

Workshop Manual



SE5000 Digital Tachograph



Stoneridge - Setting the standard
www.SE5000.com



Important

The Stoneridge tachograph SE5000 has full type approval for use in the European union according with Commission Regulation (EC) No. 1360/2002 of 13 June 2002 and other related legislatives.

The Approval Certificate number is e5-0002. This number will be indicated on all Stoneridge tachographs.

The tachograph fulfils the requirements of EU Commission Directive 72/245/EEC, last amended by Directive 2006/96/EC, certificate No 03 0289, in respect of electromagnetic compatibility.

Workshop Card

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

!

- The workshop card is not allowed to be used by any unauthorised personnel.
- Never store the workshop card together with the associated PIN code.

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For updated addresses to workshops in all countries, please log on to
<http://www.stoneridge-electronics.info>

Symbols



Warning



Important information



Tip, Note



Action required



Page reference

Display

Messages in the display

Version of Tachograph

This manual is valid for Digital Tachograph SE5000,
Rev. 7.3.

Information on the Internet

Further information about Stoneridge digital tachograph SE5000 and about Stoneridge Electronics AB can be found at:

www.stoneridgeelectronics.info

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Introduction

This manual is directed to workshop personnel performing installation, maintenance, periodic inspection and repair of the SE5000. 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

!

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 digital tachograph systems. For example installation, activation, calibration and inspection.

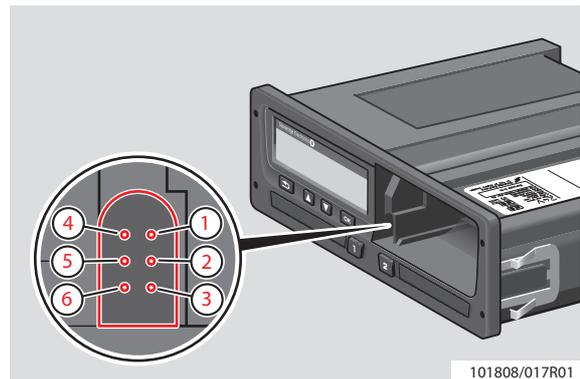
A variety of equipment will be required to carry out the above-mentioned workshop functions. Essential to most of the workshop functions carried out is the workshop card. Due to the security implications of digital tachograph systems, all workshop cards use a PIN code for authentication.

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.

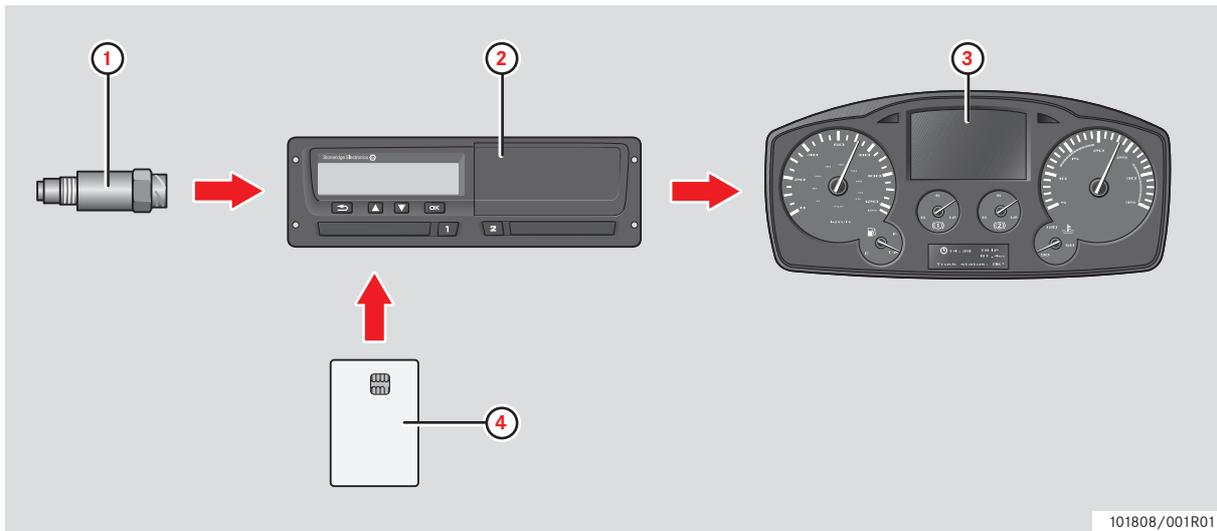
The SE5000 can program certain parameters without the need of calibration equipment.

There is a 6-pin calibration/download connector located behind the paper cassette. Approved 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.

Tachograph System Overview



- 1 Encrypted motion sensor
- 2 Digital tachograph, with integrated display and printer
- 3 Display in vehicle's instrument cluster
- 4 Card

Encrypted 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.

Digital 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 with 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.

A workshop card under security PIN control can also store driving data and can 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.



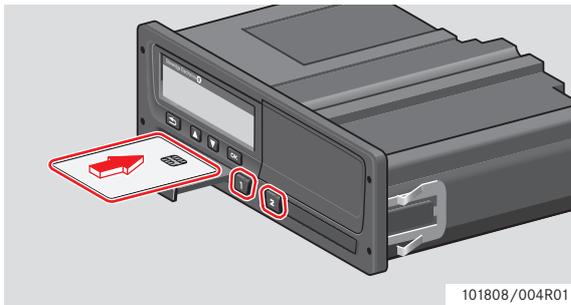
The workshop card is personal and may not be used by anyone else but the rightful card holder.

Tachograph System Overview

Insert 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.

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



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

Card Trays Locked

The card trays are locked:

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

Initial procedure

When a valid workshop card has been inserted correctly, the name of the card holder will appear shortly afterwards.



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

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

- ▶ Use the **▼** or **▲** button to select the correct digit. Confirm by pressing the **OK** button. Repeat selecting and confirming as needed.



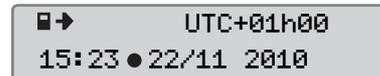
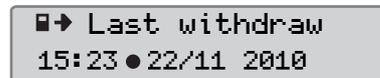
The PIN code can be between 4 and 8 characters. Use the **←** button to go back and change a digit.

The card will be ejected if no PIN code is entered within 2 minutes.

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



When the correct PIN code has been entered and confirmed the last withdraw of the card and local time/UTC offset is shown.



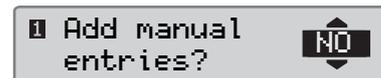
“Rest until now?”

Select and confirm “No”.



▶ “Add manual entries?”

Select and confirm “No”.



▶ Select and confirm the country you are at present in.



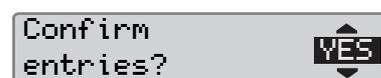
▶ “Entries printout?”

Select and confirm “No”.



▶ “Confirm Entries?”

Select and confirm “Yes”.



- ▶ “Ready to drive” will show and then the standard display. The tachograph is now in calibration mode.



!

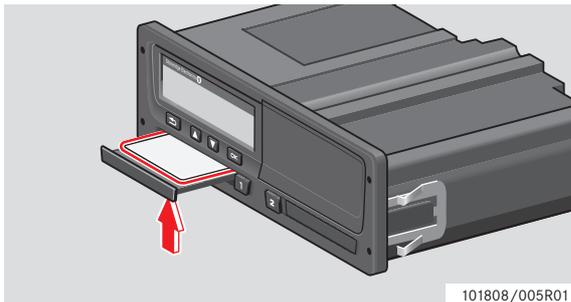
If the wrong PIN is entered, a message will be displayed to indicate how many attempts there are left.

Withdrawal of card after entering a wrong PIN code will not reset the PIN code counter.

Withdraw a Workshop Card

Press and hold the **1** button to open the driver card tray or the **2** button to open the co-driver card tray.

- ▶ Enter and confirm the country you are at present in.



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- ▶ Remove the workshop card.
- ▶ Close the tray by pushing it in carefully.

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Withdrawal of the Workshop Card is not possible in all menus.

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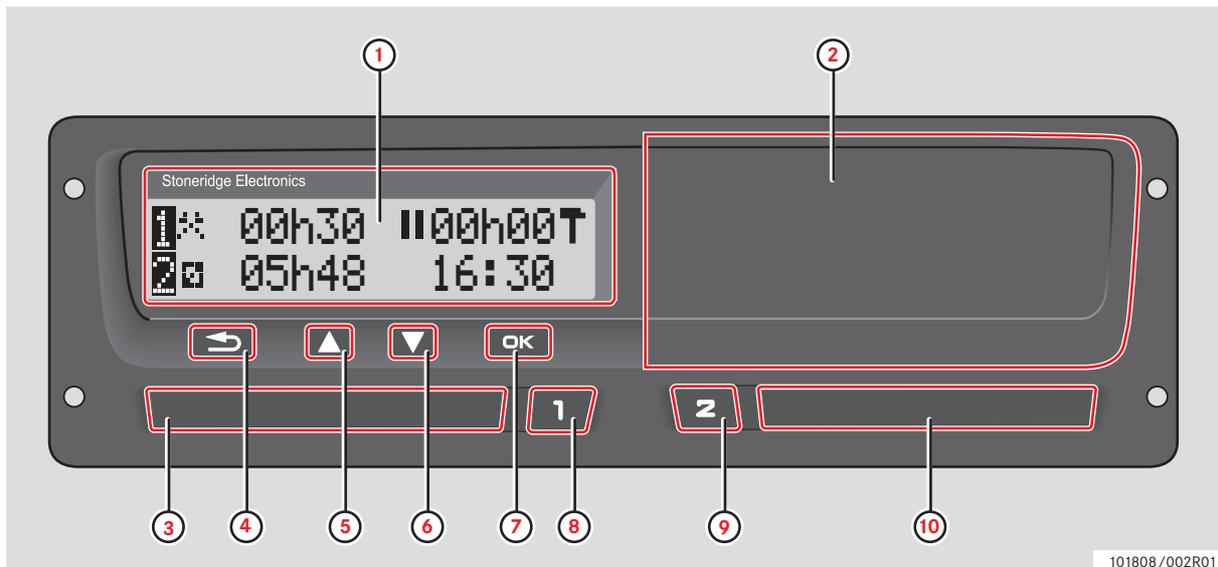
For information on installing tachograph in vehicle, please see chapter (▶ Installation of Tachograph System, page 35)

Tachograph 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.

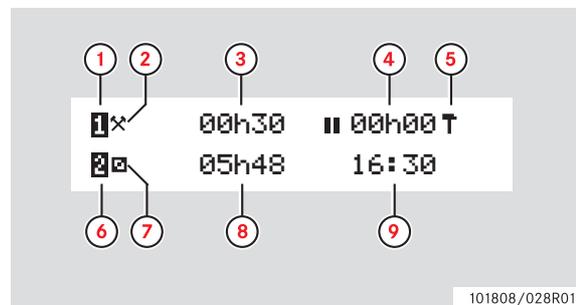
The tachograph complies with EU Regulations and displays and records speed and distance in metric units (kilometres per hour and kilometres respectively).

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

Standard Display



- 1 Driver
- 2 Driver's activity
- 3 Duration of driver's activity or continuous
drive time
- 4 Driver's cumulative break time
- 5 Mode of operation of the tachograph
(Calibration)
- 6 Co-driver
- 7 Co-driver's activity
- 8 Duration of co-driver's activity
- 9 Local time

Other Displays

Press the  or  button to change the standard display into:

- Standard display, driver 1 and 2
- Driver 1 display
- Driver 2 display
- Date and time display
- Current speed display

Tachograph Menu

The items in the tachograph menu are:

- Printer



- Places



- Settings



The menus relevant for the workshop are the **print** menu and the **settings** menu and therefore only those will be further explained in this manual. For information about other menus, see the Driver & Company Manual.

To show the items in the tachograph menu:

- ▶ Press the  button.
- ▶ Press the  or  button to scroll through the various menu items.
- ▶ Press the  button to call up a specific menu item.



These menus are only available when the vehicle is stationary.

Settings

You can change and use the following settings:

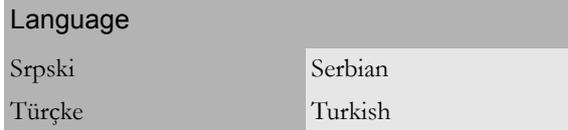
- Tachograph language
- Local time
- UTC time
- Invert display
- Built-in test (Self test)
- Parameters
- Vehicle Registration Number (VRN)

Language

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.

The available languages are the following:

Language	
БЪЛГАРСКИ	Bulgarian
Čeština	Czech
Dansk	Danish
Deutsch	German
Eesti	Estonian
Ελληνικά	Greek
English	English
Español	Spanish
Français	French
íslenska	Icelandic
Italiano	Italian
Latviesu	Latvian
Lietuviu	Lithuanian
Magyar	Hungarian
Nederland	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



The chosen language is saved only in the tachograph, not on the tachograph card.

Change Language

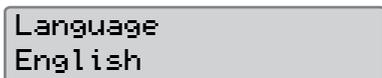
- ▶ Press the **OK** button.
- ▶ Press the **▼** or **▲** button to scroll to “Settings”.
- ▶ Press the **OK** button.



- ▶ Press the **▼** or **▲** button to scroll to “language”.



- ▶ Press **OK**.
- ▶ Press the **▼** or **▲** button to select the desired language.

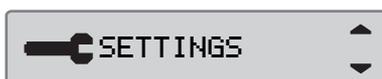


- ▶ Press the **OK** button to confirm the selected language.
- ▶ Press the **↩** button twice to return to the standard display.

Change Local Time

Setting a local time for the tachograph is for display purposes only, all the time registration for events and faults are stored in UTC time. Local time is the time in the country in which you and the vehicle are located. Local time is set manually.

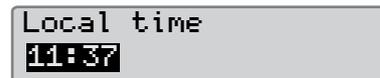
- ▶ Press the **OK** button.
- ▶ Press the **▼** or **▲** button to scroll to “Settings”.
- ▶ Press the **OK** button.



- ▶ Press the **▼** or **▲** button to scroll to “local time” and press **OK**.



- ▶ Press the **▼** or **▲** button to adjust minutes and hours in steps of 30 minutes.



- ▶ Press the **OK** button to confirm the changes.

The display “Changes saved” is shown.



- ▶ Press the **↩** button twice to return to the standard display.



The local time can be adjusted in increments of 30 minutes. This can be done without a workshop card inserted.

Change UTC Time and Date

All tachographs use Universal Time Coordinated (UTC) as their master reference time. UTC time is more or less corresponding to Greenwich Mean Time (GMT). The UTC time is not adjusted for summer / winter time.

- ▶ Press the **OK** button.
- ▶ Press the **▼** or **▲** button to scroll to “Settings”.
- ▶ Press the **OK** button.



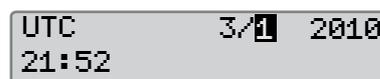
- ▶ Press the **▼** or **▲** button to scroll to “UTC time”.



- ▶ Press the **OK** button.
- ▶ The year is automatically highlighted. Use the **▼** or **▲** button to change value. Confirm with the **OK** button.



- ▶ After confirming year, the month is automatically highlighted. Adjust month with the **▼** or **▲** button. Confirm with the **OK** button.



- ▶ After confirming month, the day is automatically highlighted. Adjust day with the or button. Confirm with the button.



- ▶ After confirming day, the hour is automatically highlighted. Adjust hour with the or button. Confirm with the button.



- ▶ After confirming hour, the minutes is automatically highlighted. Adjust minutes with the or button. Confirm with the button.



The display “Changes saved” is shown.



- ▶ Press the button twice to return to the standard display.

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- Adjustments of the UTC time are restricted to within the validity start and expiry time of the workshop card inserted in the tachograph.
- The UTC time cannot be set closer than one hour before the card’s expiry date.

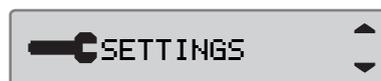
!

If the tachograph UTC time is inaccurate by a magnitude of greater than +/- 20 minutes, then the tachograph must be re calibrated.

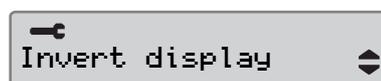
Invert Display

The display can be set in either positive or negative view.

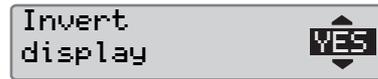
- ▶ Press the button.
- ▶ Press the or button to scroll to “Settings”.
- ▶ Press the button.



- ▶ Press the or button to scroll to “invert display” and press .



- ▶ Press to confirm “Yes”.



- ▶ The following display is shown



Reset Invert Display

- ▶ Press the button.
- ▶ Press the or button to scroll to “Settings”.
- ▶ Press the button.



- ▶ Press the or button to scroll to “invert display” and press .



- ▶ Press the or button to select “No”. Press to confirm.



The following display is shown.



Press the button twice to return to the standard display.

Built-in Test

To perform the built-in test follow the description in chapter:

- (▶ Troubleshooting and Self-test, page 45)

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.
- ▶ Press the **▼** or **▲** button to scroll to "Settings".
- ▶ Press the **OK** button.



- ▶ Press the **▼** or **▲** button to scroll to "Parameters" and press **OK**.



- ▶ Use the **▼** or **▲** buttons to scroll through the parameters.
- ▶ Confirm the parameter to be changed with **OK**.
- ▶ Use the **▼** or **▲** button to change the parameter settings.

Confirm the change with **OK**. The display "Changes saved" is shown.



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

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

Parameter	Selections	Effect on tachograph
Light source input	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.
K-line rear contact D7 master/slave	Select master or slave mode for K-line D7.	Selects if the tachograph is acting as master or slave.
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".

Tachograph User Interface

Parameter	Selections	Effect on tachograph
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".
Drive time warning	Sets the continuing drive time warning to current legislation.	The tachograph calculates the continuous drive time and cumulative rest time due to EC directives 561/2006 or 3820/85.

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

Printouts

A tachograph has the ability to supply various types of printout relating to the unit itself and to inserted workshop or driver cards. The following sections describe how to create a printout, the different types available and some examples of printouts.

How to Create a Printout

- ▶ Press the **OK** button to enter the tachograph menu.
- ▶ Press the **▼** or **▲** button until the Print menu appears, and then press **OK**.



- ▶ Use the **▼** or **▲** button to select one of the printouts shown in the table below.
- ▶ Press **OK** to confirm the printout you have selected.
- ▶ Use the **▼** or **▲** button whether to print out the data on paper (printout) or to show it in the tachograph display.
- ▶ Press **OK** to start the printout.



Types of Printout

Menu item	Type of printout	Description
24h ▼ 24h card	Driver activities from card, daily printout. (legal requirement)	List of all activities for selected date with activities stored on the driver card or co-driver card in UTC-time.
24h A ▼ 24h vehicle	Driver activities from vehicle unit, daily printout. (legal requirement)	List of all activities stored in the tachograph for the selected date, in UTC time: <ul style="list-style-type: none"> ▶ If no card is inserted, select either the current day or any of the eight recent 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.
!X ▼ events card	Events and faults printout from card. (legal requirement)	List of all warnings and malfunctions stored on a driver card.
!X A ▼ event vehicle	Events and faults printout from vehicle unit. (legal requirement)	List of all warnings and malfunctions stored in the tachograph.
T ▼ technical data	Technical data.	List of the parameter settings in the tachograph.
>> ▼ overspeeding	Overspeeding data.	List of all overspeeding warnings.
 man entry sheet	Manual entries sheet printout.	Printout for filling in manual entries manually using a pen.
 vehicle speed	Vehicle speed (km/h).	List of vehicle speed bands in km/h.
 engine speed	Engine speed (rpm).	List of engine speed bands in rpm.
 status D1/D2	D1/D2	List of changes in status for rear connector D1 and D2. The output options for connectors D1 and D2 are company specific.

Types of Printout

Menu item	Type of printout	Description
 24h card local 	Daily activities from the driver card, in local time.	List of all activities for any of the dates with activities stored on the driver card, in local time.
 24h vehic. local 	Daily activities from the tachograph (VU), in local time.	List of all activities stored in the tachograph for the selected date, in local time: <ul style="list-style-type: none"> ▶ If no card is inserted, select either the current day or any of the eight recent 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 name of the card holder is included on the printout.

Symbols

Symbol	Description
	Function not available while driving.
1 ,	Driver
2 ,	Co-driver
	Card
	Eject
	Work
	Driving, operational mode
	Rest
	Available
	Ferry/ train journey
OUT	“Out of scope”, i.e. no recording is required
	Location
	Start of work
	End of work
	Break
	From or to
	Printout
	Paper
	Display
	Processing, please wait
	Time
UTC	UTC time
LOC	Local time in printout
24h	Daily
	One week
	Two weeks
Σ	Cumulative./summary
>	Speed
>>	Overspeeding
x	Message, warning or malfunction
!	Events
?	Unknown activity
	Workshop, Calibration mode
	Company, Company mode
	Enforcement authority, Control Mode
	Non activated unit
	Finished
	Security
	External storage

Symbol	Description
	Buttons
	Company lock
	Tachograph (VU)
	Tyre size
	Sensor
	Power supply
	Print
	Settings
	Places
	Places

The symbols shown in the display and on the printouts represent persons, activities or processes of the tachograph.

Symbol Combinations

The symbol combinations shown on the display and the printouts represent persons, activities or processes of the tachograph.

Symbol	Description
● ▶	Country in which work started
▶ ●	Country in which work ended
🕒 →	Start time (UTC time)
→ 🕒	End time (UTC time)
● 🕒	Local time
🕒	Driving time for one week
🕒	Driving time for two weeks
OUT →	Start of “Out of scope”
→ OUT	End of “Out of scope”
↓ ○	Printer Low temperature
↑ ○	Printer High temperature
🗑️ --	No card
○ 🗑️	Driver card
🏠 🗑️	Workshop card
🏢 🗑️	Company card
🗑️ 🗑️	Control card
🗑️ ●	Control location
🗑️ →	Data from the tachograph

Examples of Printouts

Technical data printout

Stoneridge

1 19/10/2010 08:41 (UTC)

2 T

3 S /00007001106910 0 0
23/05/2015

4 ABCD1E2345678910
5 NL /AA-BB-12

6 Stoneridge Electronics
Adolfsbergsvägen 3
S70227 örebro

7 900208E7.3/01R01
8 SVN31309

9 1234567890/7878/06/A2
10 2010

11 v P477 31/07/2010

12 1234567890/1006/07/A1
13 e1-175

14 05/08/2010

15 T STONERIDGE ELECTRONICS
16 168 66 BROMMA

17 T S /12345678901012 1 0
18 31/08/2016

19 T 05/08/2010 (1)
20 NL /AA-BB-12
21 /??????????????

22 w 9 150 Imp/km
23 k 9 150 Imp/km
24 l 3 331 mm
25 315/80 R22.5
26 > 89 km/h
27 15 km; 15 km

T Johansson and Sons
123 45 BROMMA

T S /12345678901012 1 0
31/08/2016

28 T 06/08/2010 (2)
29 ABCD1E2345678910
30 NL /AA-BB-12

w 9 150 Imp/km
k 9 150 Imp/km
l 3 331 mm
315/80R22.5
> 89 km/h
0 km; 26 km

! 06/08/2010 10:40
06/08/2010 10:41
T Johansson and Sons
123 45 BROMMA

T S /12345678901012 1 0

! 19/10/2010 08:40
x 19/10/2010 08:40

101808/018R02

- 1 Date and time of printout.
- 2 Technical data printout.
- 3 Cardholder ID.
- 4 Vehicle Identification Number (VIN).
- 5 Vehicle Registration Number (VRN) and country of registration.
- 6 Tachograph manufacturer.
- 7 Tachograph part number.
- 8 Tachograph approval number.
- 9 Tachograph serial number, date of manufacture, type of equipment and code of manufacturer.
- 10 Year of manufacture.
- 11 Software version and installation date.
- 12 Motion sensor serial number.
- 13 Motion sensor approval number.
- 14 Date of first installation of motion sensor.
- 15 Workshop having performed the calibration.
- 16 Workshop address.
- 17 Workshop card identification.
- 18 Workshop card expiry date.
- 19 Calibration date and purpose, see page 39.
- 20 VIN.
- 21 VRN (shown as question marks before registered) and country of registration.
- 22 Characteristic coefficient of vehicle.
- 23 Constant of the recording equipment.
- 24 Effective circumference of wheel tyres.
- 25 Size of tyres.
- 26 Authorized speed setting.
- 27 Old and new odometer values.
- 28 Calibration date and purpose.
- 29 VIN.
- 30 VRN and country of registration.
- 31 Old date and time.
- 32 New date and time.
- 33 Most recent event date time.
- 34 Most recent fault date time.

Events and faults VU printout

Stoneridge

1 30/05/2007 00:38 (UTC)

2 !XA

3 T STONERIDGE ELECTRONICS
T UK / K 0 0 0 0 0 0 0 0
11/07/2007

4 A ABCD1E2345678910
NL /AA-BB-12

5 ! 00 14/08/2003 14:24
!02 (001) 00h20
NL /NL012345678910 0 0
NL /NL087369844270 0 0

6 ! 01 27/01/2007 08:57
!04 (003) 00h14

7 ! 03 08/12/2006 18:52
!05 (001) 00h00
NL /NL012345678910 0 0

8 ! 00 14/08/2003 14:22
!06 (001) 12h50
NL /NL012345678910 0 0

9 !+ 01 01/03/2007 09:30
!08 (001) 99h59

10 ! 00 02/04/2007 09:24
!15 (001) 00h00

11 x 00 04/04/2007 14:37
x40 (000) 00h00

12 x 00 02/04/2007 11:36
x35 (000) 01h38

13 !*

14 !

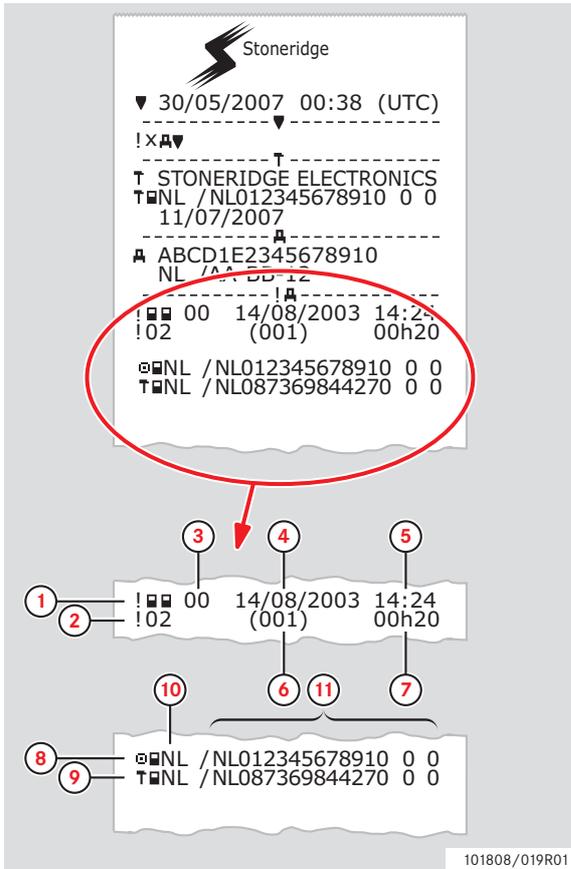
15 !

101808/020R01

- 1 Date and time of the printout.
- 2 Type of printout. (events and faults, VU).
- 3 Workshop card identification.
- 4 Vehicle Identification Number (VIN)
Vehicle Registration Number (VRN)
and country of registration.
- 5 Card conflict (event).
- 6 Driving without valid card (event).
- 7 Card inserted while driving (event).
- 8 Last card session not correctly closed (event).
- 9 Power supply interruption (event).
- 10 Data integrity error (event).
- 11 Card fault (fault).
- 12 Sensor fault (fault).
- 13 Control place.
- 14 Controller signature.
- 15 Driver signature.

▷ List of Event and Fault Codes and Diagnostic Trouble Codes (DTCs), page 67.

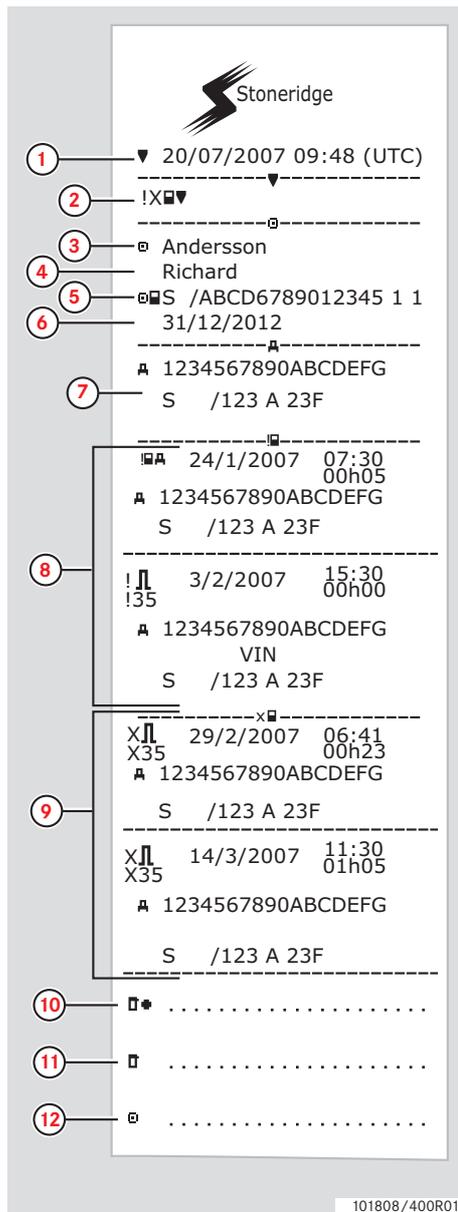
Detailed overview of events and faults VU print-out



- 1 Type of event or fault (card conflict).
- 2 Event or fault code (card conflict).
- 3 Event or fault record purpose:
00 - one of the 10 most recent (or last) events or faults.
01 - the longest event for one of the last 10 days of occurrence.
02 - one of the 5 longest events over the last 365 days.
03 - the last event for one of the last 10 days of occurrence.
04 - the most serious event for one of the last 10 days of occurrence.
05 - one of the 5 most serious events over the last 365 days.
06 - the first event or fault having occurred after the last calibration.
07 - an active/on-going event or fault.
- 4 Date of event or fault.
- 5 Start time of event or fault.
- 6 Number of events of the same type during the day.
- 7 Duration of event or fault.
- 8 Card inserted in slot 1 at the beginning of event or fault (Driver card).
- 9 Card inserted in slot 2 at the end of the event or fault (Workshop card).
- 10 Card issue country.
- 11 Card number (shown with every second number replaced with a space if not in calibration or company mode or if no card is inserted).

For a detailed list of all events and faults, see
 ▷ List of Event and Fault Codes and Diagnostic Trouble Codes (DTCs), page 67.

Events and faults card



- 1 Date and time (UTC time).
- 2 Type of printout. (event and faults, card).
- 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 List of all events stored on the card.
- 9 List of all faults stored on the card.
- 10 Control place.
- 11 Controller's signature.
- 12 Driver's signature.

24 h Driver Card Printout

1 06/03/2009 10:32 (UTC)

2 24h

3 Andersson

4 Richard

5 S /00007001106910 0 0

6 20/02/2012

7 1234567890ABCDEFG

8 S /ABC 123

9 Stoneridge Electronics

10 900208R7.1/26R01

11 Johansson and Sons

12 S /0 0 0 1 1 6 0 0

13 23/09/2008

14 S /0 0 0 1 2 3 0 0

15 23/01/2009

16 06/03/2009 52

17 1

18 S /ABC 123

19 0 km

20 08:55 00h01

08:56 00h01

08:57 01h25

10:22 00h01

10:23 00h09

21 1 km; 1 km

21 08:53 S 0 km

00h02 1 km

08h54 01h25

00h11 ? 00h00

00h30

- 1 Printout date and time (UTC time).
- 2 Type of printout (24h, card).
- 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.
- 8 Registering member state and Vehicle Registration Number, VRN.
- 9 Tachograph manufacturer.
- 10 Tachograph part number.
- 11 Responsible workshop for last calibration.
- 12 Workshop card number.
- 13 Date of last calibration.
- 14 Last control the inspected driver has been subjected to.
- 15 Enquiry date and daily card presence counter.
- 16 Tray where card was inserted.
- 17 VRN, Vehicle Registration Number, for the vehicle where the driver card was insert.
- 18 Vehicle odometer at card insertion.
- 19 Activities with driver card inserted, start and duration time.
- 20 Card withdrawal: Vehicle odometer and distance travelled since last insertion for which odometer is known.
- 21 Daily summary of activities.

(Continuing on next page) >>

101808/200R02

The screenshot displays a tachograph interface with the following content:

- 22** Points to the last five events and faults from the driver card, including:
 - !11 27/02/2009 16:32 93h41
 - X35 05/03/2009 15:20 17h32
 - !11 05/03/2009 15:20 17h32
 - X35 06/03/2009 08:55 01h37
 - !11 06/03/2009 08:55 01h37
- 23** Points to the last five events and faults from the VU, vehicle unit, including:
 - X35 00 03/03/2009 09:15 05h10
 - !11 00 03/03/2009 09:15 05h10
 - !08 01 03/03/2009 14:26 (1) 48h53
 - X35 07 05/03/2009 15:20 19h12
 - !11 07 05/03/2009 15:20 19h12
- 24** Points to the control place field, represented by a star icon and a dotted line.
- 25** Points to the controller's signature field, represented by a signature icon and a dotted line.
- 26** Points to the driver's signature field, represented by a signature icon and a dotted line.

At the bottom right of the interface, the text "101808/201R02" is visible.

- 22** Last five events and faults from the driver card.
- 23** Last five events and faults from the VU, vehicle unit.
- 24** Control place.
- 25** Controller's signature.
- 26** Driver's signature.

24 h Vehicle Unit

Stoneridge

1 06/03/2009 10:39 (UTC)

2 24h

3 Andersson

4 Richard

5 S /00007001106910 0 0

6 20/02/2012

7 Schmidt

8 Magnus

9 S /00007001106880 0 0

10 20/02/2012

11

12 06/03/2009

13 0 - 1 km

14 Andersson Richard
S /00007001106910 0 0
20/02/2012

15 S /ABC 123

16 03/03/2009 11:45

17 0 km
00:00 08h53
0 km; 0 km

18 0 km
08:53 00h02
0 km; 0 km

Andersson Richard
S /00007001106910 0 0
20/02/2012
S /ABC 123
06/03/2009 10:26
0 km
08:55 00h01
08:56 00h01
08:57 01h25
10:22 00h01
10:23 00h16
1 km; 1 km

101808/300R02

Note! For excluded parts, see the driver card print out.

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

(Continuing on next page) >>

19 Schmidt Magnus
S /00007001106880 0 0
20 20/02/2012
21 S /ABC 123
22 05/03/2009 14:40
0 km
00:00 08h53
0 km; 0 km

0 km
08:53 00h02
0 km; 0 km

Schmidt Magnus
S /00007001106880 0 0
20/02/2012
S /ABC 123
06/03/2009 10:25
0 km M
08:55 00h01
08:56 01h43 *
1 km; 1 km

1 00h00 0 km
X 00h02 00h00
H 00h00

2 00h00 00h02
X 00h00 00h02
H 00h00

Andersson Richard
S /00007001106910 0 0
08:53 S
00h02 0 km 1km
X 08h54 01h25
H 00h16
08:10h37

Schmidt Magnus
S /00007001106880 0 0
08:53 S
00h00 0 km 1km
X 00h00 08h54
H 01h43
08:10h37

101808/301R02

- 19 Co-driver.
- 20 Registration member state and vehicle registration number of previous vehicle used.
- 21 Date and time of card withdrawal from previous vehicle.
- 22 Vehicle odometer at card insertion.
M= Manual entries of driver activities.
* = Rest period of at least one hour.
- 23 Summary of periods without card in driver slot.
- 24 Summary of periods without card in co-driver slot.
- 25 Daily summary of activities (driver).
- 26 Daily summary of activities (co-driver).

Overspeeding

Stoneridge

1 20/07/2007 09:48 (UTC)

2 >> 89 km/h

3 Andersson

4 Richard

5 S /ABCD6789012345 1 1

6 31/12/2012

7 1234567890ABCDEF G

S /123 A 23F

8 9/2/2007 11:31

>> 17/1/2007 (008)

9 12/2/2007 19:24 00h05

98 km/h 94 km/h

Andersson

Richard

S /ABCD6789012345 1 1

31/12/2012

10 >>(365)

9/2/2007 11:31 00h10

99 km/h 97 km/h

Svensson

Bertil

S /EFGH123456786 2 2

31/12/2012

11 >> 12/2/2007 19:24 00h05

98 km/h 94 km/h

Andersson

Richard

S /ABCD6789012345 1 1

31/12/2012

12 >> 12/2/2007 19:24 00h10

99 km/h 97 km/h

Svensson

Bertil

S /EFGH123456786 2 2

30/11/2011

13

14

101808/500R02

- 1 Date and time (UTC time).
- 2 Type of printout. (overspeeding, speed limiting 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. Date and time of first overspeeding and number of overspeeding events
- 9 First overspeeding after the last calibration. Date time and duration. Max and average speed. Driver and drivers card identification.
- 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.

Installation of Tachograph System

The full fitting procedure consists of the following:

- Fitting the motion sensor and the sensor 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.

!

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 data label must show the correct Stoneridge tachograph type approval number-e5-0002.
- The tamper label must be intact and not interfered with. The tamper label which has 2 different appearances can be seen on (▷page 47).
- The Stoneridge hologram must be present and correct. The hologram is located on the tamper label behind the paper cassette, see (▷page 47).
- 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.

!

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 sensor and fitted directly to the vehicle gearbox.

!

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

A Stoneridge tachograph only works with a Stoneridge approved motion sensor. Any existing motion sensor that was previously used with an analogue tachograph must be replaced before progressing.

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 has 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.

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

Installation of Tachograph System

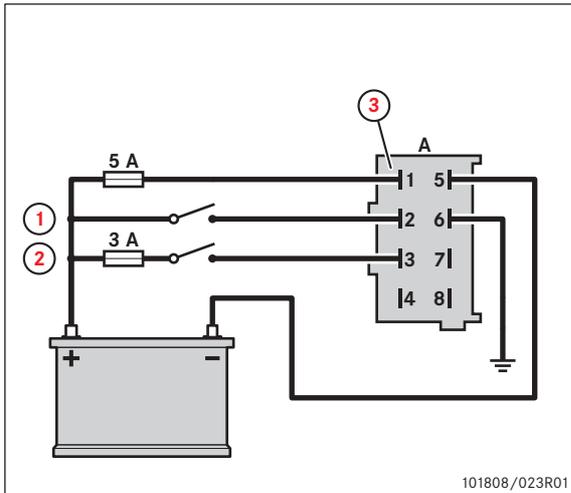
Tachograph Power Connections

The power to the tachograph is supplied through rear socket A, see picture on page 54. Note that all fuses used to protect the non-ADR type tachographs 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:

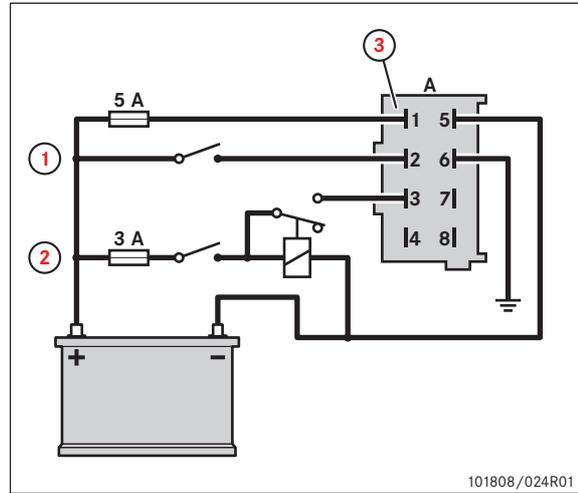
▷ Fitting an ADR Tachograph, page 58

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.

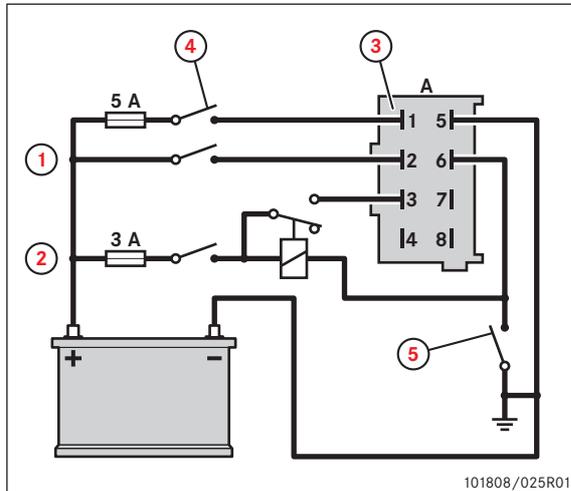


- 1 Lights
- 2 Ignition
- 3 2714-265 (housing natural) and 2714-270 (tabs)



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 Connections

Various electrical signal connections to the tachograph rear sockets will be required, with the exact connections dependant on the vehicle type. A description of all rear connections is included in:

▷ Rear socket connections, page 54.

Fitting the Tachograph

Since the Stoneridge tachograph conforms to the ISO 7736 standard for a radio enclosure, fitment of 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 their seat.

A tachograph installation kit is available to aid fitting the tachograph into a vehicle. For more information, contact the Stoneridge local importer.

▷ Contact Stoneridge After Market Head Office, page 3.

► 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.

► 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.

!
Do not damage the exterior case during installation!

Activation and Motion Sensor Pairing

When a Stoneridge digital 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.



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.

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 MKII 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.

Installation of Tachograph System

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

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



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



When the pairing process is complete the following is displayed, press the **OK** button to confirm.



When the activation process is complete the following is displayed, press the **OK** button to confirm.



The activation process causes certain tachograph parameters to be initialised.

▷ Calibrating the Tachograph, page 39



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.



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 messages **Pairing failed** and **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.



If the pairing is not completed the following is displayed.



If activation or pairing fails:

- ▶ Remove the workshop card.
- ▶ Check the system connections.
- ▶ Re-insert the workshop card and redo 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 tachographs internal memory.

Connect a tachograph programmer (e.g. Stoneridge MKII version) to the front calibration/download connector to program the vehicle parameters.

For location of the front download connector, see:

▷ Calibration and Download Front Connector, page 53.

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 the non-activated mode, calibration parameter entry is possible to allow pre-programming of tachographs prior to fitment without the need for valid workshop card ownership.

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

- The current UTC date and time.
- The odometer reading.
- The characteristic coefficient of the vehicle (W-factor) and the tachograph constant value (K-factor).
- The effective circumference of the vehicle drive wheels (L-factor) and 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).



If the time is updated less than 20 minutes and no other updates are performed, this does not constitute a calibration but a time adjustment.

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

When a calibration is carried out a record of the calibration is generated and stored in the tachograph.

The contents of the record are as follows and the number in brackets refers to the technical printout example on page 25:

- The calibration purpose (18):
 - At activation.
 - The first calibration after activation.
 - The first calibration of the tachograph in the current vehicle.
 - Calibration as part of an inspection.
- The workshop name, address, card number and card expiry date (14-17).
- The VIN and VRN (3-4, 19-20, 28-29).
- The W, K and L-factors (21-23).

- The tyre size and speed limiting device setting (24-25).
- The odometer value (26).
- The UTC date and time (30-31).
- The date of next calibration (2 years from current date).

Similarly a calibration record is also generated and stored on the inserted valid workshop card (the card in tray 1 if valid workshop cards are inserted in both trays). The contents of the workshop card stored calibration records are as follows:

- A count of the total number of calibrations performed with the card.
- The calibration purpose (as described above).
- The VIN and VRN.
- The W, K and L-factors.
- The tyre size and speed limiting device setting.
- The odometer value.
- The UTC date and time.
- The date of next due calibration.
- The tachograph part number and serial number.
- The motion sensor serial number.
- A count of the number of calibrations performed since the workshop card stored calibration records were last downloaded.

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.

▷ Programming Vehicle Related Parameters, page 38.

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 reprogram 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.

Installation of Tachograph System

Checking Calibration Data

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

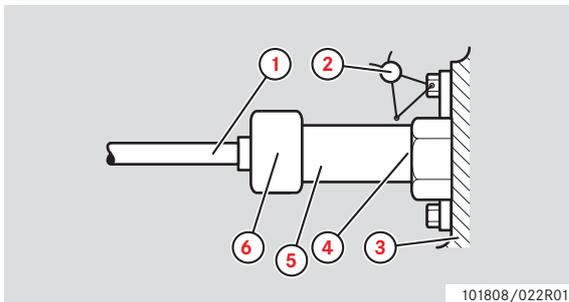
- ▶ Eject the workshop card.
- ▶ Make a technical data printout to confirm the correctness of the stored data.

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

Sealing the Digital 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.

Sealing of the motion sensor may be achieved using the same methods as for an analogue system, i.e. by the use of sealing pliers and traditional seals. The retaining nut for the motion sensor is cross-drilled so that it may be wired and sealed to a suitable drilled bolt securing the gearbox. The actual sealing method must be authorised by the relevant authorities. If re-sealing is necessary it must be carried out by authorised holders of valid workshop cards.



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

!

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 legislation.

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

Completing and Fitting the Installation Plaque

The final part of the digital tachograph system installation procedure is the completion and fitting 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.



Installation of shroud

In certain countries a shroud (part number 6800-007) that protects the connectors from tampering is required to be mounted at the rear of the tachograph.

Instructions can be obtained from your local importer.

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 workshop 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 CITO downloading equipment which significantly reduces the downloading time.

For more information about the CITO download equipment, contact Stoneridge.

▷ Contact Stoneridge After Market Head Office, page 3.

- ▶ Remove the printer cassette.
 - ▷ Printer Maintenance, page 43.

- ▶ Attach the download equipment to the tachograph through the 6-pin front download connector, located behind the paper cassette.
 - ▷ Calibration and Download Front Connector, page 53.

- ▶ Start downloading data according to the instruction on the download equipment.



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 (▷page 19).

Care and Maintenance

Care for Tachograph

Care for tachograph:

- Do not place objects on the trays when they are open, otherwise they could be damaged.
- The ingress of dirt can lead to premature failure of the tachograph. Keep the trays closed at all times and only open them to insert and withdraw cards.
- 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.



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

Care for Workshop card

Care for workshop card:

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

Workshop Card Damaged, Lost or Stolen

If the workshop card is damaged, lost or stolen the owner has to request to the responsible authority for a replacement card.

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

Printer Maintenance

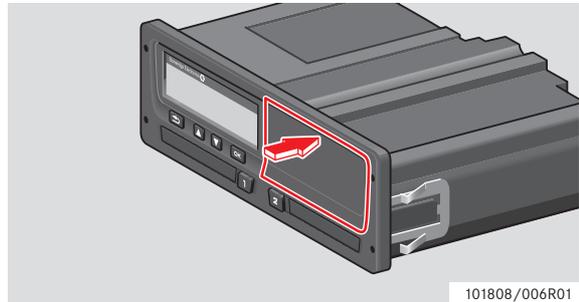
The only serviceable parts in the Stoneridge tachograph are the paper cassette and the printer paper. The printer heads may also be cleaned using a Stoneridge approved printer head cleaning pen. Do not attempt to service any other tachograph parts. If the paper cassette is damaged then the complete cassette must be replaced as a single item.



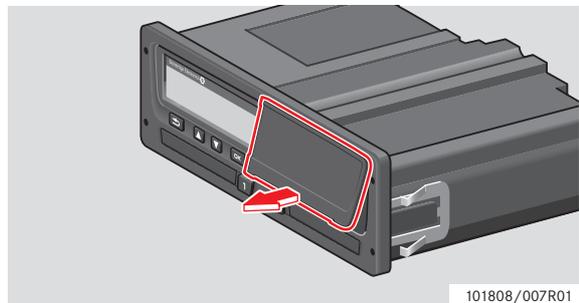
Cleaning the printer head must be done with the ignition switched off.

Removing the Paper Cassette

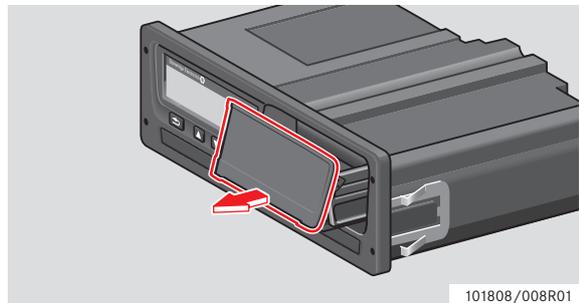
- ▶ Press the upper edge of the front panel. The panel folds out.



- ▶ Hold the panel by the lower edge.



- ▶ Pull the paper cassette out carefully.

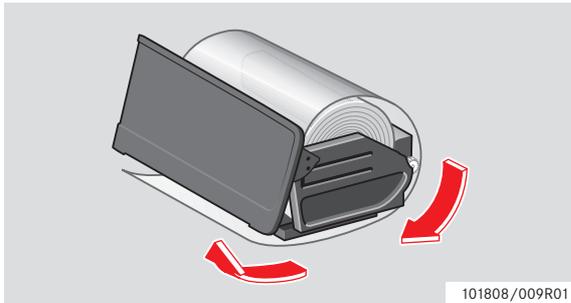


Inserting a Paper Roll



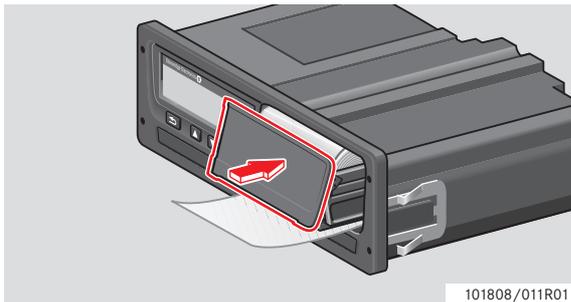
Only use printer paper approved by Stoneridge, otherwise there is a risk of printer malfunctions.

- ▶ Insert the paper roll. Feed the paper around the back of the paper cassette and forward, passing the lower edge of the panel.



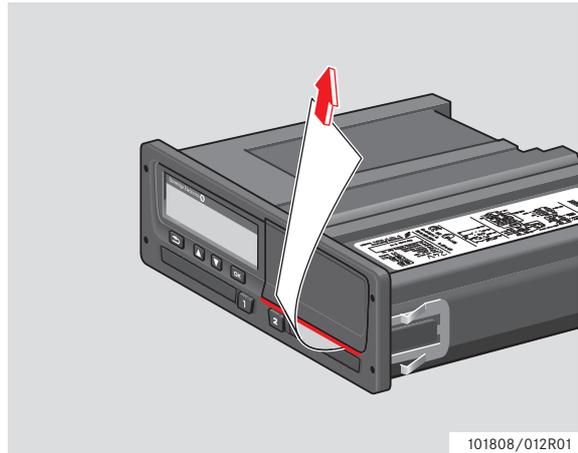
101808/009R01

- ▶ Insert the paper cassette into the fixtures of the tachograph.
- ▶ Press the middle of the panel and slide the paper cassette into the tachograph until it engages.



101808/011R01

- ▶ Pull the paper upwards and tear it off.



101808/012R01

Replacement Parts for Printer

Contact your local representative if you are in need of replacement parts.

Replacement part	Part No.
Paper roll - 3 pack	6800-032
Paper roll - 8 pack	6800-002
Paper cassette	6800-001



Store the printer paper in a cool, dry and dark location.

Troubleshooting and Self-test

Check of components

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

- Display
- Inserted card
- Buttons
- Printer
- Invert display function

Self-test Procedure

The self-test is only possible when the vehicle is stationary.

- ▶ Press the **OK** button.
- ▶ Select and confirm the **Settings** menu.



- ▶ Select and confirm to **Built-In test**.



- ▶ Scroll up or down to select a test. The selected test's symbol appears on the black bar, right-hand side of the display. See the table on the following pages for available tests.
- ▶ Press the **OK** button to start the selected self-test.

Symbol	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.	▶ If the display is unreadable the tachograph must be decommissioned and replaced.
■	Card	Test of the inserted card There must be a card inserted in the relevant slot. The name of the card holder is read and displayed for 2 seconds.	<ul style="list-style-type: none"> ▶ If a card is reported as defective, check a different card to ensure that the tachograph is functioning. ▶ If the tachograph is defective, then it must be decommissioned and replaced. ▶ If it is the driver card that is definitely defective, then contact the responsible authority in the country where the card was issued.
⌘	Buttons	Button test You are prompted to press all buttons one by one from left to right – each button must be pressed within 2 seconds of each other, otherwise the test fails.	<ul style="list-style-type: none"> ▶ Carefully clean dirty buttons with a damp cloth and a mild detergent. ▶ If the buttons still fails the tachograph must be decommissioned and replaced.
▼	Printer	Test page printed out	<ul style="list-style-type: none"> ▶ Check the paper cassette and that paper is included, if necessary insert a paper roll or replace the cassette. ▶ If the printer still fails the tachograph must be decommissioned and replaced.
↕	Inverted display function	Inverted display function test The display view is inverted for 2 seconds	▶ If the display is unreadable the tachograph must be decommissioned and replaced.

Opening the Card Trays with no Power or when Disconnected

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:

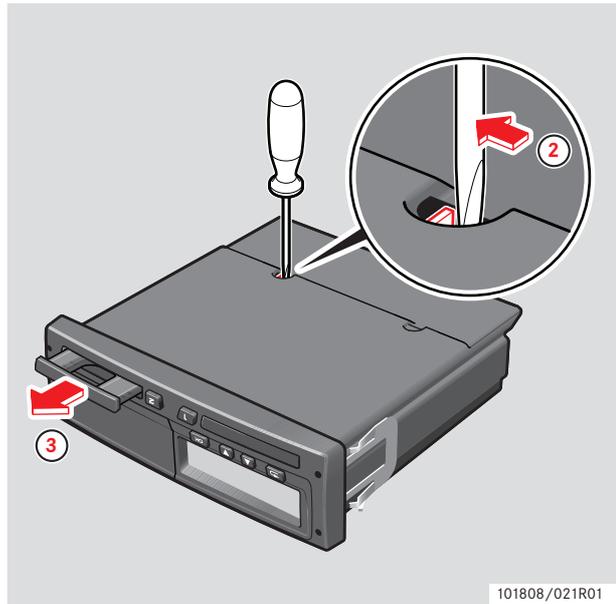
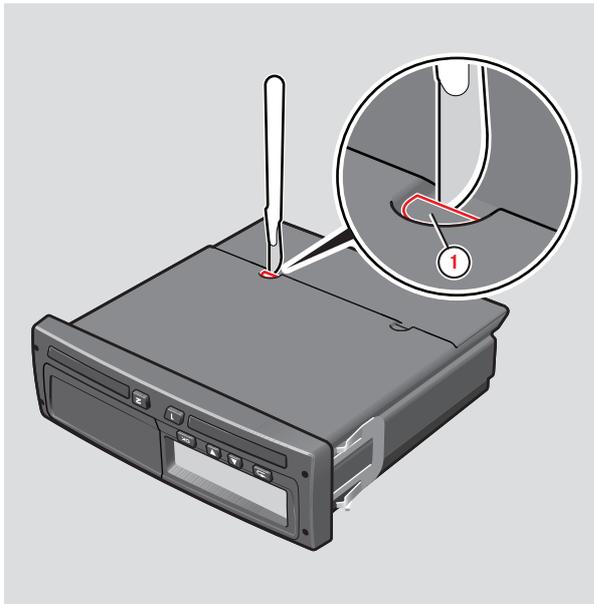
- ▶ Remove the tachograph from the dashboard.
- ▷ Removal of Tachograph, page 51.
- ▶ Ensure that the ignition is switched off.

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

- ▶ Identify the predetermined breakpoint 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.
- ▶ Insert a knife or a screwdriver in the hole and push the tray release mechanism sideways. The appropriate tray will now eject and the card can be removed.

Decommissioning of tachograph

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



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Inspection of Tachograph System

Inspection of a digital 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 vehicle's characteristic coefficient (W factor) or the effective circumference of the drive wheels (L factor).
- If the tachograph UTC clock time is inaccurate by more than 20 minutes.
- If the vehicle registration number (VRN) has changed.
- When it has been 2 years since the last system inspection.

Inspecting Procedure

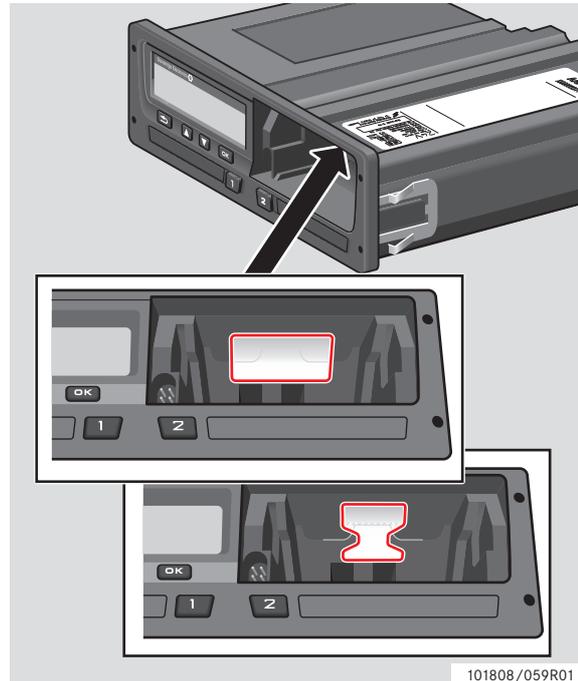
Follow this procedure to confirm that the function of the recording equipment is correct.

- ▶ Check the ability to store driver data on the driver card.
- ▶ Determine that the tachograph operates within maximum tolerances for both speed and distance.
- ▶ Check the tyre size and the actual circumference of the drive wheel tyres.
- ▶ Check the calibration
(▶ Checking Calibration Data, page 40)

Also, perform the following visual checks:

- ▶ 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.
- ▶ Check for evidence of tampering with the tachograph seals and labels.
- ▶ Check for additional seals and labels that do not belong to the tachograph, as they might cover drill holes.
- ▶ Check that the heat seal is present.
- ▶ Check the tachograph type approval mark.
- ▶ 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.

- ▶ Check that the label and the logotype hologram is present and in one piece. The position of the label is shown in the illustration below. The hologram is only visible in strong light.



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 VIN and VRN.
- The inspection result.
- The certificate issue date.



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.

For more information on the installation plaque, see:
▶ Completing and Fitting the Installation Plaque, page 40.

Repair and Decommission of Tachograph

Due to digital tachograph system requirements the only allowable repair that can be carried out is the replacement of the paper cassette.

▷ Printer Maintenance, page 43.

!
The tachograph case must never be opened, as it would be a breach of the digital 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

- ▶ Download the entire data from the tachograph memory
 - ▷ Download Data, page 41.
- ▶ Remove the tachograph from the vehicle.
- ▶ 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:

▷ Troubleshooting and Self-test, page 45.

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

Replacement of the Tachograph

It is recommend 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 (6).

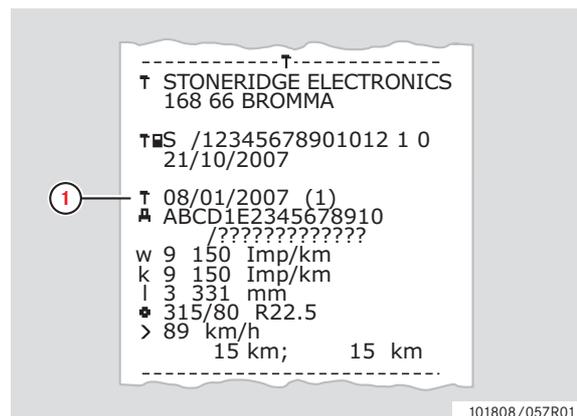
▷ Technical data printout, page 25.

- ▶ Make a technical printout to see the warranty time and save print out.
- ▶ Remove the tachograph as described in:
 - ▷ Removal of Tachograph, page 51.
- ▶ If the removed tachograph is faulty, then download all data and return it to the owner.
 - ▷ Download Data, page 41.
- ▶ Update the replacement unit with the remaining warranty time for the replaced unit.
- ▶ Install the replacement unit as described in:
 - ▷ Installation of Tachograph System, page 35.

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 an MKII which is used in these instructions.

- ▶ Read the remaining Warranty Validity Time (WVT) for the old unit, using a MKII.
- ▶ 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.
 - ▷ Technical data printout, page 25.
 - 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.
- ▶ Program the new tachograph, with the calculated remaining WT, using a MKII.



1 Date of activation

Removal of Tachograph

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

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



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

Technical Data

Technical Parameters

Operating voltage:

9-32 V (non-ADR)
17-32 V (ADR)

Recommended 18-32 V for 24 V systems

Recommended 9.5-16 V for 12 V systems

Normal operating temperature:

-25°C to +70°C



The temperature range for the ADR version is -25°C to +65°C.

Storage temperature:

-40°C to +85°C

Weight:

Less than 1100g (including paper roll)

Dimensions:

188 x 218 x 59 mm

Current consumption (ignition On, including motion sensor):

65 mA @ 24 V (approx.)

100 mA @ 12 V (approx.)

Current consumption (ignition Off):

9 mA at 24 V (approx.)

12 mA at 12 V (approx.)

LCD

Dot-Matrix LCD (19 x 98 pixels)

Visible area 72 x 16.6 mm, 2 rows x 16 characters

Printer

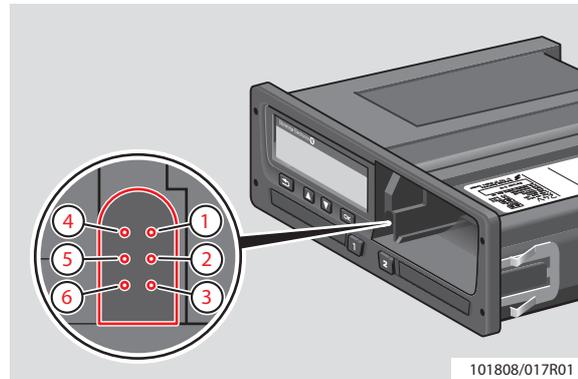
Paper width 57-58 mm, paper roll diameter 30 mm (max), 24 characters per line.

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.

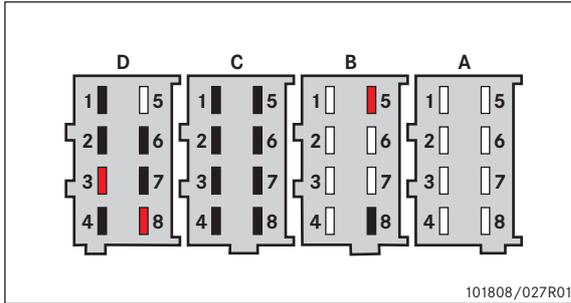


101808/017R01

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.



Pins marked in red (B5, D3 and 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, D6 and D7) are optional pins/functions defined by ISO16844-1.



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	Power supply line connected.
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.
A7	CAN_GND	CAN bus GND line, which is connected to tachograph GND (A5) via a series combination of a 1Ω 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.

Pin	Name	Description
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	Battery (+) with current limitation	Power supply to Stoneridge telematic unit. Current limitation is 400 mA in 10-30V range.
C2	Battery (-)	Return line for the battery supply.
C3	Revs signal input.	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.
C4		Not used.
C5	C-CAN_H	Alternative CAN bus HIGH signal line.
C6	C-CAN_GND	Alternative CAN bus GND line, which is connected to tachograph GND (A5) via a series combination of a 1Ω 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 120Ω resistor.
D1	Status input 1	Input, which signals that an event may be recorded.
D2	Status input 2	Alternative event input, which signals that an event may be recorded.

Pin	Name	Description
D3	Positive supply	An output supply suitable for status inputs.
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	Data commI/O K-line	Speedometer/K-line interface according to ISO-14230
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 (CAN_H to CAN_L or ground and vice-versa) 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.

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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. Cables can be purchased from Stoneridge for most vehicle types.

Stoneridge ADR Digital Tachograph

Approved for Use in Hazardous Goods Vehicles

The ADR 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 94/9/EC.

TÜV test certificate number:

ATEX 2507 X, with corresponding supplements.

(TÜV= Technischer Überwachungs Verein)

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The ADR tachograph explosion protection is only guaranteed when the vehicle is stationary and the battery isolating switch is open.

Special Features of the ADR Tachograph

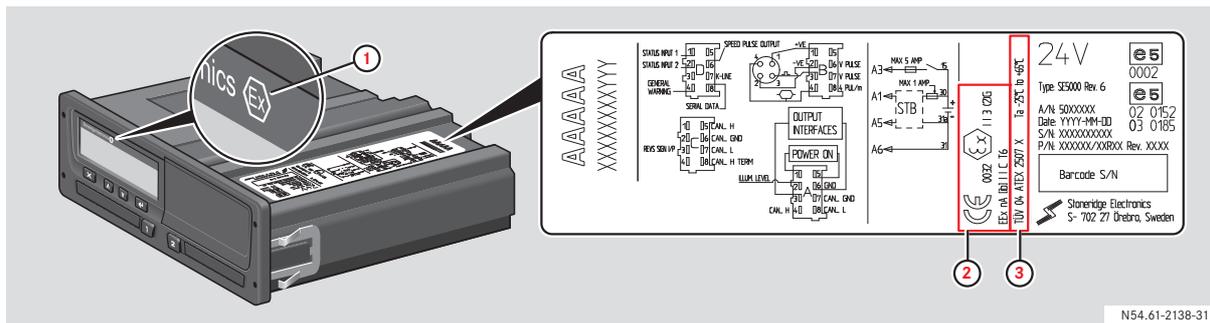
For the ADR tachograph some functions are disabled immediately when the ignition is switched off:

- Card trays cannot be ejected.
- No printouts are possible.
- Background illumination for buttons and display is switched off.
- The supply voltage to pin 5 of the front connector is not active.



The ADR tachograph will enter the power saving mode immediately after the ignition is switched off.

To have the ADR tachograph fully operational the ignition key must be in position key-on.

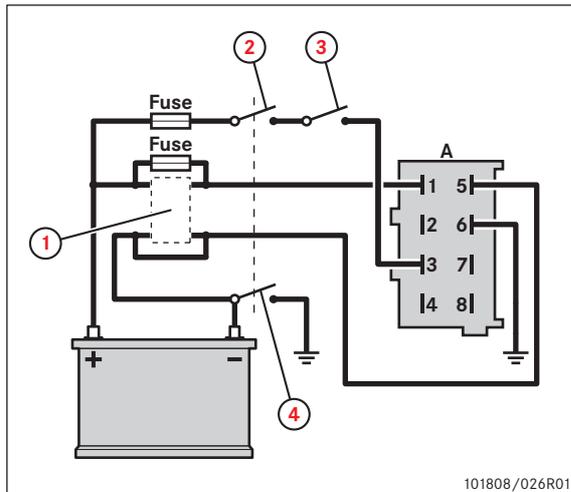


N54.61-2138-31

- 1** Ex symbol on tachograph front
- 2** ADR classification
- 3** Number for TÜV test certificate

Fitting an ADR Tachograph

When fitting a Stoneridge ADR 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).

i

The motion sensor data is only valid for connection to motion sensor type KITAS 2171.xx according to EU type examination certificate number TÜV 02 ATEX 1842 X).

Messages, Warnings and Malfunctions

The information shown on the tachograph display is separated into three types of notifications, depending on the seriousness of a specific occurrence:

- Messages
- Warnings
- Malfunctions

An alphabetical list of all workshop messages, warnings and malfunctions is presented on the following pages.

If a display is triggered only when a workshop card is inserted this is explained as [Workshop card] in the description text.

Messages

A message informs for example about completed processes, problems with the workshop card or is a reminder to take a break.

Messages are not stored and cannot be printed.

To clear a message:

- ▶ Press the **OK** button.

Warnings

Warnings appear in the event of infringements, such as overspeeding, or if tachograph data cannot be recorded for various reasons.

Warnings either pop up or flash in the display.

Warnings are stored and can be printed on paper or on the display. (Events and faults printout)

▷ Printouts, page 21.

To clear a warning:

- ▶ Press the **OK** button twice.

Malfunctions

Malfunctions are displayed in case of tachograph, sensor or workshop card malfunctions or if tampering with this equipment is detected.

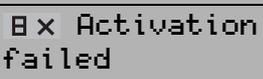
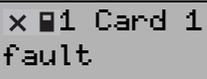
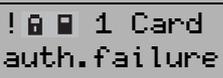
Malfunctions are stored and can be printed out on paper or on the display. (Events and faults printout)

▷ Printouts, page 21.

To acknowledge a malfunction:

- ▶ Press the **OK** button.

Messages, Warnings and Malfunctions

Display	Type	Unit	Description	Action
	Message	Tachograph	Function not available while driving.	<ul style="list-style-type: none"> ▶ Stop the vehicle and retry the entry. ▶ 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.
	Message	Tachograph	The tachograph is being activated for use. [Workshop card]	<ul style="list-style-type: none"> ▶ Wait until the automatic activation is completed.
	Message	Tachograph	The tachograph activation process has been completed successfully. [Workshop card]	<ul style="list-style-type: none"> ▶ The tachograph activation process has been completed successfully.
	Message	Tachograph	The tachograph activation process has failed. [Workshop card]	<ul style="list-style-type: none"> ▶ Remove the workshop card from the tachograph. ▶ Check system connections. ▶ Re-insert workshop card to retry activation. ▶ Disconnect the tachograph for 30 seconds and retry, ▶ If tachograph will not activate it must be decommissioned.
Already in calibration mode	Message	Card	Two workshop cards inserted at the same time. The second card will be ejected without being authenticated.	
	Malfunction	Card	Error on the driver card in tray 1. (2 if tray 2.)	<ul style="list-style-type: none"> ▶ Withdraw and examine the card. ▶ Check the tachograph with a functional card.
	Warning	Tachograph	The last withdrawal time of the inserted driver card, as read from the inserted card, is later than the UTC time of the tachograph.	<ul style="list-style-type: none"> ▶ 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.
	Malfunction	Card 1 or 2	The inserted card cannot be authenticated by the tachograph.	<ul style="list-style-type: none"> ▶ Check that the inserted card is valid and correctly inserted. ▶ Check if the card works in another tachograph. ▶ Try to insert another card.

Display	Type	Unit	Description	Action
! ■ ■ Card conflict	Warning	Card	An invalid card combination has been detected. For example a company and a workshop card.	▶ Withdraw the offending card.
! Ⓜ ← ■ 2 Card data integrity error	Malfunction	Card	Corrupt data has been detected when reading data from the card in tray 2 (1 if tray 1) to the tachograph.	▶ Clean the card with a soft damp cloth and try again. ▶ In case of faulty card, contact the responsible authority in the country in which you are located.
! ■ → x 2 Card eject without saving	Message	Card	Data could not be stored on the card withdrawn from tray 2 ("1" if tray 1) due to an error.	▶ Clean the card with a soft damp cloth and try again. ▶ In case of faulty card, contact the responsible authority in the country in which you are located.
Ⓜ ■ 1 Card expired	Message	Card	The card inserted in tray 1 ("2" if tray 2) has expired.	▶ Eject the card and replace it with a valid one.
1 Card expires in xx days	Warning	Card	The card inserted in tray 1 ("2" if tray 2) expires in xx days, where xx is a number between 0 and 30.	▶ Contact the responsible authority to get a new card. The message disappears automatically after 5 seconds or when a button is pushed.
! ■ ○ Card ins. while driving	Warning 05	Card	A tachograph card is inserted in any slot while driving.	▶ No further action required.
! Ⓜ A/A Data integrity error	Malfunction 15	Tachograph	Corrupted files have been detected in the tachograph. These files will not have a valid signature when downloaded.	▶ Check for evidence of tampering with the tachograph. If there is evidence of tampering the tachograph must be decommissioned and replaced.
↓ Downloading busy	Message	Tachograph	The tachograph is downloading data. [Workshop card]	▶ Wait for the download procedure to complete.
↓ ✓ ↓ Download complete	Message	Tachograph	The tachograph download process has been completed successfully. [Workshop card]	▶ No further action required.
↓ x ↓ Download failed	Warning	Tachograph	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.

Messages, Warnings and Malfunctions

Display	Type	Unit	Description	Action
○ 1 / 2 x Driving can't open slot	Message	Tachograph	An attempt was made to open the card tray (slot) while the vehicle was in motion.	▶ Stop the vehicle. The card tray can be opened only when the vehicle is stationary.
! ○ 1 Driving w/o valid card	Warning	Card	Driving without a valid card or with an invalid card combination.	▶ Stop and insert a valid card and/or remove inappropriate card.
fn x Function not possible	Message	Tachograph	The desired function cannot be carried out.	▶ No further action required.
! 1 A Hardware sabotage	Malfunction	Tachograph	Authenticated card has been removed by force or a tampering with the hardware has been detected.	▶ Check for evidence of tampering with the tachograph. If there is evidence of tampering the tachograph must be decommissioned and replaced.
! 1 Insertion of a non valid card	Warning	Card	A non-valid card has been inserted into a slot.	▶ Withdraw the non-valid card. ▶ Check that the card has not been inserted upside down or is expired.
! 1 A 2 Last sess. not closed ok	Warning	Card	The tachograph detects that the previous card session has not been correctly closed. The card in tray 2 ("1" if tray 1) has been withdrawn before all relevant data have been stored on 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 the responsible authority in the country in which you are at present in.
M.....! Memory full!	Message	Tachograph	Manual entries memory full.	▶ Remove the manual entries so that the total number of manual entries is less.
New time? ● ○ 03:01 	Message	Tachograph	Daylight saving time changes.	▶ Answer "Yes" to start or end daylight saving time. ▶ Answer "No" or press the  button to cancel.
! ○ / T 1 No driver/ workshop card	Message	Card	A function has been selected that requires an inserted driver or workshop card.	▶ Insert a driver or workshop card.
! 1 1? No further details	Malfunction	Sensor	Internal sensor error.	▶ Replace the motion sensor.
>> Over speeding	Warning	Tachograph	The speed of the vehicle has exceeded the highest speed allowed for the vehicle. This has been active during at least 60 seconds.	▶ Find out the maximum speed allowed for the vehicle.
>>? Overspeeding pre-warning	Message	Tachograph	Overspeeding, pre-warning.	▶ Driver related message. Observe the speed limit.

Display	Type	Unit	Description	Action
 → A... ✓ Pairing complete	Message	Tachograph, Sensor	The motion sensor - tachograph pairing process has been completed successfully. [Workshop card]	<ul style="list-style-type: none"> ▶ No further action required.
 → A... × Pairing failed	Message	Tachograph, sensor	The motion sensor - tachograph pairing process has failed. [Workshop card]	<ul style="list-style-type: none"> ▶ Remove the workshop card from the tachograph. ▶ Check the system connections. ▶ Re-insert the workshop card to retry pairing. ▶ Replace the sensor if required. ▶ If the message is shown repeatedly the tachograph might be faulty beyond repair and must be decommissioned and replaced.
PIN?	Message	Tachograph	Enter a PIN code to: - activate a tachograph - enter the tachograph calibration mode [Workshop card]	<ul style="list-style-type: none"> ▶ Enter a valid PIN code.
! † Power supply interruption	Warning	Tachograph	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.	<ul style="list-style-type: none"> ▶ Check the vehicle and tachograph power supply levels. ▶ Check the power supply cables. ▶ Check the vehicle's battery and replace if necessary.
▼ ↑ ○ Printer high temperature	Message	Printer	The printing could not start, or the ongoing printing has been interrupted because the temperature of the printer is too high.	<ul style="list-style-type: none"> ▶ Wait until the printer temperature is within allowable range and try to print again.
▼ ↓ ○ Printer low temperature	Message	Printer	The printing could not start because the temperature of the printer is too low.	<ul style="list-style-type: none"> ▶ Wait until the printer temperature is within allowable range and try to print again.
▼ ↓ † Printer low power	Message	Printer	The ongoing printing has been interrupted because the tachograph input voltage is too low.	<ul style="list-style-type: none"> ▶ Check the vehicle battery voltage, wiring, etc. ▶ If the printer still fails the tachograph must be decommissioned and replaced.
▼ Ⓟ × Printer out of paper	Message	Printer	Printer paper is out.	<ul style="list-style-type: none"> ▶ Insert a new paper roll. ▶ If fault remains active for no apparent reason the tachograph must be decommissioned and replaced.

Messages, Warnings and Malfunctions

Display	Type	Unit	Description	Action
▼ x ▼ Printing cancelled	Message	Printer	The current printing has been cancelled.	▶ No further action required.
>4 1/2h? Quarter left reminder	Message	Tachograph	The driver has 15 minutes left until the legal continuous driving time of 4 1/2 hours will be exceeded.	▶ Find a suitable place to take a break in the next 15 minutes.
! Ⓜ A Sensor auth. failure	Malfunction	Sensor	An unsuccessful authentication attempt of the motion sensor has been detected.	<ul style="list-style-type: none"> ▶ 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.
! Ⓜ=0 Sensor cable fault	Warning	Sensor	Motion sensor data error.	<ul style="list-style-type: none"> ▶ Check the motion sensor operation and wiring. ▶ Replace the motion sensor if necessary.
! Ⓜ>0 Sensor cable fault	Warning	Sensor	Motion sensor data error.	<ul style="list-style-type: none"> ▶ Check the motion sensor operation and wiring. ▶ Replace the motion sensor if necessary.
x Ⓜ. x Sensor comms error	Malfunction	Sensor	Motion sensor communication error.	<ul style="list-style-type: none"> ▶ Check the motion sensor operation and wiring. ▶ Replace motion sensor if necessary.
! Ⓜ Sensor data error	Warning	Sensor	Motion sensor data error	<ul style="list-style-type: none"> ▶ Check the motion sensor operation and all wiring, replace the sensor if faulty. ▶ Check for evidence of tampering. ▶ If the error remains active for no apparent reason, decommission and replace the tachograph.
x Ⓜ Sensor fault	Malfunction	Sensor	A data link error between the speed sensor and the tachograph.	<ul style="list-style-type: none"> ▶ 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.
! Ⓜ Ⓜ/Ⓜ Sensor data integrity error	Malfunction	Sensor	Internal sensor error, stored data integrity failure	▶ Replace the motion sensor if necessary.
x Ⓜ ✓ x Sensor no acknowledge	Malfunction	Sensor	Motion sensor communication error.	<ul style="list-style-type: none"> ▶ Check the motion sensor operation and wiring. ▶ Replace the motion sensor if necessary.

Display	Type	Unit	Description	Action
x A ← M Sensor no answer	Malfunction	Sensor	Motion sensor communication error.	<ul style="list-style-type: none"> ▶ Check the motion sensor operation and wiring. ▶ Replace the motion sensor if necessary.
M → A...Sensor pairing	Message	Tachograph, sensor	The motion sensor and tachograph are in the process of pairing.	<ul style="list-style-type: none"> ▶ Wait until the automatic pairing process is complete.
x A M † ↑ Sensor power high	Malfunction	Sensor	Sensor power too high.	<ul style="list-style-type: none"> ▶ Check the vehicle battery voltage, wiring, etc. ▶ Replace the motion sensor if necessary.
x M † ↓ Sensor power low	Malfunction	Sensor	Sensor power too low.	<ul style="list-style-type: none"> ▶ Check the vehicle battery voltage, wiring, etc. ▶ Replace the motion sensor if necessary.
! M † Sensor power no signal	Malfunction	Sensor	Sensor has no power.	<ul style="list-style-type: none"> ▶ Check the vehicle battery voltage, wiring, etc. ▶ Replace the motion sensor if necessary.
A → T? Service pre-warning	Message	Tachograph	Next calibration, pre-warning.	<ul style="list-style-type: none"> ▶ Calibrate the tachograph.
>4 1/2h Time for break reminder	Message	Tachograph	The legally maximized continuous driving time of 4 1/2 hours has elapsed.	<ul style="list-style-type: none"> ▶ Stop the vehicle at the earliest opportunity and take a break for 45 minutes.
! A → T Time for service	Message	Tachograph	Calibration error, time for periodic inspection.	<ul style="list-style-type: none"> ▶ Perform a calibration.
M → M Timeout no key pressed	Message	Tachograph	The tachograph is waiting for input.	<ul style="list-style-type: none"> ▶ Press the appropriate buttons and complete the process.
x M / M ✓ x Unable to open slot	Message	Tachograph	The card tray (slot) cannot be opened.	<ul style="list-style-type: none"> ▶ Check the tray for correct operation. ▶ If the tray still fails the tachograph must be decommissioned and replaced.
! M M Unauth. change of sensor	Malfunction	Sensor	The sensor has been changed since last pairing.	<ul style="list-style-type: none"> ▶ 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.
!UTC Time adjust not allowed	Message	Tachograph	UTC time adjustment more than +/- 1 minute once a week is not allowed, when not in calibration mode.	<ul style="list-style-type: none"> ▶ If the UTC time in the tachograph has deviated by more than 20 minutes, the tachograph must be re-calibrated by a workshop for tachographs.

Messages, Warnings and Malfunctions

Display	Type	Unit	Description	Action
x A VU internal fault	Malfunction	Tachograph	Internal fault in the tachograph	▶ Decommission and replace the tachograph.
! Wrong PIN! Attempts left:2	Message	Card	Wrong PIN entered but still attempts left. [Workshop card]	▶ Press OK and try again.
x 1 Wrong PIN! Card locked1	Message	Card	Wrong PIN entered and no attempts left. [Workshop card]	▶ Eject the card and replace it with a valid one.

List of Event and Fault Codes and Diagnostic Trouble Codes (DTCs)

List of Event and Fault Codes and Diagnostic Trouble Codes (DTCs)

A list of all DTC's that are stored in the Stoneridge digital 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 technical printout and the DTC will be seen on a test instrument.

Code	DTC	Type of event or fault	Description	Suggested action to be taken
		General events		
0x02		Card conflict	An invalid card combination has been detected. For example a company and a workshop card.	▶ Withdraw the offending card.
0x03		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.
0x04	0x1260	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.
0x05		Card inserted while driving	A tachograph card is inserted in any slot while driving.	▶ No further action required.
0x06		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.
0x07		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.
0x08	0x0004	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.
	0x2004	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.

List of Event and Fault Codes and Diagnostic Trouble Codes (DTCs)

Code	DTC	Type of event or fault	Description	Suggested action to be taken
0x09	0x2180	Motion data error (No CNTR)	Motion sensor data incorrect. Tachograph receives speed value from motion sensor without receiving any pulses.	<ul style="list-style-type: none"> ▶ 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.
	0x2280	Motion data error (CNTR)	Motion sensor data incorrect. Tachograph receives speed counter value from motion sensor that differs from value calculated by the tachograph.	
	0x2452	Motion data error (Event) VU Security breach attempts	Motion data incorrect. Tachograph signature mismatch.	
0x11	0x2452	Motion sensor authentication failure	An unsuccessful authentication attempt of the motion sensor has been detected.	<ul style="list-style-type: none"> ▶ 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.
0x12		Tachograph card authentication failure:	The inserted card cannot be authenticated by the tachograph.	<ul style="list-style-type: none"> ▶ Check that the inserted card is valid and correctly inserted. ▶ Check that the card works in another tachograph. ▶ Try to insert another card.
0x13	0x2452	Unauthorised change of motion sensor	The sensor has been changed since last pairing.	<ul style="list-style-type: none"> ▶ 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.
0x14		Card data input integrity	The cryptographic communication with the card inserted (in slot 1 or 2) is unsuccessful.	<ul style="list-style-type: none"> ▶ To check the card, insert it in another tachograph. ▶ Try to insert another card.
0x15		Stored data integrity error	The stored data is erroneous. Most likely, the tachograph is tampered with.	<ul style="list-style-type: none"> ▶ Check for evidence of tampering with the tachograph.
0x18		Hardware sabotage (Security violation)	Card has been removed by force or a tampering with the hardware has been detected.	<ul style="list-style-type: none"> ▶ Check for evidence of tampering with the tachograph ▶ Decommission and replace the tachograph.
		Motion sensor related events		
0x20	0x2508	No further details	Motion sensor internal error	<ul style="list-style-type: none"> ▶ Replace the motion sensor.
0x21	0x2508	Authentication failure	Motion sensor internal error, authentication failure.	<ul style="list-style-type: none"> ▶ Replace the motion sensor.

List of Event and Fault Codes and Diagnostic Trouble Codes (DTCs)

Code	DTC	Type of event or fault	Description	Suggested action to be taken	
0x22	0x2508	Stored data integrity error	Motion sensor internal error, stored data integrity failure	► Replace the motion sensor	
0x31	0x0139 0x0800 0x2007	Recording equipment faults	Internal fault in the tachograph	► If DTC remains active for no apparent reason, decommission and replace the tachograph.	
		VU internal fault			
0x35	0x2280	Sensor fault Error response or ACK	Motion sensor communication error. Content of ACK or response is not correct.	► 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.	
		0x2003 (4 sec)	Sensor fault (MS Power to Low)		Motion sensor power supply too low.
		0x2380	Sensor fault (No ACK)		Motion sensor communication error. No ACK received when expected.
		0x2380	Sensor fault (No response)		Motion sensor communication error. No response received when expected.
		Card faults			
0x40		Card fault - No further details		► Withdraw the card and check it. ► Insert the card into another tachograph and verify functionality. ► Insert another card and verify functionality.	
	0x0200	Slot 1	Error detected on inserted card in slot 1.		
	0x0300	Slot 2	Error detected on inserted card in slot 2.		
		Manufacturer specific events and faults, i.e. pop-ups			
	0x0660	Printing stopped, out of paper	Printer is out of paper.	► Insert a new paper roll.	
	0x01C0	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.	
	0x0D40	Calibration error	Calibration error, time for periodic inspection. Two years has passed since last calibration.	► Perform a calibration.	
	0x0B78	CAN bus off	CAN bus off, A connector, also named TCO-CAN.	► Check cables, especially A connector at the back of the tachograph.	

List of Event and Fault Codes and Diagnostic Trouble Codes (DTCs)

Code	DTC	Type of event or fault	Description	Suggested action to be taken
	0xFD0B	CAN Bus off, FMS CAN	CAN, bus off, C connector, also named FMS-CAN.	<ul style="list-style-type: none"> ▶ Check cables, especially C connector at the back of the tachograph.
	0x0007	VU power supply high	Tachograph power supply voltage is higher than maximum value.	<ul style="list-style-type: none"> ▶ Check vehicle power supply levels. ▶ Check power supply input to tachograph. ▶ Check all connections and tachograph operation.
	0x0003	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	<ul style="list-style-type: none"> ▶ Check vehicle power supply levels. ▶ Check power supply input to tachograph. ▶ Check all connections and tachograph operation.
	0x0900	No ignition but speed pulses present	Ignition off, but speed pulses are present.	<ul style="list-style-type: none"> ▶ Investigate if the vehicle has been under environmental disturbances like vibrations etc. ▶ Check motion sensor operation and all wiring – replace sensor if faulty. ▶ Check speed pulses are not being injected through front connector.

Frequently asked Questions, FAQ

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

Frequently asked questions	Answers
What digital tachograph can be fitted in this vehicle?	Please contact customer support workshop.support@stoneridge.com Workshop Support +44(0) 870 887 9200
The tachograph will not read / recognise the card.	Ensure that the card is correctly inserted. (▷ Insert Workshop Card, page 12) 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. (▷ Messages, Warnings and Malfunctions, page 59)
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. 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. ▷ Opening the Card Trays with no Power or when Disconnected, page 46.
Data integrity error on the display.	Contact your Stoneridge dealer for actions.
Why does the printout at the end of the day show more driving time than the driver thinks is done?	Because of the EU one minute rule, i.e any minute that contains at least one second of driving results in the whole minute being registered 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.	Before removing the driver card, ensure that the mode is changed to rest, or add Manual Entries with the activity "Rest". (rest until now?-> yes).
The illumination does not work.	Turn on the illumination using the MKII programmer.
Why can I not program all the SE5000 functions using SVDO programmer?	Only the functions necessary to calibrate the SE5000 are included in the SVDO programmer.
Where do you plug the programmer / download tool in?	Behind the printer cassette. ▷ Calibration and Download Front Connector, page 53.

STONERIDGE - SETTING THE STANDARD

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