

Workshop Manual

SE5000-8 Smart Tachograph



Important

The Stoneridge tachograph SE5000-8 has full type approval for use in the European union according with Commission Regulation (EU) 2016/799 of 18 March 2016 and other related legislatives.

The Approval Certificate number will be indicated on all Stoneridge tachograph.

The tachograph fulfils the requirements of UNECE regulation number 10, revision 05, in respect of electromagnetic compatibility.

Workshop Card

If a workshop card is lost, stolen or faulty, contact the responsible authority.

Note!

The workshop card is not allowed to be used by any unauthorised personnel.

Never store the workshop card together with the associated PIN code.

Tachograph Version

Smart Tachograph SE5000-8.

Type approval number: e5 0002

Internet Information

Further information about Stoneridge SE5000-8 Smart Tachograph and about Stoneridge Electronics Ltd can be found at:

www.stoneridgeelectronics.com

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Changes

Stoneridge Electronics reserves the right to introduce changes in design, equipment, and technical features at any time. You cannot, therefore, base any claims on the data, illustrations or descriptions in this Manual.

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Introduction

This manual is directed to workshop personnel performing installation, maintenance, periodic inspection and repair of the SE5000-8. It is mainly concerning the calibration mode of operation. However, knowledge of the operational mode of the unit is also required in case of driving a tachograph fitted vehicle for calibration or testing purposes.

For driver related information, please see the latest version of the Driver & Company Manual.

Repairs and Modifications

Note!

A tachograph case must never be opened. No tampering with or modifications to the tachograph system are permitted.

Unauthorized personnel that modify this equipment may be committing a punishable offence, depending on the legislation in the country.

In case of any exterior damage, the workshop must carry out an inspection on the unit to determine whether the tachograph still conforms to security requirements or not. If a tachograph does not pass an evaluation or is faulty, it must be returned to Stoneridge Electronics, unless another arrangement with Stoneridge is made.

Operation Safety

Risk of damage!

High-level transient voltage can cause permanent damage to tachograph electronic circuits. Similarly, failure of other electrical components on the vehicle, for example the alternator regulator, may result in damage to the tachograph, which is permanently connected to the battery. Any damage done to the tachograph in this way will result in the tachograph warranty being invalidated.

Disconnect the electrical supply to the tachograph if:

- Electrical welding is carried out on the vehicle.
- Prolonged boost starting is anticipated.

Workshop Functions and Equipment Requirements

A Stoneridge tachograph can be operated in one of four modes of operation:

- Operational (driver card or no card inserted)
- Control (control card inserted)
- Calibration (workshop card inserted)
- Company (company card inserted)

A tachograph workshop will be involved in a number of different functions associated with smart tachograph systems. For example installation, activation, calibration and inspection.

A variety of equipment will be required to carry out the above-mentioned workshop functions. Essential to most of the workshop functions carried out is the workshop card. Due to the security implications of smart tachograph systems, all workshop cards use a PIN code for authentication.

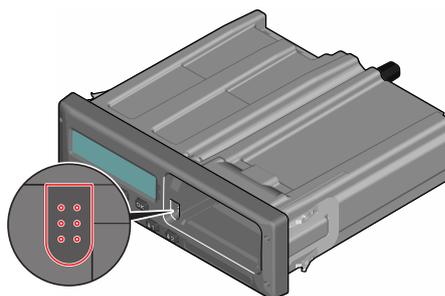
A workshop card is a tachograph card issued by the authorities of a Member State to designated staff of a tachograph manufacturer, a fitter, a vehicle manufacturer or a workshop, approved by that Member State, which identifies the cardholder and allows for the testing, calibration and activation of tachographs, and/or downloading from them.

With a validated workshop card it is possible to enter the tachograph calibration mode. Also, unrestricted data downloading of the entire tachograph data memory contents is possible with an authenticated workshop card inserted. Cards are obtained by a workshop via application to the relevant authorities.

Other equipment required will include an approved method and equipment to read and set calibration data and other parameters. A tachograph programmer will be necessary for programming a tachograph with calibration data and tachograph specific parameters. Download equipment will be required for downloading tachograph data.

The SE5000-8 can program certain parameters without the need of calibration equipment.

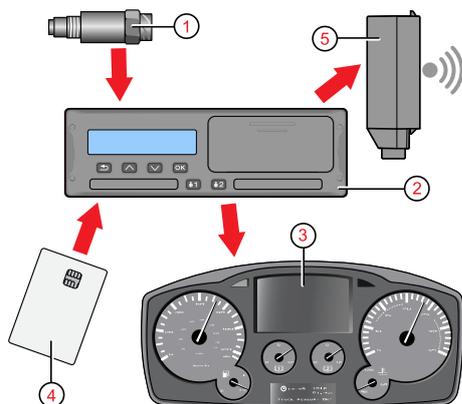
There is a 6-pin calibration/download connector located behind the paper cassette. Supported calibration/download equipment should be connected there when required.



It is also possible to program parameters via the CAN bus interface at the rear of the tachograph.

Overview

The Tachograph installation.



1. Encrypted motion sensor
2. Smart tachograph, with integrated display and printer
3. Display in vehicle's instrument cluster
4. Card
5. DSRC (Dedicated short-range communications)

Motion Sensor (1)

Used to provide the tachograph with speed signal pulses from the vehicle gearbox. To ensure the integrity of the speed sensor signal, the speed signal is transferred between the sensor and the tachograph in an encrypted form. Encrypting the speed signal ensures that any tampering with the signal will be detected and recorded.

Smart Tachograph (2)

The tachograph records and stores various data:

- Workshop or driver card data.
- Warnings and malfunctions relating to tachograph, driver, company and workshop.
- Vehicle information, odometer data and detailed speed.
- Tampering the tachograph. For more information on the tachograph, see the Driver & Company Manual.

Display in Instrument Cluster (3)

The display in the instrument cluster can be used to display information passed from the tachograph, such as speed (speedometer) and distance travelled (trip and odometer).

Workshop or Driver Card (4)

A driver card is used to store driving data relating to the owner of the card.

Due to the security implications of smart tachograph systems, all workshop cards use a PIN code for authentication. A workshop card can also store driving data and be used to enter the tachograph calibration mode of operation.

When in calibration mode, a workshop card is additionally used to store tachograph calibration information. The workshop card can hold data for minimum 88 and maximum 255 calibrations and when the card is full the oldest data will be replaced with the newest. Remember to download data regularly. This will ensure that no calibration data stored on the card are lost.

Note!

The workshop card is personal and may not be used by anyone else but the rightful card holder.

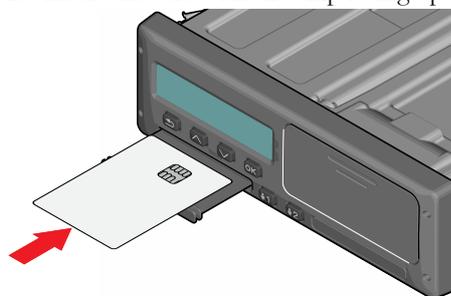
DSRC (5)

The DSRC, is a unit that is separate from the vehicle unit, and it is used to perform targeted roadside checks via microwave communication link.

Insert a Workshop Card

Insert the workshop card in either of the left or right card tray. The workshop card must be inserted in the tachograph in order to identify the workshop.

1. Press and hold the **1** button to open the driver card tray or the **2** button to open the co-driver card tray.
2. Insert the card with the chip facing upwards.



3. Close the tray by pushing it in carefully. The tachograph now processes the workshop card data.

Initial Procedure

When a valid workshop card has been inserted correctly, the name of the card holder will appear shortly afterwards (we use Mr. Smith in our card examples).

```

1 Welcome
Smith
  
```

Enter the PIN code associated with the card. The PIN can be entered by using the buttons on the tachograph or a Stoneridge Optimo2 Tachograph programmer.

The following explains how to enter the PIN code using the buttons.

4. Use the arrow button to select the correct digit. Confirm with **OK**. Repeat selecting and confirming as needed.

The PIN code can contain from 4 to 8 characters. Use the **Back** button to go back and change a digit. The card will be ejected if no PIN code is entered within 2 minutes.

5. Select the enter **↵** symbol to identify the end of the entered PIN code and then confirm the code by long-pressing the **OK** button.

Note!

If the wrong PIN is entered, a message will be displayed to indicate how many attempts there are left. Withdrawal of card after entering a wrong PIN code will not reset the PIN code counter.

When the correct PIN code has been entered and confirmed the last withdraw of the card will be shown in local time:

```
■→Last withdraw
15:23 23/12 2018
```

After a few seconds the first line of the display will change and show the local time difference from UTC (+ 1 hour in this case).

```
■→ UTC+01h00
07:53.24/12 2018
```

If the inserted card is unknown to the tachograph, drivers consent is requested to export personal data.

```
OK to exp
pers. data?
```

Select **YES** or **NO** and then press **OK** to confirm.

Then the display will ask.

```
Rest until
now?
```

6. Select **NO** and then press **OK** to confirm.

Then the display will ask.

```
Add manual
entries?
```

7. Select **NO** and then press **OK** to confirm.
8. Select and confirm your present country location.

And the question:

```
Entries
printouts?
```

9. Select **NO** and then press **OK** to confirm.

And the question:

```
Confirm
entries?
```

10. Select **YES** and then press **OK** to confirm.

The following display will now be shown and after that the Driver Standard Display.

```
Ready to
drive
```

Withdraw a Workshop Card

1. Press and hold the **1** button to open the driver card tray or the **2** button to open the co-driver card tray.
2. Select and confirm your present country location.
3. Remove the workshop card.
4. Close the tray by pushing it in carefully.

The card tray is locked when:

- The vehicle is in motion.
- While the tachograph is busy processing the card.
- If the power supply to the tachograph is interrupted.

Note!

If the workshop card authentication fails, see **Display Messages** on page 39 and look for:

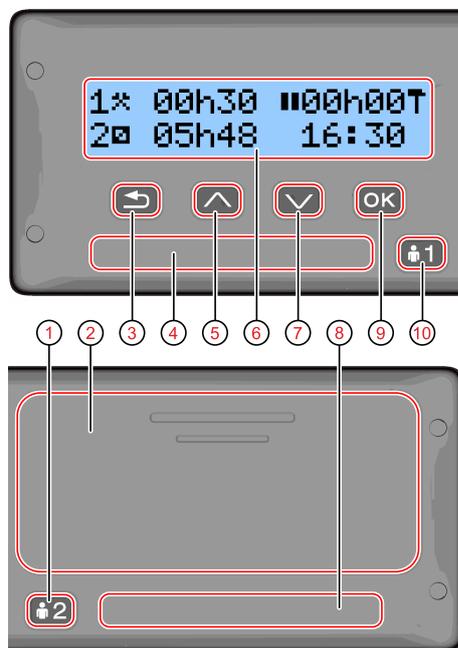
```
! Card 1
auth.failure
```

User Interface

The tachograph detailed within this manual comprises two card tray mechanisms, a printer, an LCD display, a calibration/download interface (6-pin connector located behind paper cassette) and user controls, located in an ISO standard radio enclosure. This type of enclosure enables mounting in a variety of locations, ensuring that insertion and removal of the driver cards and operation of the controls can be easily achieved by an operator.

The tachograph complies with EU Regulations and displays and records speed and distance in metric units (kilometres per hour and kilometres respectively).

The tachograph also incorporates an internal clock, which is used to indicate the current time on the tachograph display. The tachograph is available for use in both 12 and 24 V vehicle systems.



1. Co-driver button
2. Printer, 6-pin calibration/download connector, behind the paper cassette
3. Back button
4. Driver card tray
5. Up button
6. Display
7. Down button
8. Co-driver card tray
9. OK button
10. Driver button

Settings

You can change and use the following settings:

- Tachograph language
- Local time

- UTC time
- Invert display
- Drivers consent to export personal data
- Built-in test (Self test)
- Parameters
- Vehicle Registration Number (VRN)
- DDS Settings
- WTD Setting

Languages

The workshop card language is by default used in the tachograph and on the printouts. The language can be changed to any of the available languages in the tachograph.

Available Languages

When you insert your driver card the Tachograph automatically changes to the language on the card. But you can select any of the following languages.

Language	Language in English
Български	Bulgarian
Čeština	Czech
dansk	Danish
Deutsch	German
eesti	Estonian
Ελληνικά	Greek
English	English
español	Spanish
français	French
islenska	Icelandic
italiano	Italian
latviesu	Latvian
lietuviu	Lithuanian
magyar	Hungarian
Nederlands	Dutch
norsk	Norwegian
polski	Polish
português	Portuguese
română	Romanian
русский	Russian
slovenčina	Slovakian
slovenscina	Slovenian
suomi	Finnish
svenska	Swedish
shqip	Albanian
bosanski	Bosnian
hrvatski	Croatian
Македонски јаз	Macedonian
srpski	Serbian
Türkçe	Turkish
Україна	Ukraine

Change Parameters

The parameters menu is accessible in calibration, company, and non-activated mode.

Warning!

Changes in the parameter settings affect the tachograph and the vehicle system.

Make sure you know the configuration of the vehicle before any changes are made.

To change a parameter:

Press the **OK** button and select:

SETTINGS

Press the **OK** and select:

Parameters

Scroll through the parameters and use the arrow button to change the parameter settings.

Confirm the change with **OK**. The display will show:

Changes
saved

Press the **Back** button twice to return to the standard display.

The following parameters can be changed in calibration and non-activated mode.

Parameter	Selections	Effect on tachograph
Light source	Select between CAN, (Controller Area Network), A2 step or A2.	Input source for the display illumination.
CAN termination A4 and A8	Select "ON" or "OFF".	Controls termination resistor of TCO CAN.
Additional data recording	Select whether the additional data recording for vehicle speed, engine speed and D1/D2 status should be available "ON" or not "OFF".	ON = Enables the tachograph to record additional data. OFF = It is not possible to record additional data.
Output format D6	Set the hardware to ISO or to OC, (Open Collector).	D6 is used by the tachograph to drive an external speedometer.
Download CAN selection	Select the output channel for remote download, A-CAN or C-CAN.	Selects which channel the remote download function shall use.
Show download progress	Select whether or not to show a progress display when the tachograph is busy downloading.	If activated the download progress is shown in the display.
D8 data format	Select the serial output format to SRE standard or 2400 extended.	D8 is the serial data output. SRE standard = an extended serial data format. 2400 extended = the analogue tachograph original serial data format.
Default activity key ON	Select what activity to enter when the ignition is switched ON, Rest, Work, Available or No change.	Customer opportunity to make the driver duty automatically changed when the ignition is switched ON.
Default activity key OFF	Select what activity to enter when the ignition is switched OFF. Rest, Work, Available or No change.	Customer opportunity to make the driver duty automatically changed when the ignition is switched OFF.
Manual entries timeout	Select the timeout for manual entries to the tachograph - 1 or 20 minutes..	The manual entries will be closed when no interaction has been made for 1 or 20 minutes, depending on the settings. As default the timeout is 1 minute.

All parameters are also possible to configure through A-CAN, C-CAN or front side K-line.

Symbols

This is a list of the most frequently shown symbols on the display and on the printouts.

Symbol	Description
⊖	Function not available
1 □	Driver or slot
2 □	Co-driver or slot
▣	Card
▲	Eject
✂	Work
⊗	Driving/driver (mode of Operation)
⌂	Rest/break
⊞	Available
♠	Ferry / train crossing
OUT	Out of scope, -i.e. no activities time durations are calculated
•	Local time/location
▶	Start of daily work period
⌂	End of daily work period
	Break
→	From or to
▼	Printer, printout
℄	Paper
□	Display
⌘	Processing, please wait
⊗	Time, clock
UTC	UTC time
24h	Daily
	Weekly
	Two weeks
Σ	Total/summary
>	Speed
>>	Over speeding
×	Faults
!	Events
?	Pre-warning/question/unknown activity
T	Workshop
♠	Company
⊞	Controller
⊞	Manufacturer
⊞	Security
↓	External storage/download
⌘	Buttons
✓	Finished
⌘	Tachograph (VU), vehicle
♠	Tyre size
⊞	Sensor
⊞	Power supply
⌘	Print
⌘	Print, submenu
⊞	Company lock
⊞	Places
⊞	Places, sub menu

Symbol	Description
⌘	Settings
⊞	GNSS positioning facility
⊞	ITS interface
T	Remote communication facility (DSRC)

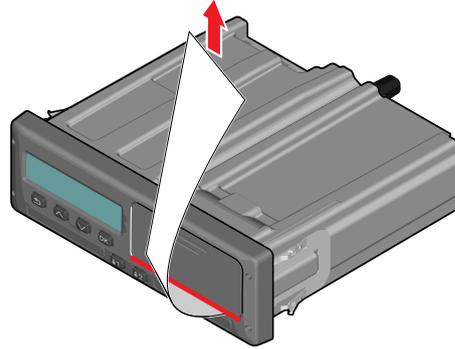
Symbol Combinations

The following combination of symbols are the most common.

Symbols	Description
•▶	Location start of daily work period
▶•	Location end of daily work period
⊗→	From time (UTC)
→⊗	To time (UTC)
•⊗	Local time
⊞⊞	Crew driving
⊞	Driving time for two weeks
OUT▶	Out of scope - begin
▶OUT	Out of scope - end
♠→	Ferry/train mode - begin
→♠	Ferry/train mode - end
⊞▶	Cumulative driving time of current day
↓⊞	Printer low temperature
↑⊞	Printer high temperature
▣--	No card
⊞▣	Driver card
T▣	Workshop card
♠▣	Company card
⊞▣	Control card
⊞•	Control place
⌘→	From vehicle
⊞⊞	Position after 3 hours accumulated driving time

Printouts

You can view the information stored in the tachograph and on the driver cards by printing it on paper or by showing it on the display. There are a number of different presentations available, which you can read more about in **Printout Examples below**



Printout Data

1. Press **OK** to show the menu and select:
`PRINT`
2. Press **OK** and select the type of printout to make.
Then press **OK**.

Some types of printouts require specification of the driver card and a date. If so the following is displayed:

`Select card 1 or 2`

3. Select **1** to make a printout for the current driver's card or **2** to make a printout for a co-driver's card.

Some printouts require selection of the file system generation (generation 2 cards has two file systems (gen 1 and gen 2). If so the following is displayed:

`Card gen 1 or 2`

4. If applicable, select card file system generation 1 or 2
5. Select the desired date by using the arrow buttons and press **OK**.
6. Now you select whether to view the data on the display only or to make a printout on paper.

- To view the data on the display only, select:

`display`

- Press **OK** and scroll through the data using the arrow buttons and then press **OK** to return.

- To make a printout on paper, select

`printer`

- Press **OK**. The display will show:

`Printer busy`

- If you would like to cancel the process, press and hold the **Back** button. Wait until the message is cleared and then pull the printout upwards to tear it off.

Note!

To avoid paper jam make sure the slot on the paper cassette is not blocked.

Printout Examples

On the following pages there are a number of printout examples that can be selected from the **PRINT** menu:

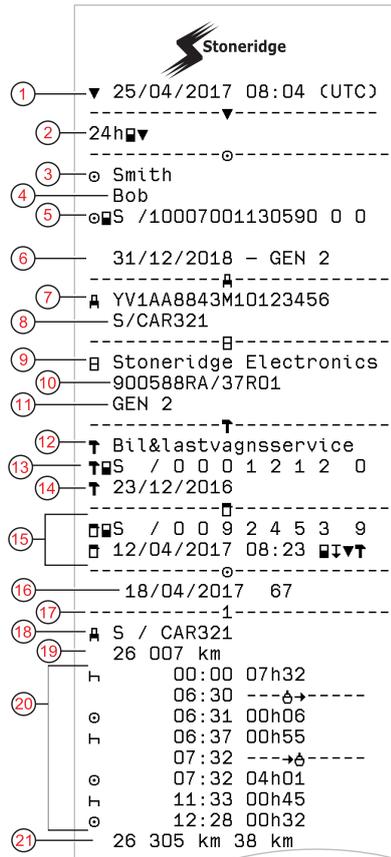
- Daily printout (card) `24h card` (including local time).
- Daily printout (VU) `24h vehicle` (including local time).
- Event and faults (card) `event card`.
- Event and faults (VU) `event vu`.
- Technical data `technical data`.
- Overspeeding `overspeeding`.
- Historic cards `historic cards`.

Daily Printout (card)

This printout lists all activities stored on the driver card (or co-driver card) for the selected date (legal requirement). UTC time is used.

The display shows the following (on the second line):

24h card



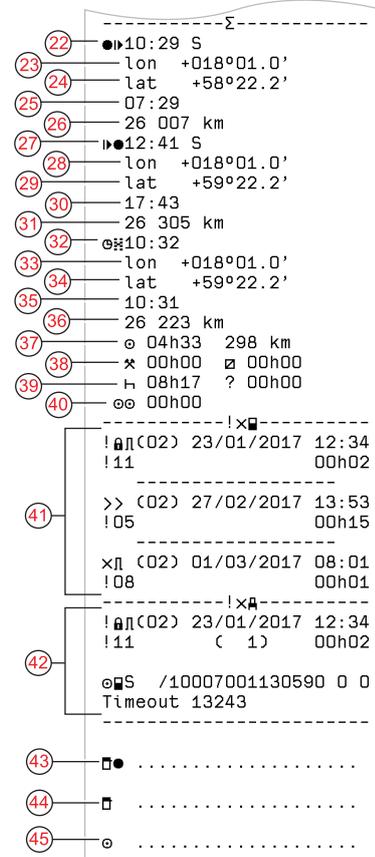
1. Printout date and time
2. Type of printout (24h, card)
3. Card holder's surname
4. Card holder's first name
5. Type of card, Country, and Card Identification.
6. Card expiration date and generation
7. Vehicle identification, VIN
8. Registering member state and Vehicle Registration Number, VRN
9. Tachograph manufacturer
10. Tachograph part number
11. Tachograph generation number
12. Responsible workshop for last calibration
13. Workshop card number
14. Date of last calibration
15. Last control the inspected driver has been subjected to
16. Enquiry date and daily card presence counter
17. Tray where card was inserted
18. VRN, Vehicle Registration Number, for the vehicle where the driver card was inserted
19. Vehicle odometer at card insertion
20. Activities with driver card inserted, start and duration time
21. Card withdrawal: Vehicle odometer and distance travelled since last insertion for which odometer is known

Daily Printout (card) continued

To make it easier to check the activities on the printout you can select local time instead of UTC. The printout contains in all other respect the same information.

Note!

The text **OUT OF REGULATION** indicates that this printout doesn't comply with any regulation.



22. Time and location at the start of daily period
23. Longitude at the start of daily period
24. Latitude at the start of daily period
25. Time of latest position from GNSS
26. Odometer at the start of daily period
27. Time and location at the end of daily period
28. Longitude at the end of daily period
29. Latitude at the end of daily period
30. Time of latest position from GNSS
31. Odometer at the end of daily period
32. Time after 3 hours of accumulated driving
33. Longitude after 3 hours of accumulated driving
34. Latitude after 3 hours of accumulated driving
35. Time of latest position from GNSS
36. Odometer after 3 hours of accumulated driving
37. Total driving duration and distance
38. Total duration of **work** and **available**
39. Total duration of **rest** and **unknown**
40. Total duration of crew activities
41. Events and faults from the driver card
42. Events and faults from the VU, vehicle unit
43. Control place
44. Controller's signature
45. Driver's signature

Daily Printout (VU) (1/3)

M=Manual entries of driver activities.

This printout lists all activities stored in the tachograph (VU) for the selected date (legal requirement). UTC time is used. The printout is dependent of the following:

- If no card is inserted, select either the current day or any of the eight previous calendar days.
- When a card is inserted, select any day stored in the tachograph, out of a maximum of typically the recent 28 days. If no data is available for the selected date, the printout will not be initiated.

The display shows the following (on the second line):

24h vehicle

Stoneridge

1 18/04/2017 08:08 (UTC)

2 24h

3 Smith

4 Bob

5 /10007001130590 0 0

6 31/12/2018 - GEN 2

7 YV1AA8843M10123456 S/CAR321

8 Stoneridge Electronics 900588RA/37R01 GEN 2

9 Btl&lastvagnsservice

10 T S / 0 0 0 1 2 1 2 0

11 T 15/12/2018

12 S / 0 0 9 2 4 5 3 9

13 06/02/2018 16:23

14 05/02/2018

102 075 - 102 809 km

Smith Bob

/10007001130590 0 0

31/12/2018 - GEN 2

S / CAR321

05/02/2018 17:49

102 075 km M

00:00 07h32

07:30 03h10

10:40 00h46

11:26 00h10

11:36 03h12

14:48 00h55

15:43 02h00

102 809 km 734 km

1. Printout date and time
2. Type of printout (24h, VU)
3. Card holder's surname
4. Card holder's first name
5. Card and country identification number
6. Card expiration date and generation
7. Activities stored in the VU per slot in chronological order
8. Enquiry date
9. Vehicle odometer at 00:00 and 24:00
10. Driver (slot 1)
11. Registration member state and vehicle registration number of previous vehicle used
12. Date and time of card withdrawal from previous vehicle
13. Vehicle odometer at card insertion
14. Activities with start and duration time

Daily Printout (VU) (2/3)

To make it easier to check the activities on the printout you can select local time instead of UTC. The printout contains in all other respect the same information.

Note!

The text OUT OF REGULATION indicates that this printout doesn't comply with any regulation.

Stoneridge

13/04/2017 08:04

** OUT OF REGULATION **

24h UTC+01h00

Smith Bob

/10007001130590 0 0

YV1AA8843M10123456 S/CAR321

Σ

15 10:30 S

16 lon +018°01.1'

17 lat +57°22.2'

18 10:30

19 102 075 km

20 10:32 S

21 lon +018°01.0'

22 lat +57°22.3'

23 10:32

24 102 076 km

25 10:30

26 lon +018°01.0'

27 lat +59°22.2'

28 10:29

29 102 365 km

30 14:26

lon +012°02.8'

lat +57°40.1'

14:26

102 635 km

31 08h22 734 km

32 00h10 00h00

33 01h45 ? 00h00

15. Periods without card in driver slot
16. Time and location at the start of daily period
17. Longitude at the start of daily period
18. Latitude at the start of daily period
19. Time of latest position from GNSS
20. Odometer on start of daily period
21. Time and location at the end of daily period
22. Longitude at the end of daily period
23. Latitude at the end of daily period
24. Time of latest position from GNSS
25. Odometer on end of daily period
26. Time after 3 hours of accumulated driving
27. Longitude after 3 hours of accumulated driving
28. Latitude after 3 hours of accumulated driving
29. Time of latest position from GNSS
30. Odometer after 3 hours of accumulated driving
31. Total driving duration and distance
32. Total duration of **work** and **available**
33. Total duration of **rest** and **unknown**

Daily Printout (VU) (3/3)

```

34 -----
35  Smith
36  Bob
37  S /10007001130590 0 0
38  10:30 S
39  lon +018°01.1'
40  lat +57°22.2'
41  07:29
42  102 075 km
43  10:32 S
44  lon +018°01.0'
45  lat +57°22.3'
46  10:32
47  102 076 km
48  13:31
49  lon +018°21.0'
50  lat +58°22.2'
51  13:31
52  102 289 km
53  03h30 270 km
54  * 00h31 00h00
55  00h00
56  00h00
57  !xA
58  ! (02) 28/01/2018 08:30
59  !11 ( 1) 00h23
60  S /10007001130590 0 0
-----
61  [ ] .....
62  [ ] .....
63  [ ] .....
64  [ ] .....
65  [ ] .....

```

- 34. Record identifier (VU daily summary per driver)
- 35. Driver surname
- 36. Driver's first name(s)
- 37. Driver's card identification
- 38. Time and location at the start of daily period
- 39. Longitude at the start of daily period
- 40. Latitude at the start of daily period
- 41. Time of latest position from GNSS
- 42. Odometer on start of daily period
- 43. Time and location at the end of daily period
- 44. Longitude at the end of daily period
- 45. Latitude at the end of daily period
- 46. Time of latest position from GNSS
- 47. Odometer on end of daily period
- 48. Time after 3 hours of accumulated driving
- 49. Longitude after 3 hours of accumulated driving
- 50. Latitude after 3 hours of accumulated driving
- 51. Time of latest position from GNSS
- 52. Odometer after 3 hours of accumulated driving
- 53. Total driving duration and distance
- 54. Total duration of **work** and **available**
- 55. Total duration of **rest** and **unknown**
- 56. Total duration of crew activities
- 57. Events and faults
- 58. Type, purpose, and start time of event
- 59. Additional code, repetitions that day, duration
- 60. Card identification
- 61. Control place
- 62. Controller signature
- 63. From time
- 64. To time
- 65. Driver signature

Events and Faults (card)

This printout lists all warnings and faults stored on the card (legal requirement). UTC time is used.

The display shows the following (on the second line):

event card

```

Stoneridge
1 18/04/2017 08:11 (UTC)
2 !x
3 Card file generation 2
4 Smith
5 Bob
6 S /10007001130590 0 0
7 31/12/2018 - GEN 2
8 YV1AA8843M10123456
9 S/CAR321
10 ! (00) 28/01/2018 08:53
!00 00h00
A S /CAR321
! (00) 29/01/2018 10:03
!00 00h32
A S /CAR321
11 x (00) 01/02/2018 09:00
X00 00h00
A S /CAR321
12 . . . . .
13 . . . . .
14 . . . . .
  
```

1. Date and time
2. Type of printout (event and faults, card)
3. Card file system (generation 1 or 2)
4. Card holder's surname
5. Card holder's first name
6. Card and country identification number
7. Card expiration date and generation
8. Vehicle identification number VIN
9. Registering member state and Vehicle Registration Number, VRN
10. List of all events stored on the card
11. List of all faults stored on the card
12. Control place
13. Controller's signature
14. Driver's signature

Events and Faults (VU)

This printout lists all warnings and faults stored in the tachograph or vehicle unit (legal requirement). UTC time is used.

The display shows the following (on the second line):

event vehicle

For a detailed list of all events and faults, see **Event, Fault and Diagnostic Trouble Codes** on page 47.

```

Stoneridge
1 06/02/2018 17:49 (UTC)
2 !xA
3 Smith
4 Bob
5 S /10007001130590 0 0
6 31/12/2018 - GEN 2
7 YV1AA8843M10123456
8 S/CAR321
9 ! (00) 28/01/2018 08:30
!04 ( 1) 00h23
!05 ( 1) 00h00
A S /10007001130590 0 0
! (00) 29/01/2018 10:03
!09 ( 2) 00h32
>> (00) 30/01/2018 10:23
!07 ( 1) 00h13
S /10007001130590 0 0
>> (00) 05/02/2018 11:08
!07 ( 1) 00h20
S /10007001130590 0 0
11 x (00) 01/02/2018 09:00
12 x40 ( 1) 00h00
13 S /10007001130590 0 0
14 . . . . .
15 . . . . .
16 . . . . .
  
```

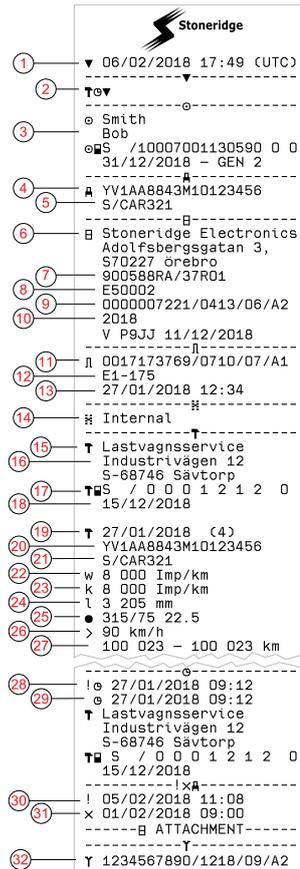
1. Date and time of the printout
2. Type of printout (events and faults, VU)
3. Card holder
4. Card identification
5. Card expiration date and generation
6. Vehicle Identification Number (VIN)
7. Registering member state and Vehicle Registration Number, VRN
8. Type, purpose, and start time of event
9. Additional code, number of similar events, and duration of event
10. Card identification
11. Type, purpose, and start time of fault
12. Additional code, number of similar faults, and duration of fault
13. Card identification
14. Control place
15. Controller signature
16. Driver signature

Technical Data

This printout list data as speed settings, tyre size, calibration data and time of adjustments.

The display shows the following (on the second line):

technical data



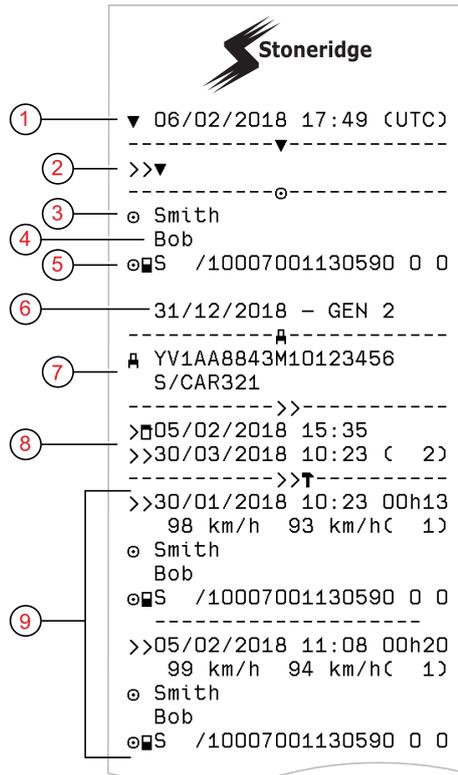
1. Date and time
2. Type of printout (technical data)
3. Cardholder ID
4. Vehicle Identification Number (VIN)
5. Registering member state and Vehicle Registration Number, VRN
6. Tachograph manufacturer
7. Tachograph part number
8. Tachograph approval number
9. Tachograph serial number, type of equipment and code of manufacturer
10. Year of manufacture and software version and installation date
11. Motion sensor serial number
12. Motion sensor approval number
13. Date and time of motion sensor pairing (The last 20 pairings will be stored)
14. GNSS coupling data
15. Workshop performing the last calibration
16. Workshop address
17. Workshop card identification
18. Workshop card expiry date
19. Calibration date and purpose
20. VIN
21. VRN and country of registration
22. Characteristic coefficient of vehicle
23. Constant of the recording equipment
24. Effective circumference of wheel tyres
25. Vehicle tyre size
26. Speed limiting device setting
27. Old and new odometer values
28. Old date and time (Before time adjustment)
29. New date and time (After time adjustment)
30. Most recent event date and time
31. Most recent fault date and time
32. DSRC serial number

Overspeeding

This printout lists overspeeding events together with duration and the name of the driver.

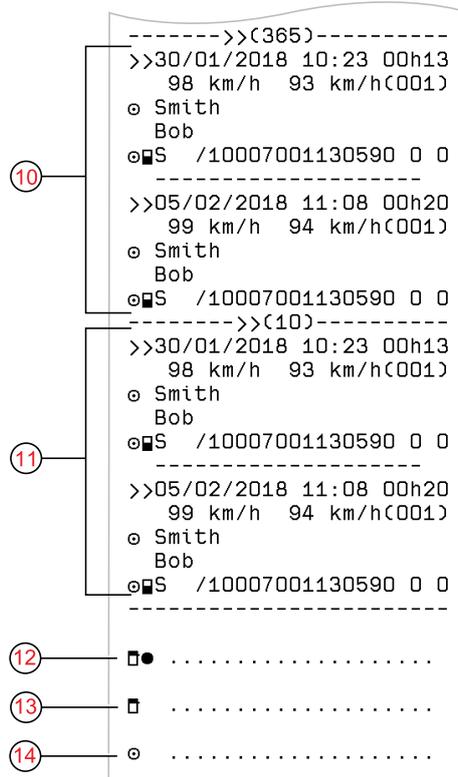
The display shows the following (on the second line):

overspeeding



1. Date and time.
2. Type of printout. (overspeeding). Speed limiting device setting.
3. Card holder's surname.
4. Card holder's first name.
5. Card and country identification number.
6. Expiry date of the driver card.
7. Vehicle identification. VIN, registering member state and VRN.
8. Date and time of the last overspeeding control.
9. Date and time of first overspeeding and number of over speeding events since the last over speeding control. First overspeeding after the last calibration. Date time and duration. Max and average speed. Driver and drivers card identification.

Overspeeding continued



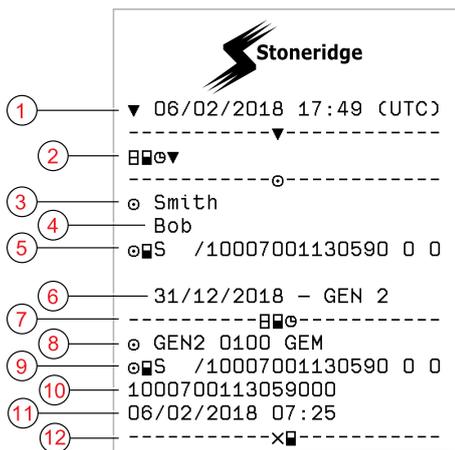
10. Five most serious overspeeding over the last 365 days. Date time and duration. Max and average speed. Driver and drivers card identification.
11. Most serious overspeeding events over the last ten days. Date time and duration. Max and average speed. Driver and drivers card identification.
12. Control place.
13. Controller's signature.
14. Driver's signature.

Historic Cards

This printout lists the history of cards used in the Tachograph.

The display shows the following (on the second line):

historic cards



1. Date and time
2. Type of printout: History of inserted cards
3. Card holder's surname
4. Card holder's first name
5. Card and country identification number
6. Expiration date and generation of the driver card
7. Cards insertion section
8. Type of card, generation, version, manufacturer
9. Card identification
10. Card serial number
11. Date and time of last card insertion
12. Faults from card section

Installation

A complete installation contains the following:

- Fitting the motion sensor and the sensor cable.
- Fitting the DSRC unit and cable.
- Making mandatory electrical power and required signal connections.
- Mounting the tachograph.
- Activating pairing with motion sensor.
- Calibrating and programming the tachograph.
- Sealing the tachograph system.
- Completing and fitting an installation plaque.

Note!

Before the vehicle is allowed to be taken into operation on roads covered by EU legislation, the entire installation procedure must have been carried out. Although in case of installation of a replacement unit, only certain parts of the installation procedure might be required.

If vehicle registration number (VRN) is not entered during the first installation, it has to be entered by the vehicle owner before use. See the Driver & Company manual for further information.

Checking before Installation

Prior to the tachograph installation it must be verified that the tachograph about to be installed is a genuine Stoneridge Electronics tachograph. To do that ensure the following:

- The tachograph unit marking must show the correct Stoneridge tachograph type approval number.
- The tamper label must be intact and not interfered with. The tamper label which has 2 different appearances, see **Inspecting Procedure** on page 32.
- The Stoneridge hologram must be present and correct. The hologram is located on the tamper label behind the paper cassette, see **Inspecting Procedure** on page 32.
- It must be ensured that there is no damage i.e. drill-holes in the exterior casing of the tachograph.
- Any evidence of tampering with the tachograph seals and labels should be checked for.
- Any evidence of additional seals or labels should be checked for as they might cover drill-holes.
- Check that the heat seal is present. The heat seal is on the top of the tachograph.

Note!

The tachograph package must not have been tampered with before delivery and the content of the package should be confirmed with Stoneridge Electronics.

Fitting a Tachograph in a Vehicle

Power, motion sensor and associated signal connections must be prepared prior to installation.

Motion Sensor

The motion sensor must be a Stoneridge approved type of smart tachograph sensor and fitted to the vehicle gearbox.

Note!

See the manufacturer's installation instructions for more information about the motion sensor.

A Stoneridge smart tachograph only works with a Stoneridge approved motion sensor.

Sensor Cable

If a motion sensor of the correct type is fitted the sensor cable can be connected.

Stoneridge sensor cables are available in various lengths to suit different types of vehicles. When fitting a sensor cable, the cable assembly must be laid into the vehicle in adequate length, bearing in mind the following criteria:

- Wherever possible, the cable must be routed alongside other cables to avoid the risk of damage.
- Avoid loose connections, which may catch or drag.
- Do not clip or tie the cable to any moving parts.
- Ensure the possibility of removing the tachograph from the panel with the sensor cable still plugged in.
- Do not pull the cable tight at either end.
- With tilt cabs, care must be taken that the cable cannot be nipped, cut or stretched when the cab is tilted.
- The cable must be routed well away from sources of intense heat such as an exhaust manifold or turbocharger.

If all conditions above have been satisfied, the cable assembly can be appropriately secured using cable ties.

The sensor is connected to socket B at the rear of the tachograph, see **Rear socket connections** on page 36

Installation

If any of the above conditions are not met, the tachograph must not be installed.

DSRC

Installation of the DSRC, including cable connections, shall be according to the corresponding vehicle manufacturer instructions.

The installation must fulfill the following requirements:

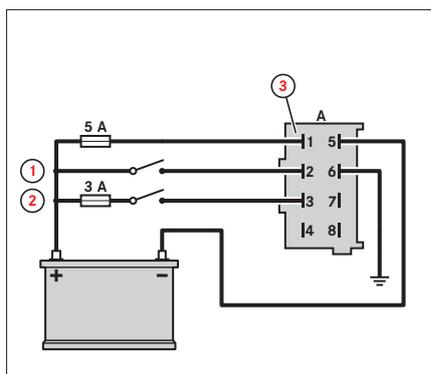
- The field of view opening angle shall be 45 degrees horizontally and vertically in the forward direction of the vehicle
- Allowed deviation vertically: ± 10 degrees.
- Allowed deviation horizontally: ± 5 degrees.
- The material in the field of view shall be PC-ASA or similar and must not contain any metal, metal oxide or coal.
- The DSRC must be tested initially according to DSC_033 in (EU)2016/799, in new vehicle types or in existing vehicles with changed materials in front of the DSRC.

Power Connection

The power to the tachograph is supplied through rear socket A, see **Rear socket connections** on page 36. Note that all fuses used to protect the non-ADR type tachograph must be of an anti-surge type and the fuses must be positioned in such way as to discourage illegal disconnection.

For details on how to make power connections and to protect the ADR version of the Stoneridge tachograph, see: **Fitting an ATEX Tachograph** on page 38.

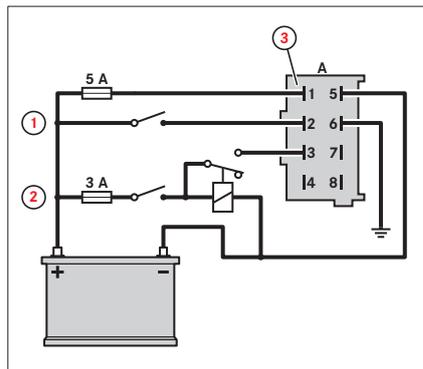
A Stoneridge power cable must be used to make the circuit shown below.



1. Lights
2. Ignition
3. 2714-265 (housing natural) and 2714-270 (tabs)

The tachograph can be affected by line borne interference and current surges. The effects of these occurrences can be reduced by connecting the

power and ground feeds directly to the battery and using a relay on the ignition feed as shown below.

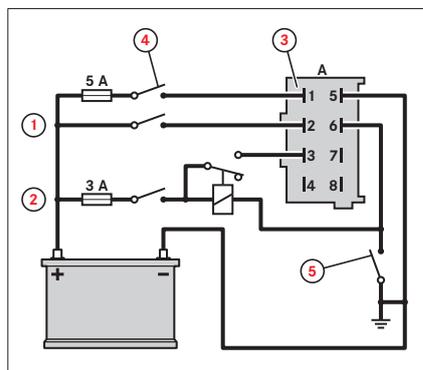


1. Lights
2. Ignition
3. 2714-265 (housing natural) and 2714-270 (tabs)

Note!

Line connections should be avoided, in particular the “scotch lock” type. A connector can be used for making in-line connections if necessary.

On vehicles where an isolator switch (battery master switch) is required, the switch can be connected to the positive line only (a), the negative line only (b) or with both switches (a and b) connected as shown in the figure below.



1. Lights
2. Ignition
3. 2714-265 (housing natural) and 2714-270 (tabs)
4. Isolator switch (a)
5. Isolator switch (b)

Tachograph Signal Connection

Various electrical signal connections to the tachograph rear sockets may be required, with the exact connections dependant on the vehicle type. For a description of all rear connections, see **Rear socket connections** on page 36

Fitting the Tachograph

Since the Stoneridge tachograph conforms to the ISO 7736 standard for a radio enclosure, fitting the

tachograph is an easy procedure. The tachograph must be positioned in such way as to allow a driver to view the display and also to access the necessary functions safely from the seat.

A tachograph installation kit is available to aid fitting the tachograph into a vehicle. For more information, contact the Stoneridge local importer, see **Contact Stoneridge** on page 1

1. Pull the wires through from the back of the cavity and insert the radio cage into the enclosure. It is very important that the wires are of suitable length to allow the unit to be moved in and out of the slot when connected. Equally important is to allow the wires enough space at the rear of the unit so that it can sit in place without damaging the wires.
2. Support the tachograph at the rear of the unit. This can be done either by:
 - placing a rubber acorn onto the peg at the rear of the unit or,
 - using a universal mounting strip and self-threading nut. Place one end of the mounting strip over the tachograph rear peg and then secure it with the self-threading nut screwed onto the peg. The other end of the strip can then be fixed to the vehicle to secure the rear of the tachograph.

Note!

Do not damage the exterior case during installation!

Activation and Motion Sensor Pairing

When a Stoneridge smart tachograph is manufactured, it leaves the factory in a non-activated mode of operation. In the non-activated mode the unit is not fully operational and no data records will be stored.

Note!

In non-activated mode, entry of calibration data is possible without a workshop card inserted. This allows pre-programming of tachographs without the need of a valid workshop card.

Changing a motion sensor can only be done in calibration mode. If the tachograph has not previously been activated then the activation process will occur before the pairing.

A non-activated tachograph can be identified when powered by the appearance of the activation symbol.



1. Activation symbol

When a motion sensor is connected to a powered tachograph it will automatically be paired with the tachograph. Pairing can only be done in the calibration mode of operation, i.e. with a valid workshop card inserted. Pairing can also be initiated with a programmer (for instance a Stoneridge Optimo2 Tachograph programmer) without removing the workshop card.

Activation and Pairing Processes

The activation and pairing processes are completed automatically unless the power to the unit is interrupted.

The tachograph must detect and automatically pair with a motion sensor in order for the activation process to be completed.

1. Insert a valid workshop card in the non-activated tachograph.
2. Enter the PIN security number.

The activation and pairing processes will start automatically and the following is displayed.

```
Sensor
pairing
```

If the **OK** button is pressed the following is displayed:

```
Activation
```

When the pairing process is complete the following is displayed:

```
Pairing
complete
```

3. Press **OK** to confirm.

When the activation process is complete the following is displayed:

```
Activation
complete
```

4. Press **OK** to confirm.

The activation process causes certain tachograph parameters to be initialised, see **Calibrating the Tachograph** on page 24.

Note!

If no motion sensor is present in calibration mode the tachograph will continually attempt to pair with a motion sensor until the workshop card is removed. The two messages:

```
Pairing failed
Activation failed
```

will be displayed to indicate the pairing and activation failure.

Activation or Pairing failure

If the activation is not completed the following is displayed.

```
Activation
failed
```

If the pairing is not completed the following is displayed.

```
Pairing
failed
```

If activation or pairing fails:

1. Remove the workshop card.
2. Check the system connections.
3. Re-insert the workshop card and repeat the process until the activation/pairing is successful.

Programming Vehicle Related Parameters

Once the physical installation of the tachograph is complete, a number of vehicle related parameters are required to be programmed into the tachograph internal memory.

Connect a tachograph programmer (for instance a Stoneridge Optimo2 Tachograph programmer) to the front calibration/download connector to program the vehicle parameters.

For location of the front download connector, see **Calibration and Download Front Connector** on page 36.

Calibrating the Tachograph

Calibration of a tachograph is a mandatory part of any inspection and should also take place after installation or after any repair that requires a tachograph system to be disconnected or the seal to be broken. In non-activated mode, entry of calibration data is possible without a workshop card inserted. This allows pre-programming of tachographs without the need of a valid workshop card.

There are a number of calibration parameters that are stored or updated in a tachograph by means of the calibration process as follows:

- Date and time (UTC) setting
- The odometer value
- The characteristic coefficient of the vehicle (W-factor)
- The tachograph constant value (K-factor)
- The effective circumference of the vehicle drive wheels (L-factor)
- The tyre size used on the drive wheels
- The due date of the next calibration (2 years from current date)
- The speed limiting device setting

- The vehicle registering country, the vehicle registration number (VRN) and the vehicle identification number (VIN)
- Identity of seals used
- Serial number of the DSRC-VU unit

Note!

The K and W-factors must both be explicitly written into the smart tachograph.

The vehicle calibration parameters should be determined using approved methods, for instance a rolling road. These along with all the other parameters listed above require to be programmed into the tachograph, see **Programming Vehicle Related Parameters** above.

The tachograph programmer will give confirmation of the success or failure of programming the calibration parameters into a tachograph. If the programming procedure fails, the workshop card should be removed from the tachograph. The connections should be checked for faults before the workshop card is re-inserted and an attempt to re-program should be made. When in the calibration mode of operation it is possible to inject speed pulses into the tachograph via the calibration/download front connector pin 4 (the calibration I/O pin). This can be done to check the speed display by inputting speed pulses at a known rate. It should be noted however that whenever a vehicle begins to move, any speed pulses injected via the front connector will be ignored and any speed displayed or recorded will be derived from the true speed pulse signal coming from the motion sensor via the rear connector.

Checking Calibration Data

All tachograph calibration data must be checked for correctness following a tachograph data calibration mode session.

- Eject the workshop card.
- Take a technical data printout to confirm the correctness of the stored data.

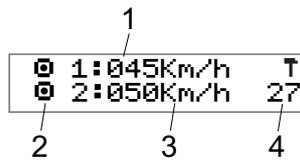
The workshop is responsible for the correct entry of the vehicle parameters.

Checking Second Source Motion Sensor

The tachograph always uses a second source of motion signal (via the GNSS system), and this section describes how this shall be checked. Checking can be carried out by viewing the Motion Sensor View.

With the workshop card inserted, press the arrow up button until you reach the Motion Sensor View. See

position (3) below to check if a second source motion sensor is present.



1. Primary Motion Sensor speed.
2. Indicates motion. If this pictogram is shown (-), no motion, or speed below a set threshold, is detected.
3. Second source of motion speed. The digits shows the speed indication of the second source (GNSS speed).
If these characters (- -) are shown instead of the digits, the tachograph does not receive signals from a second source motion sensor.
4. Fault number, if fault is present. If there is no fault this section is blank.

Fault Number Motion Sensor

The Fault number in the view has a corresponding DTC Code, **Event, Fault and Diagnostic Trouble Codes** on page 47

Fault number in the View	DTC Code
27	0x2780

Check DSRC

DSRC is a microwave transponder located in the front of the vehicle and it transmits vehicle status on request.

To test the DSRC functionality:

1. Turn on the ignition
2. Position a DSRC test tool 2–10 meters in front of the vehicle
3. Check that the VU returns a valid data package via DSRC radio when the test equipment asks for it
4. Check that VU error message:



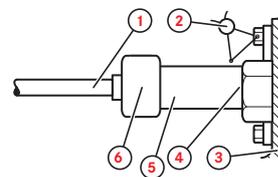
is not shown on the VU display

Sealing the Smart Tachograph System

The motion sensor must be sealed at its connection to the gearbox. This is to ensure the integrity of the signal from the vehicle (through the gearbox) to the tachograph.

The seals shall be certified and mounted according to the standard EN 16882:2016.

The actual sealing method must be authorised by the relevant authorities. If resealing is necessary it must be carried out by authorised holders of valid workshop cards. All used seal numbers (up to 5) should be stored in the VU.



1. Sensor cable
2. Wired seal
3. Gearbox
4. Retaining nut
5. Sensor
6. Sensor connector

Note!

If a workshop detects a broken seal, it must:

- Inspect, calibrate and re-seal the tachograph system.
- Prepare a report about the cause of the broken seal and inform the relevant authorities in accordance to the actual country's legalisation.

The installation plaque must also be sealed, unless it is of a type that cannot be removed without damaging it.

Installation Plaque

The final part of the smart tachograph system installation procedure is the completion and fitment of an installation plaque.

The installation plaque must be clearly visible and easily accessible. The installation plaque is normally placed on the recording equipment, the vehicle's "B" pillar or the doorframe on the driver's side of the vehicle.

The installation plaque state the following:

- Constant of the tachograph, K factor (imp/km).
- Effective circumference of the wheel tyres, L factor (mm).
- Characteristic coefficient of the vehicle, W factor (imp/km).
- Tyre size.
- Vehicle Identification Number (VIN).
- Name, address or trade name of the approved fitter or workshop.
- Date of calibration.
- Information that the GNSS facility is internal.
- The serial number of the DSRC.

Installation

- The serial numbers of the seals in place (up to 5).
- The part where the motion sensor is installed.

k-Factor = 114567 imp/km l-Factor = 3245 mm
w-Factor = 114567 Imp/km Tyre Size = 315/80 R22.5
Installation Date = 28 FEB 2009 VIN = XLER4X20005142784
Workshop No. = GBL123456 VU S/N = 123456789
Technician Surname = SCOTT HENRY GORDON
Technician Forenames = ANTONY TAYLOR COOPER
Workshop = STONERIDGE ELECTRONICS LTD
Address = CLAVERHOUSE INDUSTRIAL ESTATE, DUNDEE, DD4 9UB
Sensor S/N = 1477709990I0504/14/A1
Location of Adaptor = O/S/F in Engine Bay
Location of Sensor =
Impulse Cable Colour = YELLOW
Remote Com S/N =
GNSS S/N = NONE FITTED
Seal S/Ns = XX NNNN NNNN
XX NNNN NNNN, XX NNNN NNNN
XX NNNN NNNN, XX NNNN NNNN

HOLO GUARD LABEL

Download Data

Downloading means to copy, together with a security digital signature, a partial or a complete set of data from the memory of a vehicle unit or from a driver card. The entire tachograph contents can be downloaded by a Workshop under the control of a valid workshop card. All downloading of stored data from a tachograph or from a driver card must be done when the vehicle is stationary and when the tachograph is in calibration mode of operation.

Stoneridge recommends using the CITO2 downloading equipment which significantly reduces the downloading time.

For more information about the CITO2 download equipment, contact Stoneridge, see **Contact Stoneridge** on page 1.

1. Remove the printer cassette, see **Printer Maintenance** on page 28.
2. Attach the download equipment to the tachograph through the 6-pin front download connector, located behind the paper cassette, see **Calibration and Download Front Connector** on page 36.
3. Start downloading data according to the instruction on the download equipment.

Note!

The download can also be performed through A-CAN and C-CAN on the rear connectors.

Which interface to be used is selectable in the setting menu for parameters, see **Change Parameters** on page 10.

Care and Maintenance

To obtain a long and trouble-free lifetime for the tachograph please keep the following in mind:

- Keep the trays closed at all times and only open them to insert and withdraw a card.
- Do not place objects on the trays when they are open, otherwise they could be damaged.
- Keep the tachograph clean.
- Clean a dirty tachograph with a damp, soft cloth.

Avoid High Voltage

Interrupt the power supply to the tachograph if:

- Electrical welding operations are to be carried out on the vehicle.
- You expect that the vehicle will require several jump-starting attempts.

Note!

High voltage may lead to permanent damage and to failure of the tachograph's electronic components. Damage to the tachograph caused in this way invalidates the warranty.

Care of Cards

Treat your card with care and please note the following:

- Do not flex or bend the card.
- Ensure that the card contacts are kept free from dirt and dust.
- Clean it with a soft damp cloth if necessary.
- Protect it from damage.

Card damaged, lost or stolen

If the card is damaged, lost or stolen the owner has to request a replacement card from the responsible authority in the country where the card was issued.

If a card is stolen or if the owner suspects that an unauthorized person has access to the card, the owner has to report the incident to the local police and obtain a police report number.

A driver without a valid driver card is not permitted to drive a vehicle equipped with a smart tachograph.

Printer Maintenance

The only serviceable parts in the Stoneridge tachograph are the paper cassette and the printer paper. Do not attempt to service any other tachograph parts. If the paper cassette is damaged then the complete cassette must be replaced as a

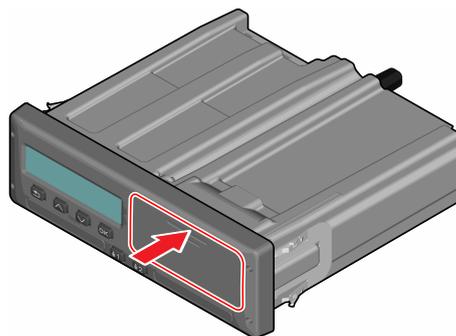
single item. Please contact your local distributor for spare part.

Change the Paper Roll

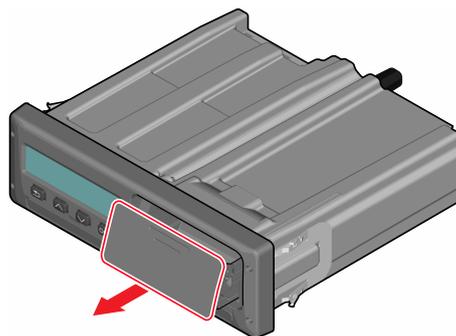
Note!

To avoid malfunctioning only use printer paper approved by Stoneridge.

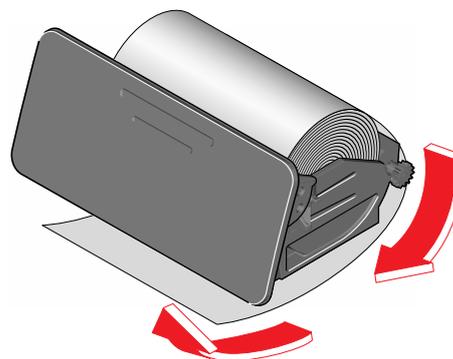
1. Press the upper edge of the front panel. The panel opens.



2. Hold the lower edge of the panel and carefully pull out the cassette.

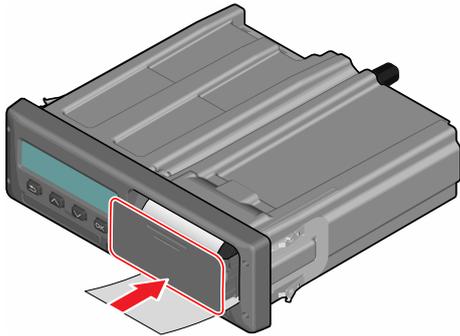


3. Feed the paper around the back of the paper cassette and forwards, passing the lower edge of the panel.

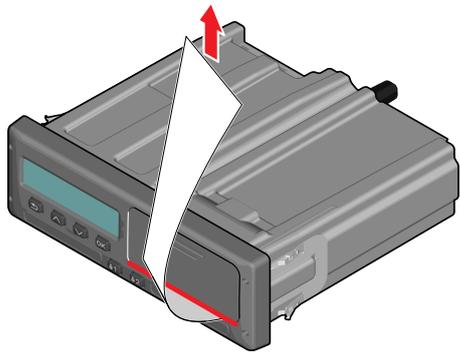


4. Insert the paper into the printer.

5. Slide the paper cassette into the tachograph and press the lower part of the panel to close.



6. Pull the paper upwards and tear it off.



Built-in Test

The built-in test can be used to check the following tachograph components for correct operation:

- Display □
- Driver card ■
- Buttons ⌘
- Printer ▼
- Invert display ⚡

Perform a built-in test in the following way, but please note that the built-in test is only available when the vehicle is stationary.

1. Press the **OK** button and select:
SETTINGS
2. Press **OK** again.
3. Select:
Built-in Test
4. Press **OK**.
5. Select one of the five test categories and press **OK**.

Type of Test	Description	Action if Test Failed
□ Display	Display test The display shows positive view, negative view and a pattern of rectangles for 1 second each.	
■ Driver card	Test of the inserted driver cards There must be a driver card in the relevant slot. The name of the card holder is read and displayed for 2 seconds.	If a card is reported as defective, check a different card to ensure that the tachograph is functioning. If the tachograph is defective and has to be decommissioned and replaced. If it is the driver card that is definitely defective, contact the responsible authority in the country where the driver card was issued.
⌘ Button	Button test You are prompted to press the buttons one by one from left to right within 2 seconds of each other, otherwise the test fails.	Carefully clean dirty buttons with a damp cloth and a mild detergent. If the buttons still fails the tachograph has to be decommissioned and replaced.
▼ Printer	Printer test Prints a test page to check printer functionality.	Check the paper cassette, if necessary insert a new paper roll or replace the cassette. If the printer still fails the tachograph has to be decommissioned and replaced.
⚡ Inverted display	Inverted display function test The display view is inverted for 2 seconds.	If the tachograph is unreadable it has to be decommissioned and replaced.

Other tests

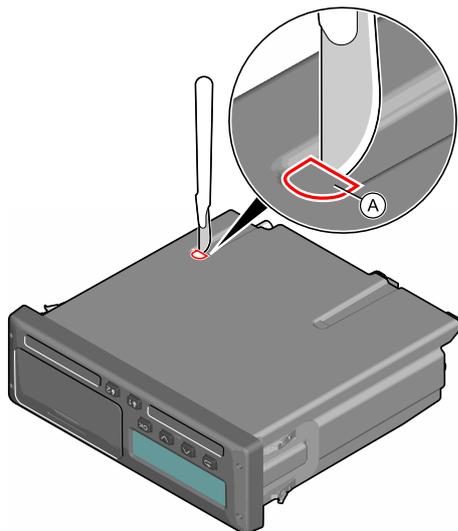
Type of Test	Description	Action if Test Failed
GNSS test	Check GNSS facility. Run "Info" ► "GNSS live view" to test the GNSS facility.	Check if any external transmitter disturbs the GNSS satellite signal.
Other active faults	Show all currently active events and faults. Switch ignition key from off to on. Now all currently active faults will be shown.	See Display Messages on page 39 for actions on each fault type.

Opening Failing Card Trays

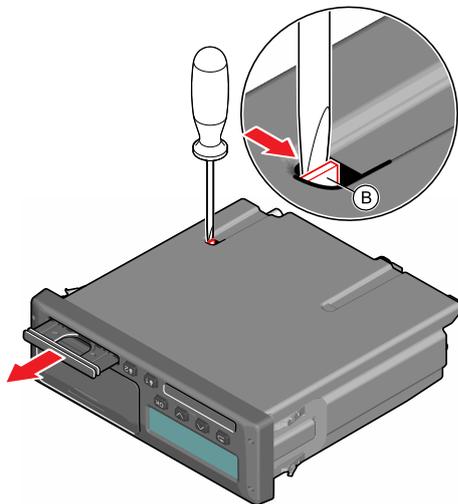
To open the card trays to get hold of the inserted card in the event of a tachograph tray failure or power failure do as follows:

1. Ensure that the ignition is switched off.
2. Remove the tachograph from the dashboard, see **How to remove the tachograph** on page 35.

On the bottom there are two small break out slots that gain access to the tray release mechanisms.



3. Identify the breakpoint (A) that corresponds to the card tray that is to be opened. Use a sharp knife to carefully cut a hole in the break out slot.



4. Insert a knife or a screwdriver in the hole and push the tray release mechanism (B) sideways. The appropriate tray will now eject and the card can be removed.

Decommission of tachograph

This operation will damage the tachograph and therefore it must be decommissioned and replaced.

Inspection of Tachograph System

Inspection of a smart tachograph system must be carried out under the following circumstances:

- After any repair of the system.
- If the motion sensor seal is broken.
- After any alteration to either the vehicles characteristic coefficient (W factor) or the effective circumference of the drive wheels (L factor).
- If the vehicle registration number (VRN) has changed.
- When it has been 2 years since the last system inspection.

Other national specific requirements may exist.

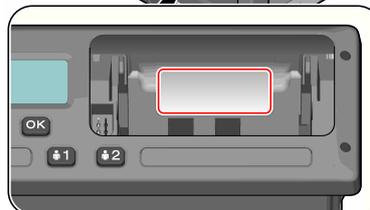
Inspecting Procedure

Follow this procedure to confirm that the function of the recording equipment is correct.

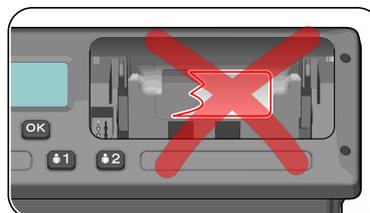
1. Check the ability to store driver data on the driver card.
2. Determine that the tachograph operates within maximum tolerances for both speed and distance.
3. Check the tyre size and the actual circumference of the drive wheel tyres.
4. Check that the GNSS functionality, see **Checking Second Source Motion Sensor on page 24**
5. Check the DSRC functionality, see **Check DSRC on page 25**
6. Check the calibration, see **Checking Calibration Data on page 24**

Also, perform the following visual checks:

1. Ensure that there is no damage to or drill-holes in the entire exterior casing of the tachograph, including rubber acorn, so that a security breach attempt could be made.
2. Check for evidence of tampering with the tachograph seals and labels.
3. Check for additional seals and labels that do not belong to the tachograph, as they might cover drill-holes.
4. Check that the heat seal is present.
5. Check the tachograph type approval mark.
6. Check that the system seals are intact. Confirm the presence of installation plaque and that the information is correct according to the checks in this procedure.
7. Check that the label and the logotype hologram is present and in one piece. The position of the label is shown in the following illustration. The hologram is only visible in strong light.



A tampered label might look like this.



If any of the following event & faults could have occurred since last inspection, a check with a reference cable has to be performed.

- !09, Motion data error
- !11, Motion sensor authentication failure
- !13, Unauthorised change of motion sensor
- !20, Motion sensor internal error
- !21, Motion sensor internal error, authentication failure.
- !22, Motion sensor internal error, stored data integrity failure
- x35, Motion sensor communication error.
- !0A, Vehicle Motion Conflict

Any unit that fails an inspection must be decommissioned and replaced with another unit.

After each inspection a tachograph test certificate must be issued to the owner of the tachograph. The information on the certificate includes:

- The tachograph owner.
- The tachograph manufacturer, model and serial number.
- The DSRC serial number.
- The Seals serial numbers.
- The VIN and VRN.
- The inspection result.
- The certificate issue date.

Note!

The test certificate is not mandatory in all countries.

Finally, as a legal requirement, a new installation plaque must be fitted to the vehicle in place of the previous one.

Please note that all seals must also be replaced and the seal numbers used must also be on the plaque.

For more information on the installation plaque, see **Installation Plaque** on page 25.

Repairs and Decommissioning

Due to smart tachograph system requirements the only allowable repair that can be carried out is the replacement of the paper cassette, see **Printer Maintenance** on page 28.

Note!

The **tachograph** case must never be opened, as it would be a breach of the smart **tachograph** security.

When it is not possible to repair a faulty tachograph, then it must be decommissioned and replaced with a new one.

Decommission Procedure

1. Download the entire data from the tachograph memory, see **Download Data** on page 27.
2. Remove the tachograph from the vehicle.
3. Store the data in a secure data store following guidelines as set by the relevant authorities.

If it is not possible to download data from a decommissioned tachograph all workshops will have a manual issued by their relevant transport authority detailing what is the requirement. Usually it is to issue an undownloadability certificate.

If a faulty tachograph has driver cards stored in either of the trays and these cannot be removed by the normal method of pressing the appropriate eject button, then see the following chapter, see **Opening Failing Card Trays** on page 31.

All faulty units must be returned to Stoneridge, unless another arrangement with Stoneridge is made.

Replacement of the Tachograph

It is recommended to replace a tachograph only with a unit having the same part number. Do not fit a replacement tachograph with a different part number unless it is confirmed by Stoneridge as an equivalent to the one it is replacing.

Information about actual part number is visible on a technical printout, see **Printout Data** on page 12.

1. Make a technical printout to see the warranty time and save print out.
2. Remove the tachograph.
3. If the removed tachograph is faulty, then download all data and return it to the owner, see **Download Data** on page 27.
4. Update the replacement unit with the remaining warranty time for the replaced unit.
5. Install the replacement unit, see **Installation** on page 21.

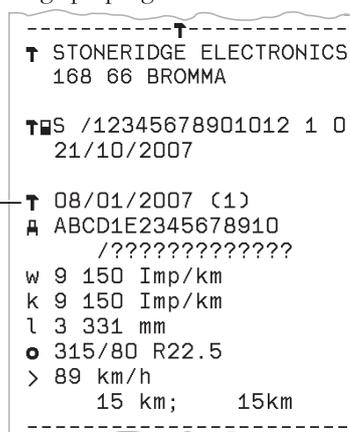
Warranty Handling

When a tachograph is replaced it is important that the new tachograph is programmed with the remaining warranty time from the old one. Use available equipment to set the parameters, for example a Stoneridge Optimo2 Tachograph programmer which is used in these instructions.

1. Read the remaining Warranty Validity Time (WVT) for the old unit, using a Stoneridge Optimo2 Tachograph programmer.
2. If the Warranty Time (WT) has passed the replacement unit's WT, then the replacement unit's WVT parameter must be set to 0.

To control the WVT do the following:

- Perform a technical printout from the old tachograph and check the activation date, see **Technical Data** on page 36.
 - Calculate the remaining WT by taking the current UTC time minus the activation date.
 - If the obtained value does not match the WVT, then someone has modified the parameters.
3. Program the new tachograph, with the calculated remaining WT, using a Stoneridge Optimo2 Tachograph programmer.



1. Date of activation

How to remove the tachograph

Once fully mounted, a Stoneridge smart tachograph can be removed from its mounting cage using a pair of tachograph extraction tools (6350-023).

1. Insert the extracting tools perpendicular into the two pair of holes at the sides of the plastic front fascia.



2. Push the extraction tools sideways towards the sides and at the same time pull the tachograph out of the cage.
3. Carefully disconnect the rear socket connections.

Technical Data

Technical Parameters

DC

Voltage –

Non-ADR (operating)	9-32 V
ADR (operating)	17-32 V
24 V (recommended)	18-32 V
12 V (recommended)	9.5-16 V

Temperature

Non-ADR (operating)	-25°C to +70°C
ADR (operating)	-25°C to +65°C
Storage	-40°C to +85°C

Weight (including paper roll)

Less than 1100 g

Dimensions

188 x 218 x 59 mm

Current

Ignition On + motion sensor	24 V - 100 mA
	12 V - 200 mA
Ignition Off + motion sensor	24 V - 9 mA
	12 V 12 mA

LCD

Dot Matrix	19 x 98 pixels
Visible area	72 x 16.6 mm
No. rows and characters	2 - 16

Printer

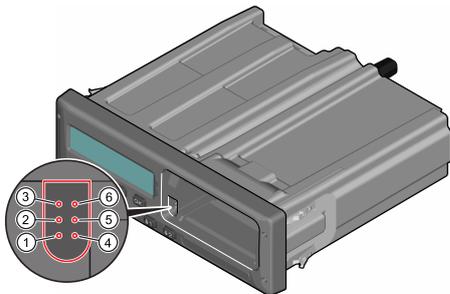
Paper width	57-58 mm
Paper roll diameter	30 mm (max)
Characters per line	24

Calibration and Download Front Connector

The calibration and download front connector is a 6-pin connector and the pin pitch is 2.54 mm.

The connector is located behind the paper cassette.

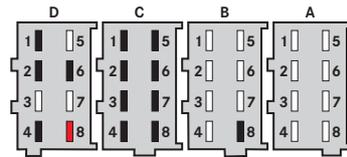
The pins are viewed in the figure and a description of the functions are listed below.



Pin	Name	Description
1	Battery (-)	Connected to battery (-), A5.
2	Data comm	The configuration of this interface is in accordance with ISO 14230. This is used for bi-directional K-line I/O.
3	RxD comm	Serial data to recording equipment, tachograph . Complies with RS232 specifications at baud rates from 9600 - 115 200 bps.
4	Calibration I/O	Calibration signal input/output.
5	Battery (+)	Permanent power output. voltage range is battery supply - 3 V at 40 mA.
6	TxD comm	Serial data from recording equipment, tachograph . Complies with RS232 specifications at baud rates from 9600 - 115 200 bps.

Rear socket connections

The rear connector is a 32-pin device and the connector pin-outs according to the ISO16844 connector format.



Pin marked in red (D8) are optional pins/functions added by Stoneridge to the connector format ISO16844-1.

Pins marked in black (B8, C1 to C8 and D1, D2, D4, and D6) are optional pins/functions defined by ISO16844-1.

Note!

The corresponding plugs for connection to sockets A, B, C and D are keyed and colour coded (white, yellow, red and brown respectively) and have different guide pins to prevent incorrect insertion.

Pin	Name	Description
A1	Battery plus +	Permanent power supply line powering the tachograph.
A2	Illumination	Connection to illumination power supply. For this tachograph it is an analogue input.
A3	Ignition supply	Ignition supply line connection.
A4	CAN_H	CAN bus HIGH signal line.
A5	Battery (-)	Return line for the permanent power supply (A1).
A6	Ground, GND	Return line for ignition supply, normally connected to local chassis ground.

Pin	Name	Description
A7	CAN_GND	CAN bus GND line, which is connected to Battery (-) (A5) via a series combination of a 1W resistor and 680nF capacitor.
A8	CAN_L	CAN bus LOW signal line.
B1	Positive supply to motion sensor	Motion sensor supply signal that is derived from the permanent power supply.
B2	Battery (-) to motion sensor	Return line for motion sensor supply (B1).
B3	Motion sensor speed signal	Real time speed signal from the motion sensor.
B4	Speed data signal	Encrypted channel (bi-directional) from the motion sensor. Is used to verify the signal integrity.
B5		Not used.
B6	Speed pulse output	Positive going pulse output signal triggered by each pulse from the motion sensor. Can be used as an alternative customer speed signal.
B7	Speed pulse output	Positive going pulse output signal triggered by each pulse from the motion sensor. The standard ISO speed signal.
B8	Distance signal, 4 pulses/m	An output string of positive going pulses generated at a rate corresponding to 4 pulses per metre.
C1	C2-CAN_H	Version dependant CAN bus HIGH signal line.
C2	Battery (-)	Return line for the battery supply.
C3	Revs signal input/ 2nd source of motion	This input signal is monitored by the processor and is used to determine engine speed. The input line is connected to the W terminal of the alternator, KL_W. This input can also be used as 2nd source of motion input.
C4	C2-CAN_L	Version dependant CAN bus LOW signal line.
C5	C-CAN_H	Alternative CAN bus HIGH signal line.
C6	C-CAN_GND	Alternative CAN bus GND line, which is connected to Battery (-) (A5) via a series combination of a 1W resistor and 680nF capacitor.
C7	C-CAN_L	Alternative CAN bus LOW signal line.
C8	Internal resistor to CAN_H	Connected to CAN_H on C5 via a 120W resistor.
D1	Status input 1	Input, which signals that an event may be recorded.

Pin	Name	Description
D2	Status input 2	Alternative event input, which signals that an event may be recorded.
D3		Not used.
D4	General tachograph warning output	This is a general open collector output controlled by the processor.
D5	Over speed output	An output which is active when an over speed condition is detected.
D6	Speedometer output	An open collector output or an ISO16844 output controlled by the processor. It is a rectangular waveform that is used to drive a vehicle's speedometer.
D7		Not used.
D8	Serial data output line	Serial data output channel continuously transmitting (in key on) speed, distance, time, date engine revs, driver and co-driver activity information in a Stoneridge Electronics proprietary format.

The CAN bus (Controller Area Network) is a versatile vehicle communications system. It is a serial bus system that is used as an open communication system for intelligent devices. It functions as an interface between the tachograph, the vehicle instrument cluster and other systems within a vehicle. The CAN bus transmission line CAN_H and CAN_L are protected against short circuits and electrical transients, which may occur in an automotive environment. In case of short circuit the protection circuit recognises this fault and the CAN transmitter output stages are disabled. It should also be noted that CAN bus via the rear connector could be used for programming a tachograph with calibration parameters instead of the front calibration (6-pin) connector.

Note!

The primary CAN bus of the vehicle must be connected to the A-CAN Bus on the tachograph! The C-CAN is used for telematic devices.

ATEX Tachograph

Hazardous Goods Vehicles

The ATEX version of the tachograph is approved for use in hazardous goods vehicles. It differs from the standard tachograph as it has explosion protection and is certified in accordance with EU Directive 2014/34/EU.

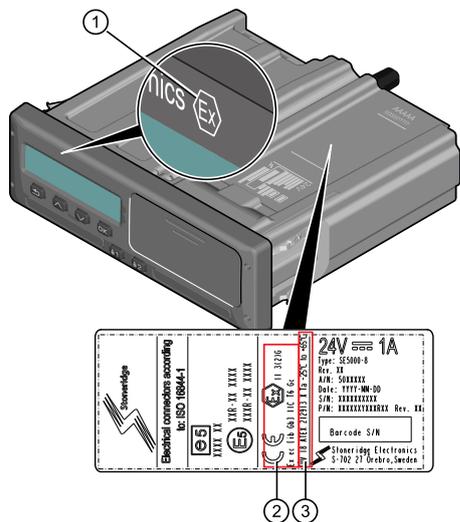
Note!

The ATEX tachograph explosion protection is only guaranteed when the ignition is off and the battery isolating switch is open.

Visible Differences

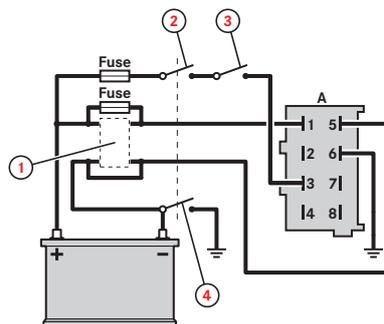
The following visible differences between a standard Tachograph and an ATEX Tachograph:

1. Ex symbol on the Tachograph front
2. ADR classification
3. TÜV test certificate number



Fitting an ATEX Tachograph

When fitting a Stoneridge ATEX tachograph the unit must be fitted within the truck cabin. To ensure that the tachograph conforms to IP54, the unit must be fitted in horizontal level. If a tachograph is to be fitted at an angle, the front fascia must be lower than the rear of the tachograph. It should also be noted that ADR vehicles might have a safety network integrated into the tachograph wiring system as well as a battery master switch. If fitted, then the safety network will be connected between the main supply from the battery and the tachograph itself. The battery master switch may be at A only, B only or at both A and B.



1. Safety device (optional)
2. Master switch (A)
3. Ignition switch
4. Master Switch (B)

Technical and Electrical Data Specifications (all rear connectors).

Supply circuit (permanent supply from the vehicle battery), A1 (+) and A5 (-); Un=24 volts.

Ignition system (supply via the battery master switch and the ignition switch from the battery), A2 (illumination), A3 (ignition supply) and A6 (chassis ground); Un=24 volts.

Motion sensor connections (compliant with intrinsic safety Eex ib IIC protection), B1 (sensor +ve), B2 (sensor -ve), B3 (sensor signal) and B4 (sensor encryption).

The ATEX Tachograph

For the ATEX Tachograph some functions are disabled immediately when the ignition is switched off:

- Card trays cannot be ejected.
- Printouts are not possible.
- Background illumination for buttons and display is switched off.

Note!

The ATEX Tachograph will enter the power saving mode immediately after the ignition is switched off.

To have the ATEX Tachograph fully operational, the ignition key must be in position key-on or ignition on, depending on your vehicle manufacturer.

Display Messages

There are four type of messages that can be seen on the display.

- **Messages** - contains information on processes or reminders to the driver. Messages are not stored and can not be printed. Press the **Back** button to clear the message.
- **Pre-warnings** - appear as early reminders to the warnings. Pre-warnings, except DDS and WTD related, are stored and can be printed. Press the **OK** button twice to clear the Pre-warning.
- **Warnings**- appear in the event of e.g. overspeeding or violations of the law or if tachograph not can be recording. Warnings are stored and can be printed. Press the **OK** button twice to clear the Warning.
- **Faults** - are more critical than warnings and are displayed if there is a fault detected in the tachograph, in the sensor or driver card. In addition faults are presented if tampering with the equipment is detected. Faults are stored and can be printed. Press the **OK** button to acknowledge the Fault.

Display	Description	Action
	Message Entry not possible while driving. Related to the operator.	Stop the vehicle and try the entry again. If the symbol still is present when vehicle stopped, disconnect and reconnect the tachograph and retry. If the symbol still is present after reconnect, tachograph must be decommissioned.
 Absence of GNSS pos info	The VU is unable to detect any valid GNSS satellite signal for a long time	Make sure the GNSS antenna is not covered with or close to large metallic parts
 Activation 	Message The tachograph is being activated for use (Workshop card). Related to the tachograph	Wait until the automatic activation is completed.
 Activation complete	Message The tachograph activation process has been completed (Workshop card). Related to the tachograph	
 Activation failed	Message The tachograph activation process has failed (Workshop card). Related to the tachograph	Eject the workshop card from the tachograph. Check system connections. Re-insert the workshop card to retry the activation. Disconnect the tachograph for 30 seconds and retry. If the tachograph will not activate it must be decommissioned and replaced.

Display Messages

Display	Description	Action
!▣ Already in calibration mode	Message Two workshop cards inserted. The second card will be ejected without being processed (authenticated). Related to the operator.	Insert only one Workshop card.
!▣▣▣ Card auth.failure	Fault The tachograph security check for the card in slot 1 failed. Similar message for slot 2. Related to the tachograph.	Check that the inserted card is valid and correctly inserted. Check if the card works in another tachograph. Try to insert another card.
×▣▣ Card fault	Fault The card in slot 1 is defective. Similar message for slot 2. Related to the card.	Eject the card and check it visually. Check the tachograph with a functional card.
!⌚▣▣ Card time overlap	Warning The last withdrawal time of the inserted driver card is later than the date/time of the tachograph. Related to the tachograph	Check the date/time of the tachograph and change if necessary. Wait for the overlap period to elapse.
!▣▣ Card conflict	Warning An invalid card combination has been detected. Related to the card.	Withdraw the offending card.
!▣→×▣ Card eject without saving	Message Data could not be stored on the card withdrawn from slot 2 due to an error. Similar message for slot 1. Related to the card.	Clean the card with a soft damp cloth and try again. In case of a faulty card, contact the responsible authority in the country in which you are located.
⌚▣▣ Card expired	Message The card in slot 1 has expired. Similar message for slot 2. Related to the operator.	Remove the card and replaced it with a valid one.
!⌚▣▣ Card expiry	Message The card in slot 1 will expire (Day/Month) . Similar message for slot 2. Related to the operator.	Contact the responsible authority to get a new card.
!▣▣ Card ins. while driving	Warning A tachograph card is inserted in any slot while driving. Related to the operator.	No further action required.
!▣←▣▣ Card integrity error	Fault Corrupt data detected when reading data from the card in slot 2 to the tachograph. Similar message for slot 1. Related to the card.	Clean the card with a soft damp cloth and try again. In case of a faulty card, contact the responsible authority in the country in which you are located.

Display	Description	Action
?@▶ daily drive time	Pre-warning - 9h daily drive time Warning - 9h daily drive time Pre-warning - daily drive time Three different warnings for reaching the allowed driving time.	
!@A/A Data integrity error	Fault Corrupted files have been detected in the tachograph. These files will not have a valid signature when downloaded. Related to the tachograph.	Check for evidence of tampering with the tachograph. If there is evidence of tampering the tachograph must be decommissioned and replaced.
!@! d/m download card	Message Indicates the time to next download of the card (Day/Month) in slot 1. Similar message for slot 2	Prepare for download.
!A d/m download vehicle	Message Indicates the time to next download from the tachograph (Day/Month).	Prepare for download.
d/d Download complete	Message The tachograph download process has been completed successfully.	No further action required.
d x d Download failed	Warning The tachograph download process has failed and is incomplete. [Workshop card]	Retry the download. Check the connections and the download equipment. Re-insert the card and retry the download. Replace or repair the download equipment if required. If the tachograph is faulty beyond repair it must be decommissioned and replaced.
@!/@x Driving can't open slot	Message An attempt was made to open the slot while the vehicle was in motion. Related to the operator.	Stop the vehicle. The card tray can be opened only when the vehicle is stationary.
!@ Driving w/o valid card	Warning Driving without an appropriate card, or with an inappropriate card combination. Related to the operator.	Stop and remove inappropriate card.
!@▶ end of daily drive	Warning Maximum daily driving time	
!@ end of weekly drive	Warning Maximum weekly driving time	
! * end of weekly work	Warning The weekly working time is reached according to the 60 h WTD rule.	
!@ end of 2-week drive	Warning Maximum 2-week driving time	
fnx Function not possible	Message The desired function cannot be carried out. Related to the tachograph.	No further action required.
!@A Hardware sabotage	Fault Authenticated card has been removed by force. Related to the operator.	The tachograph must be decommissioned and replaced.

Display Messages

Display	Description	Action
!■ Insertion of a non valid card	Warning A non-valid card has been inserted to a slot. Related to the operator.	Check that the card has not been inserted upside down or is expired.
!■▲ Last sess. not closed ok	Warning The driver card in tray 1 was ejected incorrectly during the last session. The previous card withdrawal in tray 1 was not completed correctly by the tachograph. Similar message for slot 2. Related to the card.	Eject the card and check it visually. Clean the card with a soft damp cloth and try again. In case of faulty card, contact relevant authority to get it replaced.
M.....! Memory full!	Message Manual entries memory full. Related to the operator.	Modify the manual entries so that the total number of entries is less.
New time? ●Ⓢ 03:01	Message Daylight saving time changes.	Answer YES to start or end daylight saving time. Answer NO or press the Back button to cancel.
!▲Td/m next calibration	Warning Next mandatory calibration has to be carried out (d/m = Day /Month)	Plan for the calibration.
!Ⓢ/T■ No driver/workshop card	Message A function has been selected that requires an inserted driver or workshop card. Related to the operator.	Insert a driver or workshop card.
!Ⓢ! ? No further details	Fault An unknown type of sensor error occurred. Related to the motion sensor.	Replace the motion sensor.
>> Overspeeding	Warning The vehicle speed has exceeded the speed limit set for 1 minute and will be stored. Related to the operator.	Observe the specified speed limit. Find out the maximum speed allowed for the vehicle.
>>? Overspeeding pre-warning	Warning The vehicle is exceeding the over speed limit. After 1 (one) minute of continuous over speeding the warning will be stored. Related to the operator.	Observe the specified speed limit.
!→▲...✓ Pairing complete	Message The motion sensor - tachograph pairing process has been completed successfully. [Workshop card]. Related to the tachograph or motion sensor.	No further action required.

Display	Description	Action
<p>!→A...× Pairing failed</p>	<p>Message The motion sensor - tachograph pairing process has failed. [Workshop card]. Related to the tachograph or motion sensor.</p>	<p>Remove the workshop card from the tachograph.</p> <p>Check the system connections.</p> <p>Check the sensor cable. Replace sensor cable if required.</p> <p>Re-insert the workshop card to retry pairing.</p> <p>Replace the sensor if required.</p> <p>If the message is shown repeatedly the tachograph might be faulty beyond repair and must be decommissioned and replaced.</p>
<p>PIN?</p>	<p>Message Enter a PIN code to:</p> <ul style="list-style-type: none"> • Activate a tachograph • Enter the tachograph calibration mode <p>[Workshop card]. Related to the tachograph.</p>	<p>Enter a valid PIN code.</p>
<p>!‡ Power supply interruption</p>	<p>Warning The power supply to the tachograph has been interrupted for more than 200 milliseconds. Cranking voltage should not cause this event. The event is not generated in calibration mode. Related to the vehicle.</p>	<p>Check the vehicle and tachograph power supply levels.</p> <p>Check the power supply cables.</p> <p>Check the vehicle's battery and replace if necessary.</p>
<p>▼↑□ Printer high temperature</p>	<p>Message The printing could not start, or the ongoing printing has been interrupted, because the temperature of the printer is too high. Related to the printer.</p>	<p>Wait until the printer temperature is in allowable range and try to print again.</p>
<p>▼↓‡ Printer low power</p>	<p>Message The ongoing printing has been interrupted because the tachograph input voltage is too low. Related to the vehicle.</p>	<p>Check that the ignition is on.</p> <p>Check the vehicle battery voltage, connections, etc.</p>
<p>▼↓□ Printer low temperature</p>	<p>Message The printing could not start because the temperature of the printer is too low. Related to the printer.</p>	<p>Wait until the printer temperature is in allowable range and try to print again.</p>
<p>▼⊗× Printer out of paper</p>	<p>Message The ongoing printing has been interrupted because the printer is out of paper.</p>	<p>Replace paper.</p> <p>If fault remains active for no apparent reason the tachograph must be decommissioned and replaced.</p>
<p>▼×▼ Printing cancelled</p>	<p>Message The ongoing printing has been cancelled.</p>	<p>No further action required.</p>
<p>>4 1/2h? Quarter left reminder</p>	<p>Message The driver has 15 minutes left until the legal maximum continuous driving time of 4½ hours will be exceeded.</p>	<p>Find a suitable place to take a break in the next 15 minutes.</p>
<p>?*6h reminder break</p>	<p>Pre-warning A reminder for a break according to the 6 h WTD rule.</p>	

Display Messages

Display	Description	Action
?>lh reminder daily rest	Pre-warning A reminder for the daily rest.	
!>hh reminder weekly rest	Pre-warning A reminder for the weekly rest.	
*T Remote Detection fault	Fault Cannot communicate with the Remote Detection facility (DSRC)	Check the external Remote Detection facility and the cables
!@AX Security violation	Tampering with hardware has been detected	Check for evidence of tampering with the unit. Decommission and replace the tachograph.
!@l Sensor auth. failure	Fault The tachograph does not detect the sensor. Related to the motion sensor.	The tachograph has to be decommissioned and replaced.
!@lA Sensor auth. failure		Check motion sensor operation and all wiring. Check for evidence of tampering. Pair the motion sensor and tachograph again. Perform a new calibration of the tachograph system. Replace the sensor if found faulty.
!l=0 Sensor cable fault	Warning No pulses received from motion sensor, but encrypted data is received. Related to the motion sensor.	Check the motion sensor operation and wiring. Replace the motion sensor if necessary.
!l>0 Sensor cable fault	Warning Pulses received from motion sensor, but encrypted data missing or mismatch. Related to the motion sensor.	Check the motion sensor operation and wiring. Replace the motion sensor if necessary.
*lA Sensor comms error	Fault Motion sensor communication error. Related to the motion sensor.	Check the motion sensor operation and wiring. Replace the motion sensor if necessary.
!l Sensor data error	Warning Signal failure between motion sensor and tachograph. Related to the motion sensor.	Check the motion sensor operation and wiring. Replace the motion sensor if necessary. Check for evidence of tampering. If the error remains active for no apparent reason, decommission and replace the tachograph.
!@l/l Sensor data integrity error	Fault Internal motion sensor error, stored data integrity failure. Related to the motion sensor	Replace the motion sensor if necessary.
*lA Sensor no acknowledge	Fault Motion sensor communication error. Related to the motion sensor.	Check the motion sensor operation and wiring. Replace the motion sensor if necessary.
*A<l Sensor no answer	Fault Motion sensor communication error. Related to the motion sensor.	Check the motion sensor operation and wiring. Replace the motion sensor if necessary.

Display	Description	Action
!L‡ Sensor no power signal	Fault Motion sensor has no power. Related to the motion sensor.	Check the vehicle battery voltage, wiring, etc. Replace the motion sensor if necessary.
!→A... Sensor pairing	Message The motion sensor and tachograph is in the process of pairing. Related to the motion sensor	
×A‡↑ Sensor power high	Fault Motion sensor power too high. Related to the motion sensor.	Check the vehicle battery voltage, wiring, etc. Replace the motion sensor if necessary.
×A‡↓ Sensor power low	Fault Motion sensor power too low. Related to the motion sensor.	Check the vehicle battery voltage, wiring, etc. Replace the motion sensor if necessary.
A→T? Service pre-warning	Message Next calibration, pre-warning.	Perform a calibration.
!⊙ Time conflict GNSS versus VU	Message The internal clock and the GNSS clock differs more than 1 minute	Make sure the GNSS antenna is not covered or that the GNSS signal is distorted.
>4 1/2h Time for break	Message The legal maximum continuous driving time of 4½ hours has elapsed.	
!*6h time for break	Warning Take a break according to the 6 h WTD rule	Minimum break 15 min
!▷h time for daily rest	Warning A warning for start of daily rest.	
!A→T Time for service	Message The tachograph is out of calibration.	Perform a calibration.
!▷hh time for weekly rest	Warning A warning for start of weekly rest.	
■→⊙ Timeout no key pressed	Message The tachograph is waiting for input. Timeout 1 min or 20 min.	Press the appropriate buttons and complete the process. Timeout can be changed in Settings menu.
×⊙/⊙Z× Unable to open slot	Message The card tray concerned cannot be opened. Related to the tachograph.	
!⊙‡‡ Unauth. change of sensor	Fault The sensor has been changed since last pairing. Related to the motion sensor.	Check the motion sensor operation and all wiring. - replace sensor if faulty Check for evidence of tampering. Pair the motion sensor and the tachograph again. Perform a new calibration of the tachograph system. Replace the sensor if found faulty.
!A‡ Vehicle Motion Conflict	Message GNSS motion sensor and primary motions sensor data contradicts. Related to the motion sensor.	Check second source sensor operation and primary sensor and its wiring. Check for evidence of tampering. Use reference cables.
!⊙ 12/10 VU expiry	Warning The tachograph (VU) will expire at the displayed date.	The tachograph has to be decommissioned and replaced.
×A VU internal fault	Fault The tachograph has detected an internal fault. Related to the tachograph.	The tachograph has to be decommissioned and replaced.

Display Messages

Display	Description	Action
! Wrong PIN! Attempts left:2	Message Wrong PIN entered but still attempts left. [Workshop card].Related to the card	Press OK and try again.
× Wrong PIN! Card locked !	Message Wrong PIN entered too many times. [Workshop Card] Related to the card	Eject the card and replace it with a valid one.

Event, Fault and Diagnostic Trouble Codes

A list of all DTCs that are stored in the Stoneridge smart tachograph is presented below. A check should be made to determine whether the DTC is still active or not. The cause of the DTC should be determined and appropriate action taken as described in the table that follows. The Code will be seen on the Event & Fault printout as well as on the Daily printout. The DTC will be seen on a test instrument.

General events

Code	DTC	Type of event or fault	Description	Suggested action to be taken
!02		Card conflict	An invalid card combination has been detected. For example a company and a workshop card.	Withdraw the offending card.
!03		Time overlap	The last withdrawal time of the inserted driver card, as read from the inserted card, is later than the UTC time of the tachograph.	Check the UTC time of the tachograph. Wait for the overlap period to elapse. If UTC time differs more than 20 minutes, a calibration has to be performed.
!04	001260	Driving without an appropriate card	Driving without a valid card or with an invalid card combination.	Stop and insert a valid card and/or remove inappropriate card.
!05		Card inserted while driving	A tachograph card is inserted in any slot while driving.	No further action required.
!06		Last card session not correctly closed	The card (inserted in slot 1 or 2) has been withdrawn before all relevant data have been stored on the card. It is caused at withdrawal but detected at the next insertion.	No further action required.
!07		Overspeeding	The speed of the vehicle has exceeded the highest speed allowed for the vehicle. This has been active during at least 60 seconds.	Get information on the maximum speed allowed is for the vehicle.
!08	000004	Power supply interruption (VU)	The power supply to the tachograph has been interrupted for more than 200 milliseconds. The event is not generated in calibration mode.	Check the vehicle and tachograph power supply levels. Check the power supply cables.
	002004	Power supply interruption (MS)	Power supply to motion sensor has been interrupted for more than 200 ms.	Check the vehicle and motion sensor power supply levels. Check the motion sensor operation and all the wiring, replace the sensor if faulty.
!09	002180	Motion data error (No CNTR)	Motion sensor data incorrect. Tachograph receives speed value from motion sensor without receiving any pulses.	Check motion sensor operation and all wiring. Check for evidence of tampering.
	002280	Motion data error (CNTR)	Motion sensor data incorrect. Tachograph receives speed counter value from motion sensor that differs from value calculated by the tachograph.	Pair the motion sensor and tachograph again. Perform a new calibration of the tachograph system.
	002452	Motion data error (Event)	Motion data incorrect. Tachograph signature mismatch.	Replace the sensor if found faulty.
!0B	002B80	Time conflict (GNSS versus VU internal clock)	Internal and GNSS clock differs more than 1 minute at 12 hours after time settings	Check internal clock setting. Check GNSS received clock.
!0C	002D80	Communication error with the remote communication facility	VU cannot communicate properly with the DSRC-VU facility	Check the remote DSRC-VU unit Check cabling to DSRC-VU facility

Event, Fault and Diagnostic Trouble Codes

Code	DTC	Type of event or fault	Description	Suggested action to be taken
!0D	002C80	Absence of position information from GNSS receiver	No valid GNSS signal received during three hours of accumulated driving	Check that GNSS signal can be received Check if external objects obstruct the GNSS signal

VU Security breach attempts

Code	DTC	Type of event or fault	Description	Suggested action to be taken
!11	002452	Motion sensor authentication failure	An unsuccessful authentication attempt of the motion sensor has been detected.	Check motion sensor operation and all wiring. Check for evidence of tampering. Pair the motion sensor and tachograph again. Perform a new calibration of the tachograph system. Replace the sensor if found faulty.
!12		Tachograph card authentication failure	The inserted card cannot be authenticated by the tachograph.	Check that the inserted card is valid and correctly inserted. Check that the card works in another tachograph. Try to insert another card.

Code	DTC	Type of event or fault	Description	Suggested action to be taken
!13	002452	Unauthorised change of motion sensor	The sensor has been changed since last pairing.	Check motion sensor operation and all wiring. Check for evidence of tampering. Pair the motion sensor and tachograph again. Perform a new calibration of the tachograph system. Replace the sensor if found faulty.
!14		Card data input integrity	The cryptographic communication with the card inserted (in slot 1 or 2) is unsuccessful.	To check the card, insert it in another tachograph. Try to insert another card.
!15		Stored data integrity error	The stored data in the 365 day memory is erroneous.	Decommission and replace the tachograph.
!18		Hardware sabotage	Card has been removed by force	Check for evidence of tampering with card reader. Decommission and replace the tachograph.
!18		Security violation	Tampering with hardware has been detected.	Check for evidence of tampering with the unit. Decommission and replace the tachograph.

Motion sensor related events

Code	DTC	Type of event or fault	Description	Suggested action to be taken
!0A	002780	Vehicle motion conflict	Speeds from motion sensor and GNSS contradict	Check that GNSS can receive satellite signals
!20	002508	No further details	Motion sensor internal error, but no further fault cause.	Replace the motion sensor.
!21	002508	Authentication failure	Motion sensor internal error, authentication failure.	Replace the motion sensor.
!22	002508	Stored data integrity error	Motion sensor internal error, stored data integrity failure	Replace the motion sensor
!35	002508	No further details	Motion sensor unknown internal error	Replace the motion sensor

Recording equipment faults

Code	DTC	Type of event or fault	Description	Suggested action to be taken
X31	000139 000800 002007 000C31	VU internal fault	Internal fault in the tachograph	If DTC remains active, it is a non-recursive error. Decommission and replace.

Event, Fault and Diagnostic Trouble Codes

Code	DTC	Type of event or fault	Description	Suggested action to be taken
	002280	Sensor fault Error response or acknowledge	Motion sensor communication error. Content of acknowledge or response is not correct.	Check motion sensor operation and all wiring. Check for evidence of tampering. Pair the motion sensor and tachograph again.
	002003	Sensor fault (MS Power to Low)	Motion sensor power supply too low. DTC is activated 4 sec after low power is detected.	Perform a new calibration of the tachograph system. Replace the sensor if found faulty.
	002380	Sensor fault (No acknowledge)	Motion sensor communication error. No acknowledge received when expected.	Check motion sensor operation and all wiring. Replace the sensor if found faulty.
	002380	Sensor fault (No response)	Motion sensor communication error. No response received when expected	Check motion sensor operation and all wiring. Replace the sensor if found faulty.

Card faults

Code	DTC	Type of event or fault	Description	Suggested action to be taken
!01		Insertion of a non-valid card	A non-valid card has been inserted in the VU	Make sure that only valid tachograph cards are used.
X40		Card fault		Withdraw the card and check it.
	000200	Card fault - Slot 1	Error detected on inserted card in slot 1.	Insert the card into another tachograph and verify functionality.
	000300	Card fault - Slot 2	Error detected on inserted card in slot 2.	Insert another card and verify functionality.

Manufacturer specific events and faults (pop-ups)

Code	DTC	Type of event or fault	Description	Suggested action to be taken
	000660	Printing stopped, out of paper	Printer is out of paper.	Insert a new paper roll.
	0001C0	Overspeeding pre warning	The speed of the vehicle has exceeded the highest speed allowed for the vehicle. This has been active during less than 60 seconds and the overspeeding event is not yet activated.	Driver related message.
	000D40	Calibration error	Calibration error, time for periodic inspection. Two years has passed since last calibration.	Perform a calibration.
	000B78	CAN bus off, TCO CAN	CAN bus off, A connector, also named TCO-CAN or A-CAN.	Check cables, especially A connector at the back of the tachograph.
	00FD0B	CAN bus off, FMS CAN	CAN bus off, C connector, also named FMS-CAN or C-CAN.	Check cables, especially C connector at the back of the tachograph.
	000007	VU power supply high	Tachograph power supply voltage is higher than maximum value.	Check vehicle power supply levels. Check power supply input to tachograph. Check all connections and tachograph operation.

Event, Fault and Diagnostic Trouble Codes

Code	DTC	Type of event or fault	Description	Suggested action to be taken
	000003	VU power supply low	The power supply to the tachograph has been lower than minimum value for more than 4 seconds. Cranking voltage should not cause this event	<p>Check vehicle power supply levels.</p> <p>Check power supply input to tachograph.</p> <p>Check all connections and tachograph operation.</p>
	000900	No ignition but speed pulses present	Ignition off, but speed pulses are present.	<p>Investigate if the vehicle has been under environmental disturbances like vibrations etc.</p> <p>Check motion sensor operation and all wiring – replace sensor if faulty.</p> <p>Check speed pulses are not being injected through front connector.</p>

Frequently asked Questions, FAQ

In the list below the most common questions asked and their corresponding answers are listed.

Frequently asked questions	Answers
What smart tachograph can be fitted in this vehicle?	Please contact customer support: workshop.support@stoneridge.com or +44(0) 1382 866 300
The tachograph will not read / recognise the card.	Ensure that the card is correctly inserted, see Insert a Workshop Card on page 7. Clean the card and retry. Try the card in both slots and in another tachograph . Is the card valid? Driver cards are only read if the Tachograph is activated. If a workshop card is inserted in a non-activated Tachograph, it will accept it and ask for the PIN. If the PIN is OK it will then automatically activate the Tachograph. Check displayed messages when card is inserted, see Display Messages on page 39.
I cannot download data from the tachograph .	Check that the workshop card is inserted and accepted, i.e the tachograph is in calibration mode. Remove the power to the tachograph and retry after reconnecting. Check the download device. Decommission the tachograph if the fault remains.
My card is stuck in the tachograph , how do I retrieve my card?	Remove the power to the tachograph and retry after reconnecting, see Opening Failing Card Trays on page 31.
Data integrity error on the display.	Contact your Stoneridge dealer for actions or see Display Messages on page 39.
Why does the printout at the end of the day show more driving time than the driver thinks is done?	Driving time is calculated pro minute. i.e. driving time 31 sec result in 1 minute calculated time. A 1 minute preceded of driving and succeed of driving is also calculated as driving.
Drivers are warned to take a break after inserting their card for a new shift due to not changing activities when removing their card at the end of the previous shift.	Tachograph does not know unknown activities since last withdrawal, please answer Yes to the question 'Rest until now' at next insertion (if true).
The illumination does not work.	Turn on the illumination using the Stoneridge Optimo2 Tachograph programmer. Check the light source settings.
Why can I not program all the SE5000-8 functions using VDO programmer?	Only the functions necessary to calibrate the SE5000-8 are included in the VDO programmer.
Where do you plug in the programmer / download tool?	Behind the printer cassette, see Calibration and Download Front Connector on page 36.

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