be done according to the installation instruction for your vehicle brand and model. Tacho reading via FMS might be possible, but not all trucks can be read this way. After installation, use an SMS command to check the tachograph status. If you get Tacho status:0, it means that tachograph reading via FMS is not available for this vehicle. For more details on "Tacho status:0" and other possible Tacho statuses, please refer to section [3.6. Status check via SMS commands](#).

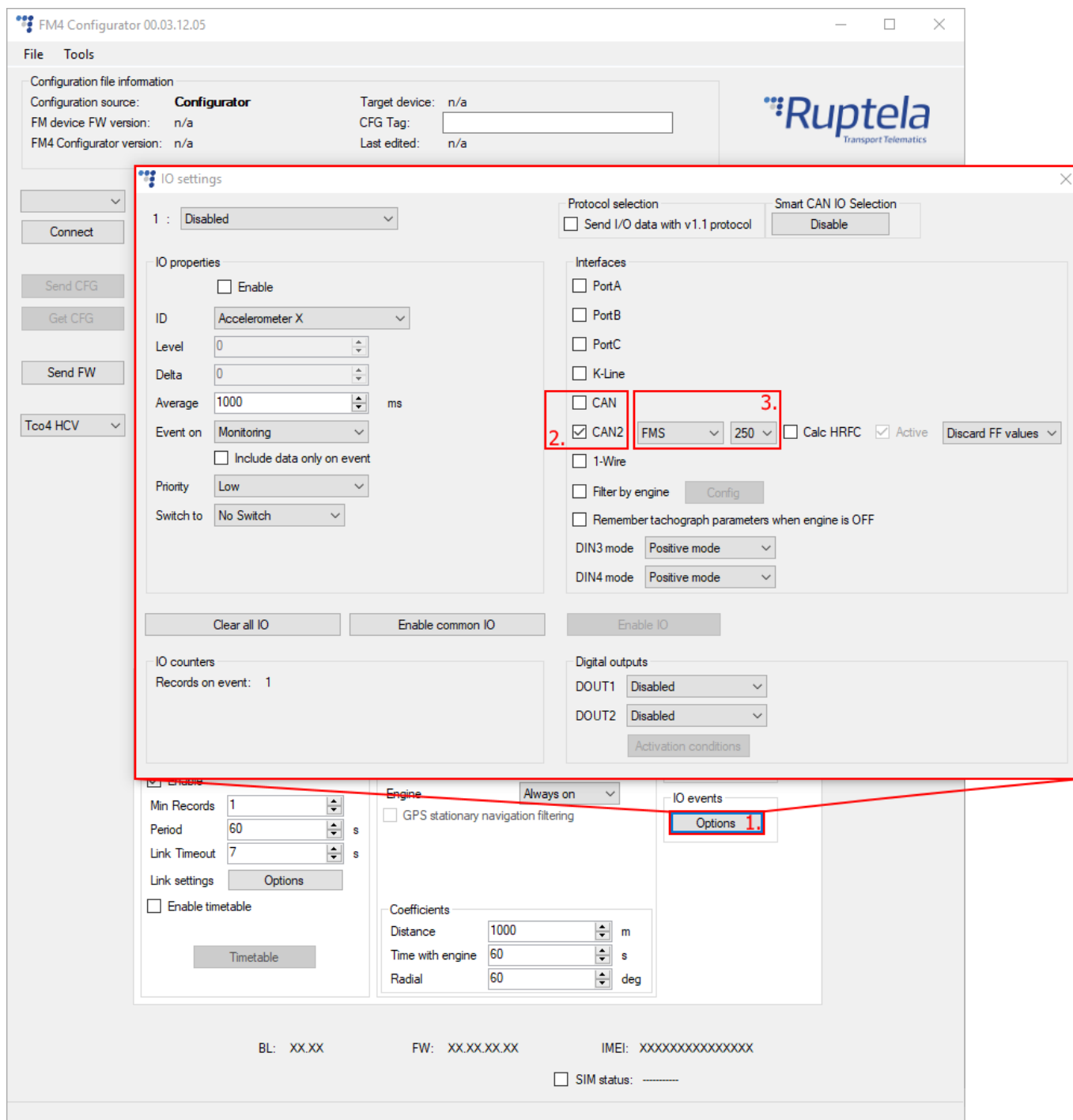
Configuration

The configuration for tachograph reading via FMS is the same as for the CAN connection (*see the configuration picture below*):

1. Click **Options** in the **IO events** section.
2. Select **CAN** or **CAN2**, depending on the line that you have connected to:

- **CAN is located in the 14 pin connector**
 - CAN H is white
 - CAN L is blue
- **CAN2 is located in 12 pin connector**
 - CAN H is white/red
 - CAN L is blue/red

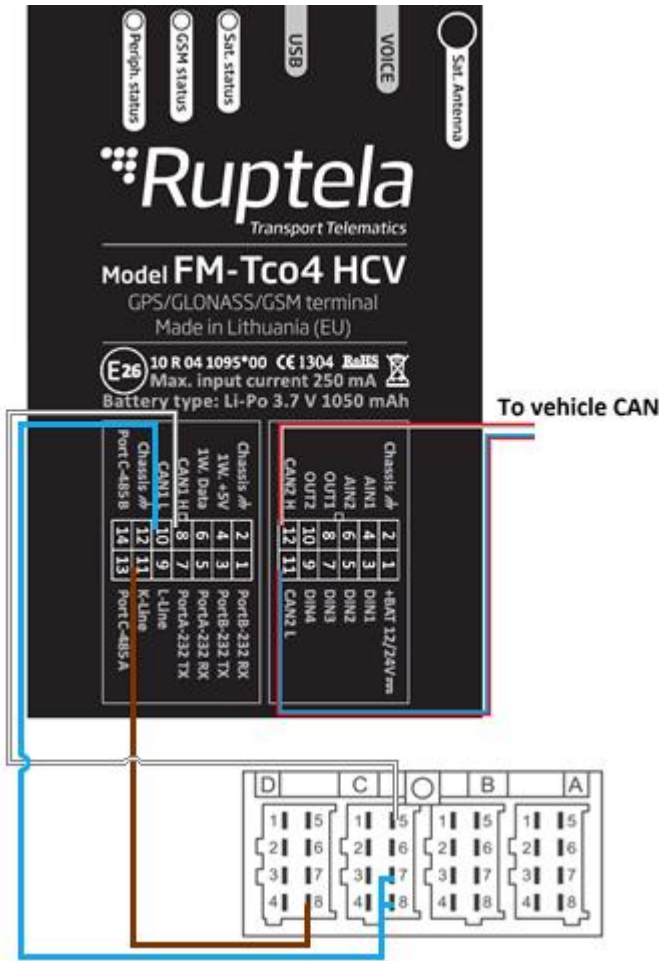
3. Select **FMS** and the required baud rate. The checkbox **Active** is enabled by default. Once all the steps are completed, do not forget to enable the required IO parameters.



By default the FM-Tco4 HCV device will gather CAN data, but upon request from the server (when you try to download the tachograph data files) it will switch to tachograph reading mode and download the required files. Status check SMS messages will work in the same way as for other connection methods (see section [3.6. Status check via SMS commands](#)).

3.2. Direct tachograph connection using two CAN interfaces

If tachograph ports C and D are free, you can use a second CAN line on the FM-Tco4 HCV device to read the tachograph directly. The other CAN line is used to read CAN parameters.



*An interconnection between pins **C7** and **C8** is usually required. To check whether you need to use this interconnection follow these steps:

- 1) The vehicle's ignition must be OFF.
- 2) Ensure that the port is free;
- 3) Set your multimeter to measure resistance;
- 4) Measure the resistance between pins **C5** and **C7**:

a) If the resistance value is approximately equal to 120 Ω, then an interconnection between pins **C7** and **C8** is not required. In this case, connect the CAN High wire to pin **C5** and the CAN Low wire to pin **C7**.

b) If the measured resistance is shown to be infinitely high, then an interconnection between pins **C7** and **C8** is required. Connect the CAN High wire to pin **C5** and the CAN Low wire to pins **C7** and **C8** as shown in the picture on the left.

After the installation, use an SMS command to check the tachograph status. Possible tachograph statuses are described in section [3.6. Status check via SMS commands](#).

If you get Tacho status:0, refer to the truck dealer to make the necessary changes and prepare the tachograph:

1. 2CAN activation
2. Parametrization of Tacho: telematics CANbus "Low speed CANbus"

3.3. K-line (D8) connection to the FM-Tco4 HCV

- **CONTINENTAL VDO DTCO 1381** pin **D8** should work without additional activation.
- **STONERIDGE SE5000** owners need to activate pin **D8** using your company card, follow these steps:
 1. Press OK;
 2. Select Settings;
 3. Press OK;
 4. Select Parameters;
 5. Press OK;
 6. Select D8 data format;
 7. Select SRE;
 8. Press OK to confirm.
- **STONERIDGE SE5000** versions older than 7.4 can be activated in authorized workshops.

In case pin **D8** is already occupied it can also be connected in parallel.

Configuration

If your connection matches the one shown in the picture above (page 6), then the configuration must be done as follows (CAN2 FMS + CAN Tacho read):

1. In the main configurator window drop-down list choose *Tco4 HCV*.
2. Click the **Options** button in **IO events**.
3. Tick the **K-Line** check box and select **TCO** from the drop-down list.
4. Tick the **CAN** check box, then choose **Tacho read** and the required baud rate.
5. Tick the **CAN2** check box, then choose **FMS** and the required baud rate (according to the installation instructions for a particular vehicle).

Once all steps are completed, do not forget to enable the required IO parameters.

Note

Active mode on CAN2 (used for CAN data) is not required for tachograph reading using both CAN lines unless installation instructions state otherwise.

The screenshot shows the Ruptela configurator interface. On the left, a sidebar shows 'Tco4 HCV 1.' selected. The main configuration area is divided into several sections. A red box highlights the IO event configuration section, which includes the following settings:

- Delta: 0 ms
- Average: 1000 ms
- Event on: Monitoring
- Include data only on event:
- Priority: Low
- Switch to: No Switch
- IO counters: Records on event: 1
- IO events: **Options 2.**

The IO event configuration section is further divided into three rows, each with a red box around the checkboxes and dropdown menus:

- Row 1: K-Line TCO (dropdown), Discard Data (dropdown)
- Row 2: CAN Tacho read (dropdown), 250 (dropdown)
- Row 3: CAN2 FMS (dropdown), 250 (dropdown), Calc HRFC, Active, Discard FF values (dropdown)

Below these rows, there are several other settings:

- 1-Wire
- Filter by engine (Config button)
- Remember tachograph parameters when engine is OFF
- DIN3 mode: Positive mode (dropdown)
- DIN4 mode: Positive mode (dropdown)
- Digital outputs: DOUT1 Disabled (dropdown), DOUT2 Disabled (dropdown)
- Activation conditions (button)

At the bottom of the interface, there are buttons for 'Clear all IO', 'Enable common IO', and 'Enable IO'. The bottom bar shows 'Engine: Always on (dropdown)', 'GPS stationary navigation filtering: ', and 'IO events: Options 2.' (highlighted with a blue box).

3.4. FM-Tco4 HCV tachograph reading from the front interface.

This method is recommended for cases when you are using a tachograph version 1.3A or newer, and the tachograph is present in the [list of supported tachographs via front interface](#). This connection method along with a different configuration allows reading Tachograph .ddd files and current tachograph (TCO) parameters from the front interface of the tachograph.

Note

This connection method is valid for VDO Tachographs, versions 1.3A and newer. For this method, the front interface should be activated using the VDO unlock card (an example of the card is shown below).

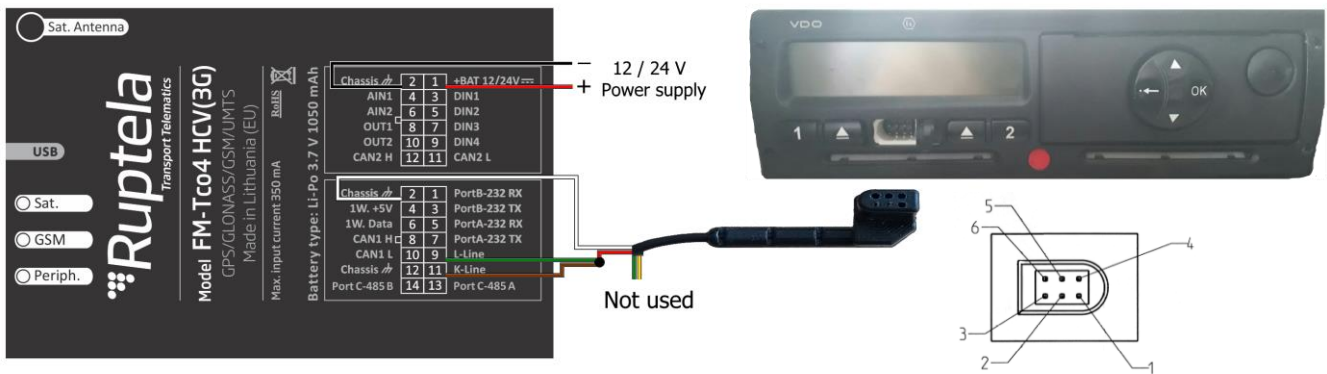
Before activation, all tachograph sockets must be free and not occupied by any driver, company, etc. card!

For the VDO unlock card please refer to your local VDO representative.

Please contact your responsible Ruptela sales manager for front tachograph connector.



The connection should be executed as shown below:



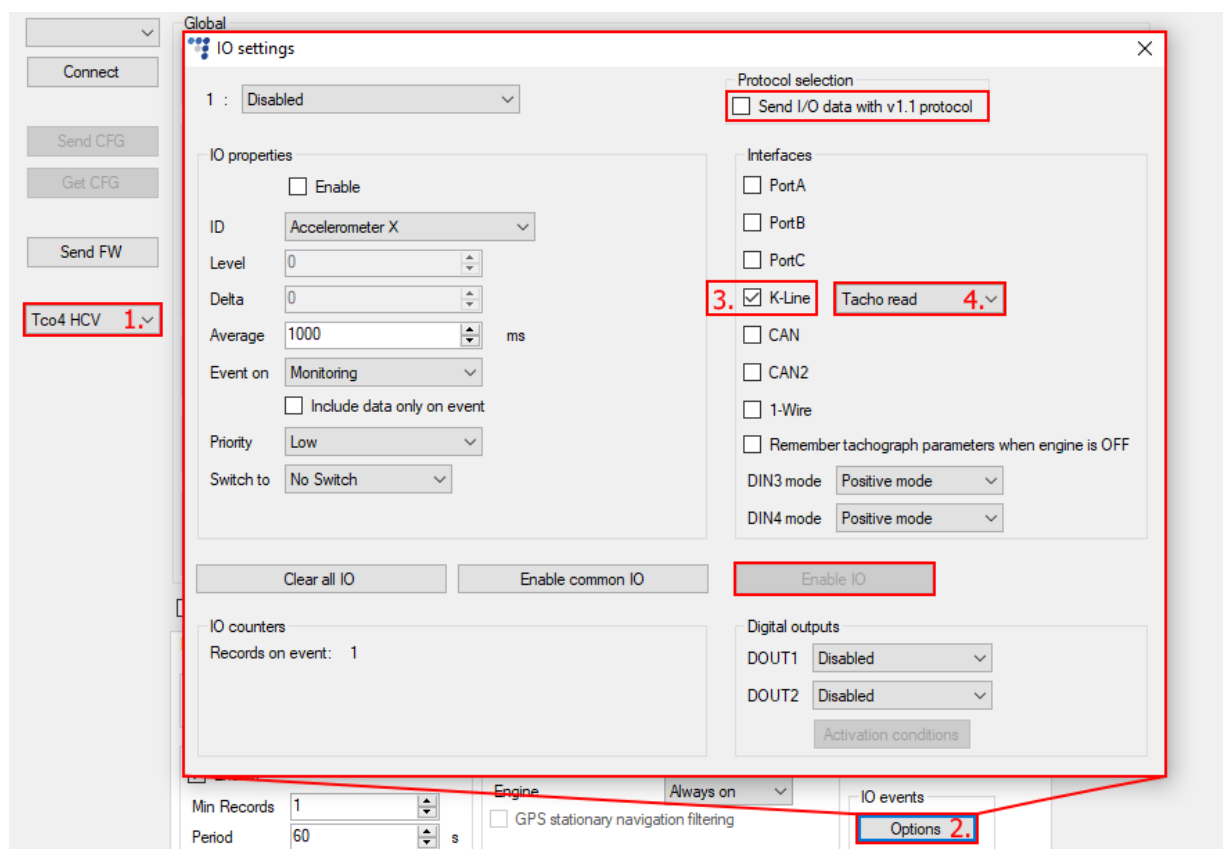
FM Device side	Tachograph front interface connector
Black – Chassis	Transparent – PIN 1*
Brown – K-Line + Green – L-line	Red – PIN 2*
Not used	Green – PIN 4
Not used	Yellow – PIN 5

*Please note that the wire colors coming from the connector may differ depending on the manufacturer.

Configuration

1. In the main configurator window drop-down list choose *Tco4 HCV*.
2. Click the **Options** button in **IO events**.
3. Tick the **K-Line** check box.
4. In the drop-down list on the right choose **Tacho read**.

Once all the steps are complete, in order to receive current tachograph (TCO) parameters, please do not forget to enable the required IO parameters. This can be done by first enabling **Protocol v1.1**, and afterwards clicking the **Enable IO** button in the **IO settings** window.



3.5. Status check via SMS commands

You can use SMS commands to check the connection state.

Message format: [PASSWORD] <space> [COMMAND]

[COMMAND] is "tacho". (example without password: "<space>tacho")

Note

Quotation marks "" and brackets [], <> are used only for explanatory purposes. Do not include them in the SMS, only the text should be included.

Possible SMS responses:

- 0 – tachograph not responding
- 1 – OK
- 2 – the tacho reading interface is not configured in the FM device.
- 4 – tacho reading is pending, state check is impossible.
- 5 – the connection is good, but there is no communication.

If the connection was performed correctly, you should receive a "tacho:1" response.

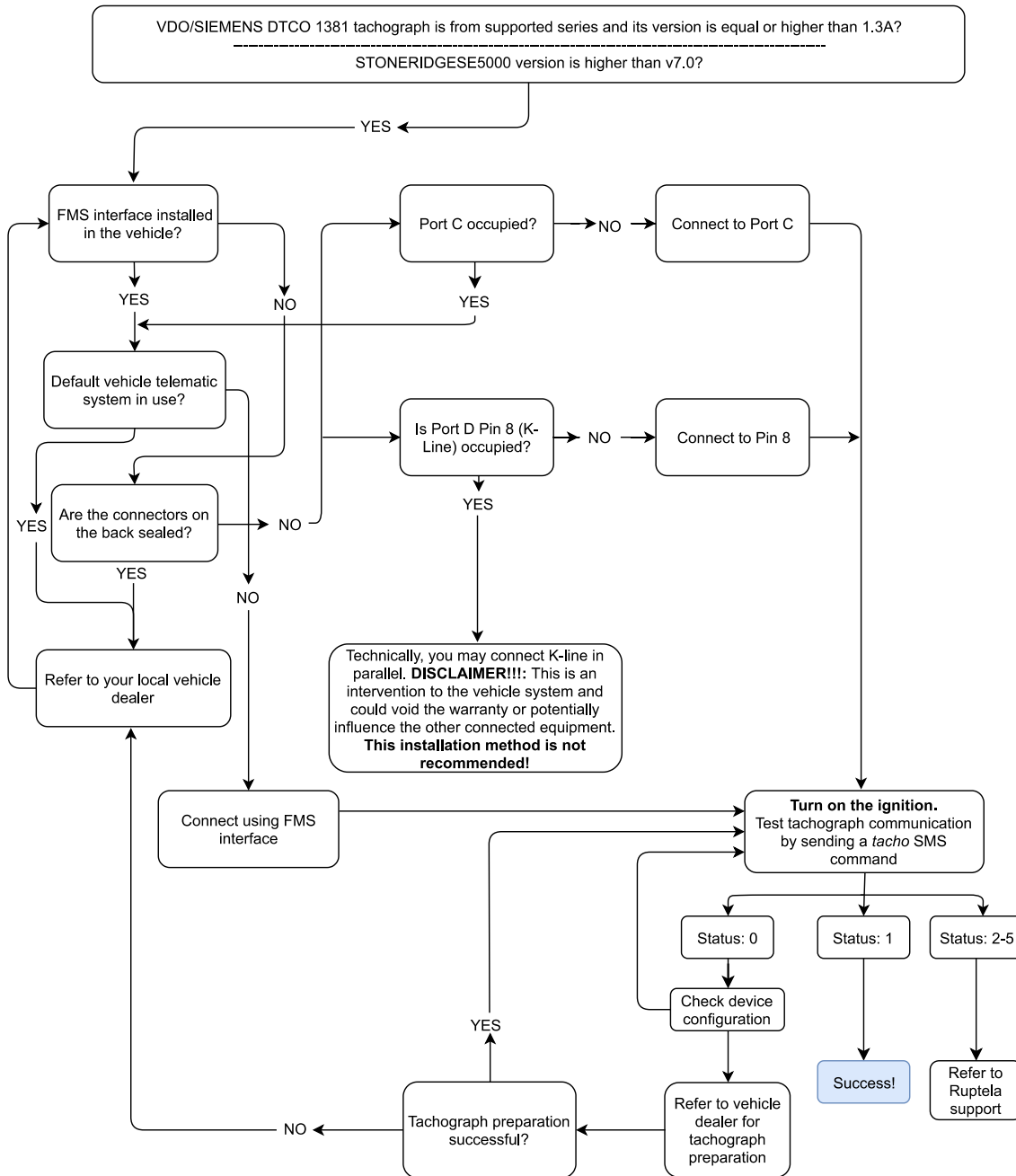


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3.6. Workflow summary

This is a summary of steps that were previously described in detail. We recommend using our [tacho harness](#) for the installation.



***Default Telematics Systems:**

1. Mercedes Benz – “FleetBoard”
2. Scania – “Scania Communicator”
3. Volvo – “Dynafleet”
4. Renault – “Optifleet Drive”
5. Iveco – “Ivecoconnect”
6. MAN – “MAN Telematics”
7. DAF – “DAF Telematics”

**In case you are not sure, whether a default Telematics System is used, please refer to your truck dealer.

4. Tachograph IO parameters from different sources

Various tachograph related IO parameters can be obtained from three different sources. In each case the FM device has to be configured accordingly. From the FM device's perspective these sources are:

- FMS – From the tachograph through a FMS CAN line to the FM device.
- Tacho read – Directly from the tachograph through a CAN line to the FM device.
- K-line - Directly from the tachograph through the K-line to the FM device.

Here we are interested in three IO parameter groups. Each group can be easily distinguished by its name:

- TCO any_name – (i.e. TCO first driver ID, TCO first driver state, TCO second driver ID etc.)
- CAN any_name – (i.e. CAN first driver ID, CAN tacho driver 1 card, CAN second driver ID etc.)
- CAN_TCO any_name – (i.e. TCO_CAN total driving time, TCO_CAN current activity duration etc.)

Some parameters can be obtained from few different sources, other can be obtained only from a single source. These cases are discussed below.

TCO any_name

IO parameters from this group can be obtained from all data sources: FMS, Tacho read, K-line. However, each source has its own priority. These priorities are arranged as follows:

1. K-line – highest priority. If K-line is properly configured on the FM device, then data for "TCO any_name" IO parameters will be gathered from this source.
2. Tacho read – intermediate priority. If K-line is not available, data will be gathered from this source.
3. FMS – lowest priority. If both K-line and Tacho read are not available, data will be gathered from this source.

The priorities matter when the FM device is configured to read data from several of these sources. For example, when the FM device's configuration is similar to one of these cases:

- K-Line: TCO, CAN: FMS, CAN2 Tacho read. Data for "TCO any_name" IO parameters will be gathered from K-line.

The screenshot shows a configuration window for TCO parameters. On the left, there are fields for Delta (0), Average (1000 ms), and Event on (Monitoring). On the right, there are three source configuration rows, each with a checked checkbox, a source name, a dropdown menu, and a value field (250). The first row is K-Line with TCO selected. The second row is CAN with FMS selected. The third row is CAN2 with Tacho read selected. There are also checkboxes for Calc HRFC and Active, and a Discard FF values dropdown.

- CAN Tacho read, CAN2: FMS. Since K-line is not available, the second highest priority belongs to Tacho read. Data for "TCO any_name" IO parameters will be gathered from there.

The screenshot shows a configuration window for TCO parameters. On the left, there are fields for Delta (0), Average (1000 ms), and Event on (Monitoring). On the right, there are three source configuration rows. The first row (K-Line) is unchecked. The second row (CAN) is checked with Tacho read selected. The third row (CAN2) is checked with FMS selected. There are also checkboxes for Calc HRFC and Active, and a Discard FF values dropdown.

- CAN2: FMS. Data for "TCO any_name" IO parameters will be gathered from FMS.

The screenshot shows a configuration window for TCO parameters. On the left, there are fields for Delta (0), Average (1000 ms), and Event on (Monitoring). On the right, there are three source configuration rows. The first row (K-Line) is unchecked. The second row (CAN) is checked with FMS selected. The third row (CAN2) is unchecked. There are also checkboxes for Calc HRFC and Active, and a Discard FF values dropdown.

CAN_TCO any_name

IO parameters from this group can be obtained only from a CAN data source: FMS or Tacho. Each source has its own priority. The priorities are arranged as follows:

1. Tacho read – highest priority. If Tacho read is properly configured on the FM device, then data for "TCO_CAN any_name" IO parameters will be gathered from this source.
2. FMS – lowest priority. If Tacho read is not configured, data will be gathered from this source.

CAN any_name

IO parameters from this group can be obtained only from CAN FMS data source.

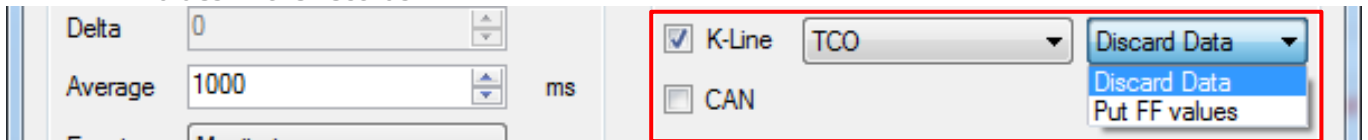
It is possible that parameters from all three groups are configured. Then, everything depends on the FM device's interface configuration. If all three sources are configured, "TCO any_name" IO parameters will be gathered from K-Line, "TCO_CAN any_name" will be gathered from the CAN interface set to Tacho read, "CAN any_name" will be obtained from the CAN interface set to FMS.

If some source is not configured, then parameters from different groups will be gathered according to their priorities.

4.1. Tachograph IO parameters filtering

When K-Line interface in FM device configuration is set to *TCO*, there is an option to filter data:

- *Discard data* – the default option. If data packets from the tachograph have invalid CRC values, the device will discard these packets. In this case, new records contain will previously obtained K-Line data (from data packets that had a good CRC value).
- *Put FF values* – if data packets from the tachograph have invalid CRC values, the device will put FF values in the records.



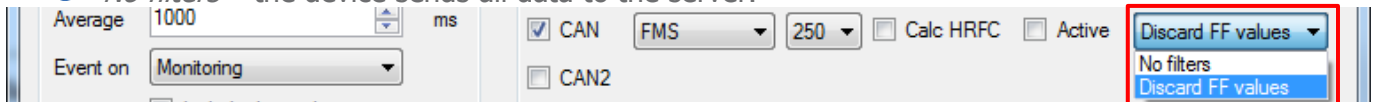
A similar option is available for CAN interfaces set to *FMS* mode:

- *Discard FF values* – default option. The device sends only valid data (according to the SAE J1939 standard) to the server. It discards FMS data packets with FF values. In this case, new records contain previously obtained FMS parameter values (from valid data packets).

Note

Filter is applied only to the following FMS parameters: *Engine total fuel used, High resolution total fuel used, Engine speed, Wheel based speed, Trailer weight, Cargo weight.*

- *No filters* – the device sends all data to the server.



Remember tachograph parameters when the engine is OFF

Problems might arise with driver working time calculations, when FMS gateway and digital tachograph switch to sleep mode and are not providing driver ID, working state and other driver related data.

When enabled, this functionality allows the FM device to keep the last known driver related IO parameter values when the engine is OFF and there is no communication with the digital tachograph.

This feature affects the following IO parameter values:

TCO first driver ID 1, TCO first driver ID 2, TCO second driver ID 1, TCO second driver ID 2, TCO first driver state, TCO second driver state, TCO first driver card, TCO second driver card.

Note

In certain cases this feature might cause errors in "Time analysis" calculations i.e. when the driver changes his status or removes the card from the tachograph while the engine is OFF and there is no communication with the tachograph. In such cases the device would provide wrong data in mentioned IO parameters.

The screenshot shows a configuration interface with the following elements:

- Event on: Monitoring (dropdown)
- Include data only on event:
- Priority: Low (dropdown)
- Switch to: No Switch (dropdown)
- CAN2: FMS (dropdown), 250 (dropdown)
- Calc HRFC
- Active
- Discard FF values (dropdown)
- 1-Wire
- Filter by engine: Config (button)
- Remember tachograph parameters when engine is OFF (highlighted with a red box)




5. Tachograph file download

The Tachograph Desktop App together with TrustTrack Web application is a specialized solution, which enables the user to automatically download *ddd files from the tachograph. Both applications are designed to work together to achieve the best performance.

Once deployed on the user's PC, the Desktop application creates a channel for the DCS to communicate with the company cards.

You can download the Tachograph Desktop App from our documentation website:
<https://doc.ruptela.it/display/AB/Automatic+DDD+file+download>

The Tachograph App application doesn't require installation. Once you have the "tacho" archive file (i.e. Zip or WinRAR) simply extract it to a desired location. Then do the following:

- Connect your card to the card reader.
- Connect your card reader (with the card in it) to the USB port of your PC.
- Double click the application icon  to launch it.
- The app needs to be configured before you can begin using it. More information is available in the user manuals at <https://doc.ruptela.it/display/AB/Automatic+DDD+file+download>.

All TrustTrack web users who have access to the tachograph module are able to request files from tachographs and create scheduled requests. Log in to your TrustTrack web user account and follow the steps described here: <http://www.fmsdocumentation.com/tachograph-module/>.

Note

After a DDD file was downloaded from the tachograph, the last download of the file is not always properly marked in driver cards. When the tachograph is read over the air, the tachograph should leave this mark, however whether it does so or not depends solely on its construction and configuration.

You can find detailed explanation for the tachograph file download at our Trust Track system's web help section at <http://www.fmsdocumentation.com/tachograph-module/> and in User Manuals at <https://doc.ruptela.it/display/AB/Automatic+DDD+file+download>.

Give your feedback - contact us now!

In case you find this guide confusing or you have some extra questions, suggestions, comments etc. please feel free to contact our Technical Support Team via email: support@ruptela.com

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6. Appendix A: List of supported tachographs via front interface

This is the list of supported Siemens VDO 1381 series tachographs that can be read **ONLY** from the front interface.

Supported VDO tachograph versions

Serial number	Vehicle manufacturer	Version	Serial number	Vehicle manufacturer	Version
1381-0090200001	Fendt	1.3a	1381-0111409004	Nissan / Renault	2.0
1381-0090200002	Fendt	1.4	1381-0111409005	Nissan / Renault	2.0
1381-0111000001	Fiat	1.4	1381-0101009004	Nissan / Renault	2.1
1381-0070300011	Ford	1.3a	1381-0111409010	Nissan / Renault	2.1
1381-0070300012	Ford	1.3a	1381-0111409011	Nissan / Renault	2.1
1381-0070300017	Ford	1.4	1381-0111400006	Renault-Nis./GM	1.3a
1381-0070300018	Ford	1.4	1381-0111400008	Renault-Nis./GM	1.4
1381-0070309004	Ford	2.0	1381-2052300012	Renault Trucks	1.3a
1381-0070309003	Ford	2.0	1381-2052300014	Renault Trucks	1.3a
1381-0250309003	Ford	2.0	1381-1052300013	Renault Trucks	1.3a
1381-0250309006	Ford	2.1	1381-2052300022	Renault Trucks	1.4
1381-0051000005	Isuzu	1.3a	1381-2052300023	Renault Trucks	1.4
1381-0050200001	Isuzu	1.4	1381-1052300021	Renault Trucks	1.4
1381-0071000007	Iveco	1.3a	1381-1070000050	Tatra	1.3a
1381-0071000008	Iveco	1.4	1381-1070000058	Tatra	1.4
1381-1011000003	KMW	1.3a	1381-1050100017	VDL Bus	1.3a
1381-0010000023	Mercedes-Benz	1.3a	1381-0051000005	VDO	1.3a
1381-1070000044	Mercedes-Benz	1.3a	1381-0050200001	VDO	1.4
1381-1070000045	Mercedes-Benz	1.3a	1381-2012000010	Volvo	1.3a
1381-0010000027	Mercedes-Benz	1.4	1381-2012000012	Volvo	1.3a
1381-1070000055	Mercedes-Benz	1.4	1381-1012000011	Volvo	1.3a
1381-0010009003	Mercedes-Benz	2.0	1381-2012000018	Volvo	1.4
1381-0010009004	Mercedes-Benz	2.0	1381-2012000019	Volvo	1.4
1381-0010009009	Mercedes-Benz	2.1	1381-1012000018	Volvo	1.4
1381-0070100005	Mitsubishi	1.3a	1381-0121000008	VW	1.3a
1381-1070100028	Mitsubishi	1.3a	1381-0120000019	VW	1.4
1381-0070100007	Mitsubishi	1.4	1381-0121000014	VW	1.4
1381-1070100040	Mitsubishi	1.4	1381-0121000015	VW	1.4
1381-0070109002	Mitsubishi	2.0	1381-0121009002	VW	2.0
1381-1070109005	Mitsubishi	2.0	1381-0120009003	VW	2.0
1381-0070109003	Mitsubishi	2.1	1381-0121009003	VW	2.0
1381-1070109011	Mitsubishi	2.1	1381-0121009009	VW	2.1
1381-1081000012	Nissan	1.3a	1381-0120000012	VW	1.3a
1381-1081000013	Nissan	1.3a	1381-0121000007	VW	1.3a
1381-1081000014	Nissan	1.3a			
1381-1081000016	Nissan	1.4			
1381-1101009001	Nissan	2.0			
1381-0081000008	Nissan / Renault	1.3a			
1381-0081000009	Nissan / Renault	1.3a			
1381-0081000011	Nissan / Renault	1.4			
1381-0101009001	Nissan / Renault	2.0			
1381-0101009002	Nissan / Renault	2.0			



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7. Appendix B: Unsupported tachograph list

This is the list of **UNSUPPORTED** Siemens VDO 1381 series tachographs. If your tachograph's series is not in the list, then the data can be read from tachograph.

Unsupported VDO tachograph versions

Serial number	Vehicle manufacturer	Version	Serial number	Vehicle manufacturer	Version
1381-1051000005	Alexander Dennis	1.0	1381-0071000002	Iveco	1.0
1381-1051000006	Alexander Dennis	1.2	1381-0071000003	Iveco	1.0
1381-1051000008	Alexander Dennis	1.2a	1381-0111100002	Iveco	1.0
1381-2010000004	Autosan	1.0	1381-1072100002	Iveco	1.0
1381-2010000005	Autosan	1.2	1381-2072100004	Iveco	1.2
1381-2010000006	Autosan	1.2a	1381-2072100005	Iveco	1.2
1381-2050100001	DAF	1.0	1381-0071000005	Iveco	1.2
1381-1050100001	DAF	1.0	1381-0111100004	Iveco	1.2
1381-2050100007	DAF	1.2	1381-0111100005	Iveco	1.2
1381-2051100001	DAF	1.2	1381-1072100003	Iveco	1.2
1381-1051100001	DAF	1.2	1381-1072100004	Iveco	1.2
1381-1050100009	DAF	1.2	1381-2072100006	Iveco	1.2a
1381-2051100003	DAF	1.2a	1381-2072100007	Iveco	1.2a
1381-1051100003	DAF	1.2a	1381-0071000006	Iveco	1.2a
1381-1010100005	Dennis Eagle	1.0	1381-0111100006	Iveco	1.2a
1381-1010100006	Dennis Eagle	1.2	1381-0111100008	Iveco	1.2a
1381-1010100007	Dennis Eagle	1.2a	1381-1072100006	Iveco	1.2a
1381-1070100002	EvoBus	1.0	1381-1072100007	Iveco	1.2a
1381-1070100003	EvoBus	1.0	1381-2050000019	Man	1.0
1381-1070100010	EvoBus	1.2	1381-1050000007	Man	1.0
1381-1070100011	EvoBus	1.2	1381-2050000023	Man	1.2
1381-1070100012	EvoBus	1.2	1381-1050000008	Man	1.2
1381-1070100001	EvoBus	1.2	1381-2050000027	Man	1.2a
1381-1070100014	EvoBus	1.2a	1381-1050000012	Man	1.2a
1381-1070100018	EvoBus	1.2a	1381-2070000039	Mercedes-Benz	1.0
1381-1070100023	EvoBus	1.2a	1381-0010000009	Mercedes-Benz	1.0
1381-0070300001	Ford	1.0	1381-0010000010	Mercedes-Benz	1.0
1381-0070300002	Ford	1.0	1381-0010000011	Mercedes-Benz	1.0
1381-0070300004	Ford	1.0	1381-1070000007	Mercedes-Benz	1.0
1381-0070300005	Ford	1.2	1381-1070000008	Mercedes-Benz	1.0
1381-0070300006	Ford	1.2a	1381-2070000046	Mercedes-Benz	1.2
1381-0070300009	Ford	1.2a	1381-0010000012	Mercedes-Benz	1.2
1381-0070300010	Ford	1.2a	1381-0010000014	Mercedes-Benz	1.2
1381-1060000003	HINO	1.0	1381-0010000017	Mercedes-Benz	1.2
1381-1060000005	HINO	1.2	1381-1070000024	Mercedes-Benz	1.2
1381-1060000006	HINO	1.2a	1381-1070000025	Mercedes-Benz	1.2
1381-1060000007	HINO	1.2a	1381-1070000038	Mercedes-Benz	1.2
1381-0051000001	Isuzu	1.0	1381-2070000051	Mercedes-Benz	1.2a
1381-1051000001	Isuzu	1.0	1381-0010000018	Mercedes-Benz	1.2a
1381-0051000003	Isuzu	1.2	1381-0010000020	Mercedes-Benz	1.2a
1381-1051000004	Isuzu	1.2	1381-0010000022	Mercedes-Benz	1.2a
1381-0051000004	Isuzu	1.2a	1381-1070000034	Mercedes-Benz	1.2a
1381-1051000007	Isuzu	1.2a	1381-1070000040	Mercedes-Benz	1.2a
1381-2072100002	Iveco	1.0	1381-1070000041	Mercedes-Benz	1.2a



Serial number	Vehicle manufacturer	Version	Serial number	Vehicle manufacturer	Version
1381-0070100001	Mitsubishi	1.0	1381-1070000030	Temsa	1.2a
1381-1070100006	Mitsubishi	1.0	1381-1070000010	Van Hool	1.0
1381-0070100002	Mitsubishi	1.2	1381-1070000020	Van Hool	1.2
1381-1070100017	Mitsubishi	1.2	1381-1070000031	Van Hool	1.2a
1381-0070100004	Mitsubishi	1.2a	1381-1050100003	VDL Bus	1.0
1381-1070100024	Mitsubishi	1.2a	1381-1050100005	VDL Bus	1.0
1381-1081000001	Nissan	1.0	1381-1050100006	VDL Bus	1.2
1381-1081000002	Nissan	1.0	1381-1050100008	VDL Bus	1.2
1381-1081000003	Nissan	1.2			
1381-1081000005	Nissan	1.2			
1381-1081000008	Nissan	1.2a			
1381-1081000009	Nissan	1.2a			
1381-0081000004	Nissan / Renault	1.0			
1381-0081000005	Nissan / Renault	1.2			
1381-0081000007	Nissan / Renault	1.2a			
1381-0111400001	Renault-Nis./GM	1.0			
1381-0111400003	Renault-Nis./GM	1.2			
1381-0111400005	Renault-Nis./GM	1.2a			
1381-2052300001	Renault Trucks	1.0			
1381-2052300002	Renault Trucks	1.0			
1381-1052300001	Renault Trucks	1.0			
1381-1052300002	Renault Trucks	1.0			
1381-2052300004	Renault Trucks	1.2			
1381-2052300005	Renault Trucks	1.2			
1381-1052300004	Renault Trucks	1.2			
1381-1052300005	Renault Trucks	1.2			
1381-2052300007	Renault Trucks	1.2a			
1381-2052300008	Renault Trucks	1.2a			
1381-1052300006	Renault Trucks	1.2a			
1381-1052300008	Renault Trucks	1.2a			
1381-1071300004	Scania	1.2a			
1381-1071400001	Scania	1.2a			
1381-1070100008	Solaris Bus	1.0			
1381-1070100015	Solaris Bus	1.2			
1381-1070100020	Solaris Bus	1.2a			
1381-1070000014	Solbus	1.0			
1381-1070000021	Solbus	1.2			
1381-1070000032	Solbus	1.2a			
1381-1070000013	Sor Libchavy	1.0			
1381-1070000027	Sor Libchavy	1.2			
1381-1070000037	Sor Libchavy	1.2a			
1381-1070000012	Tatra	1.0			
1381-1070000017	Tatra	1.2			
1381-1070000043	Tatra	1.2a			
1381-1070000011	Temsa	1.0			
1381-1070000019	Temsa	1.2			



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