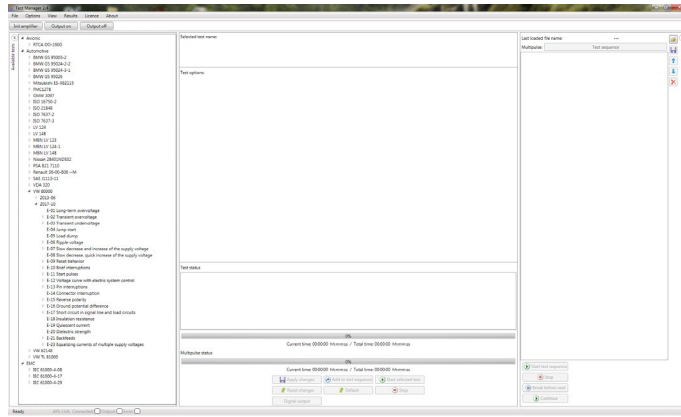


SPS Automotive software modules



Supported Windows Versions:
Windows 10

Software modules for
automotive standards
testing and their
requirements of specific
hardware

Software module ISO 7637 SAE

Testing according to ISO 7637-2 (2011-03)

4.3 Voltage transient emission test

4.3.2 Test set-up for slow pulses

4.3.3 Test set-up for fast pulses

(HARDWARE REQUIREMENT: CAR-SWITCH-TE 14)

5.6 Test pulse generator for immunity testing

5.6.1 Test pulse 1

5.6.2 Test pulses 2a and 2b

5.6.3 Test pulses 3a and 3b

(HARDWARE REQUIREMENT: CAR-TEST-SYSTEM 14)

Testing according to ISO 7637-3 (2016-07)

5.3 Test pulse generator

5.3.2 Slow transient test pulses 2a

5.3.3 Fast transient test pulses 3a and 3b

(HARDWARE REQUIREMENT: CAR-TEST-SYSTEM 14)

Testing according to SAE J 1113-11 (2012-01/2017-06/2018-12)

8. Test pulses

Fig. 2 Test pulse 1, supply disconnection from inductive loads

Fig. 3 Test pulse 2a sudden interruption of current

Fig. 4 Test pulse 2b transient from dc motors

Fig. 5 Test pulse 3a switching spikes

Fig. 6 Test pulse 3b switching spikes

Fig. 7 Test pulse 4 single pulse

(HARDWARE REQUIREMENT: CAR-TEST-SYSTEM 14)

Fig. 8 Test pulse 5a, 5c load dump single pulse unsuppressed

Fig. 9 Test pulse 5b load dump single pulse centralized suppression

(HARDWARE REQUIREMENT: Load dump generator LDS)

Software module ISO 21848

Testing according to ISO 21848 (2005-04)

4.1 Direct current

4.2 Overvoltages

4.3 Superimposed alternating voltage (50Hz ... 20 kHz)

4.4 Slow decrease and increase of supply voltage

4.5 Discontinuities in supply voltage

4.5.1 Momentary drop in supply voltage

4.5.2 Reset behaviour at voltage drop

4.5.3 Starting profile

4.6 Reversed voltage (test at the negative voltage)

4.7 Open-circuit tests (interruption of supply voltage)

(HARDWARE REQUIREMENT: Electronic switch EMS 100 including option EMS.K.2.16)

4.8 Short-circuit protection

Signal circuits (short circuits are applied to the signal circuits)

Load circuits (short circuits are applied to the load circuits)

(HARDWARE REQUIREMENT: Electronic switch EMS 100 including option EMS.K.2.16)

Software module ISO 16750-2

Testing according to ISO 16750-2 (2012-11)

- 4.2 Direct current supply voltage
- 4.3 Overvoltage
- 4.4 Superimposed alternating voltage (50Hz ... 25kHz)
- 4.5 Slow decrease and increase of supply voltage
- 4.6 Discontinuities in supply voltage
 - 4.6.1 Momentary drop in supply voltage
 - 4.6.2 Reset behaviour at voltage drop
 - 4.6.3 Starting profile
 - 4.6.4 Load dump
- (HARDWARE REQUIREMENT: Load dump generator LDS)
- 4.7 Reversed voltage (test at the negative voltage)
- 4.8 Ground reference and supply offset
- (HARDWARE REQUIREMENT: Additional amplifier or an external battery)
- 4.9 Open circuit tests (interruption of supply voltage)
- 4.10 Short-circuit protection
 - Signal circuits (short circuits are applied to the signal circuits)
 - Load circuits (short circuits are applied to the load circuits)
- (HARDWARE REQUIREMENT: Electronic switch EMS 100 including option EMS.K.2.16)

Software module LV 124

Testing according to LV 124 (2013-06), BMW GS 95024-2-2 (2011-02)

Mercedes-Benz MBN LV 124-1 (2013-06) and VW 80000 (2013-06/2017-10)

- E-01 Long-term overvoltage
- E-02 Transient overvoltage
- E-03 Transient undervoltage
- E-04 Jump start
- E-05 Load dump
- E-06 Component immunity to ripple on power supply leads
- (HARDWARE REQUIREMENT: Option OPT.24: programmable internal resistance of the LVA)
- E-07 Slow decrease and increase of the supply voltage
- E-08 Slow decrease, quick increase of the supply voltage
- E-09 Reset behaviour
- E-10 Short interruptions
- (HARDWARE REQUIREMENT: Electronic switch EMS 100)
- E-11 Start pulses / cranking profile
 - Test 1 - Cold start
 - Test 2 - Warm start
- E-12 Voltage curve with IGR
- E-13 Pin interruption
- (HARDWARE REQUIREMENT: Electronic switch EMS 100 including option EMS.SSW)
- E-14 Connector interruption
- (NOTE: For this test E-14 the LVA system provides only the voltage source)
- E-15 Reverse polarity
- (HARDWARE REQUIREMENT: Option OPT.24: programmable internal resistance of the LVA)
- E-16 Ground offset
- (HARDWARE REQUIREMENT: Electronic switch EMS 100 including option EMS.K.2.16 and an additional amplifier or an external battery)
- E-17 Short circuit in signal circuit and load circuits
- (HARDWARE REQUIREMENT: Electronic switch EMS 100 including option EMS.K.2.16 or EMS.SSW.4.8 or EMS.SSW.1.16)
- E-19 Quiescent current
- (HARDWARE REQUIREMENT: External current measurement unit)
- E-21 Backfeeds
- (HARDWARE REQUIREMENT: Electronic switch EMS 100)

Additional / Modified test steps acc. to BMW GS 95024-2-2 (2011-02)

- E-40 Very brief voltage drop
- E-41 Brief off / on for bus nodes
- E-42a Voltage impulses due to switch-off of loads
- (HARDWARE REQUIREMENT: Electronic switch EMS 100 including option EMS.K.2.16)
- E-42b Low resistance voltage inputs on charge wire

Software module LV 148 / VDA 320

Testing according to LV 148 (2013-09), VDA 320 (2015-01)

BMW GS 95026 (2013-10) and VW 82148 (2013-09)

E48-01a Long-term overvoltage

E48-02 Transient overvoltage

(**HARDWARE REQUIREMENT:** Option OPT.24: programmable internal resistance of the LVA)

E48-03 Transient process in the lower range with limited function

E48-04 Recuperation

E48-05 Superimposed AC voltage

(**HARDWARE REQUIREMENT:** Option OPT.24: programmable internal resistance of the LVA)

E48-06 Slow decrease and increase of the supply voltage

E48-06 for operation with storage, part 1

E48-06 for operation with storage, part 2

E48-07 Slow decrease, quick increase of the supply voltage

E48-08 Reset behaviour

E48-09 Short interruptions

(**HARDWARE REQUIREMENT:** Electronic switch EMS 100)

E48-10 Start pulses

E48-11 Loss of ground BN48

(**HARDWARE REQUIREMENT:** Electronic switch EMS 100 including Option EMS.K.2.16 and an additional amplifier or an external battery)

E48-12 Ground offset

(**HARDWARE REQUIREMENT:** Electronic switch EMS 100 including option EMS.K.2.16. and an additional amplifier or an external battery)

E48-13 Internal dielectric strength

E48-14 Closed-circuit current

(**HARDWARE REQUIREMENT:** External current measurement unit)

E48-15 Operation in the range without functional limitation

E48-16 Operation in the upper range with functional limitation

E48-17 Operation in the lower range with functional limitation

E48-18 Overvoltage range

E48-19 Undervoltage range

E48-20 Fault current, part 1 and part 2

(**NOTE:** For this test E48-20 the LVA system provides only the voltage source)

E48-21 Short circuit in signal circuit and load circuits

(**HARDWARE REQUIREMENT:** Electronic switch EMS 100 including option EMS.SSW)

Software module BMW GS 95002-2

Testing according to BMW GS 95002-2 (2013-07)

5.7 Transients on supply lines (TSUP)

5.8 Transients on lines except for supply lines (TOL)

(**HARDWARE REQUIREMENT:** CAR-TEST-SYSTEM 14)

Software module BMW GS 95003-2

Testing according to BMW GS 95003-2 (2010-01)

5.2.1.1 Testing for immunity to 18V transient

5.2.1.2 b) Component immunity to ripple on power supply leads

5.2.1.3.1 Slow decreasing / slow increasing of operating voltage

5.2.1.3.2 Slow decreasing / fast rise

5.2.1.3.3 IGR, development of voltage

5.2.1.4 Ground offset

(**HARDWARE REQUIREMENT:** Additional amplifier or an external battery)

5.2.1.5 Cranking profile (Figure 14 and Figure 15)

5.2.1.6 Very brief voltage dip

5.2.1.7 Brief voltage dip

5.2.1.7.1 Brief off / on for bus nodes

5.3.1 Quick chargers / jump start

5.3.2 Load dump impulses

5.3.3 Protection against polarity reversal

Software module BMW GS 95002

Testing according to BMW GS 95002 (2010-06)

7.2.1 Galvanic test

(**NOTE:** Tests according to 7.2.1 require the CAR-TEST-SYSTEM 14.)

Software module FORD-FMC 1278 / JLR-EMC-CS v1.0

Testing according to Ford FMC 1278 (2015-07)

RI 130 Coupled immunity

(HARDWARE REQUIREMENT: Transient generator TDG/Ford, CISPR 25 compliant artificial network, coupling test fixture)

CI 210 Immunity from continuous power line disturbances

CI 220 Immunity from transient disturbances

(HARDWARE REQUIREMENT: For pulses A1, A2-1, A2-2, C1 and C-2 Transient generator TDG/Ford.
For ISO pulses CAR-TEST-SYSTEM 14.

CI 221 ISO test pulses 1, 2a, 2b, 3a, 3b

(HARDWARE REQUIREMENT: For ISO pulses CAR-TEST-SYSTEM 14.

CI 222 Load dump

(HARDWARE REQUIREMENT: Load dump generator LDS

CI 230 Immunity from power cycling

(HARDWARE REQUIREMENT: One additional amplifier

CI 231 Immunity from power cycling

CI 250 Immunity to ground voltage offset

(HARDWARE REQUIREMENT: Voltage adaption UT Ford CI250 and external battery or second amplifier, LVA option NT.11.70S

CI 260 Immunity to voltage dropout

CI 270 Immunity to voltage overstress

Testing according to Jaguar, Land Rover JLR-EMC-CS-v1.0 Amendment 4 (25-02-2015)

RI 130 Coupled Immunity

(NOTE: For the transient pulses A2-1 and A2-2 the transient generator TDG/Ford is required. Besides an artificial network (CISPR 25 conform) and a coupling test fixture is needed.)

RI 150 Coupled Immunity

(NOTE: Two amplifiers or an external battery is required. Besides an artificial network (CISPR 25 conform) and a coupling test fixture is needed.)

CI 210 Immunity from Continuous Power Line Disturbances

CI 220 Immunity from Transient Disturbances

(NOTE: The transient pulses A1, A2-1, A2-2, C1 and C-2 require the transient generator TDG/Ford.

The transient pulses E and F1 require the CAR-TEST-SYSTEM 14.

The transient pulses G1 and G2 are not covered with this software version.)

CI 230 Immunity from Power Cycling

(NOTE: For the simulation of the four different signals 3 additional amplifiers, e.g. LPA 50, are required.)

CI 250 Immunity to Ground Voltage Offset

(NOTE: Voltage adaption UT Ford CI250 and external battery or second amplifier is required, additionally the LVA option 70-S is required.)

CI 265 Immunity to Low Voltage Transients

(NOTE: Waveform B: For the simulation of four different signals 3 additional amplifiers, e.g. LPA 50, are required.)

CI 270 Immunity to Voltage Overstress

Software module General Motors GMW 3097

Testing according to General Motors GMW 3097 (2012-04, 2015-06)

3.5.1 CE, Transients

(HARDWARE REQUIREMENT: CAR TE 14)

3.5.2 CI, Transients on power lines

(HARDWARE REQUIREMENT: Pulses 1, 2a, 3a and 3b require the CAR-TEST-SYSTEM 14, the simulation of load dump transients requires the load dump generator LDS)

3.5.3 CI, Coupling to other than power supply lines (CCC or DCC to I/O)

(HARDWARE REQUIREMENT: Capacitive coupling clamp CDN 2012)

3.5.4 CI, Direct capacitor coupling

3.5.5 CI, 85V direct capacitor coupling

3.5.6 CI, Alternator direct capacitor coupling

Software module Mitsubishi ES-X82115

Testing according to Mitsubishi ES-X82115 rev. D (2009-03)

- 6.1 Supply voltage range
- 6.2 Ignition off draw (IOD)
- 6.3 Supply voltage ripple
- 7.2 Supply voltage drop out
(**HARDWARE REQUIREMENT:** Electronic switch EMS 100)
- 7.3 Supply voltage dips
- 7.4 Engine cranking low voltage
- 7.6 Slow decreases and increase of supply voltage
- 8.1 Defective regulation (full-fielded alternator)
- 8.2 Jump start
- 8.3 Load dump
(**HARDWARE REQUIREMENT:** Load dump generator LDS)
- 8.4 Reverse supply voltage
- 9.1 Immunity to short circuits in the supply voltage input and load output lines
(**HARDWARE REQUIREMENT:** Electronic switch EMS 100 including option EMS.K.2.16)
- 9.2 Immunity to short circuits in I/O signal lines
(**HARDWARE REQUIREMENT:** Electronic switch EMS 100 including option EMS.SSW)
- 9.4 Supply voltage offset
(**HARDWARE REQUIREMENT:** Additional amplifier or an external battery)
- 9.5 Ground reference offset
(**HARDWARE REQUIREMENT:** Additional amplifier or an external battery, Electronic switch EMS 100 including option EMS.SSW or EMS.K.2.16)
- 10.1 Operating and voltage stress
- 10.2 Stall

Software module MBN 10567

Testing according to MBN 10567 (2018-03)

- 7.1 Operating voltage range test
- 7.2 Long-term overvoltage test
- 7.3 Transient overvoltage test
- 7.4 Transient undervoltage test
- 7.5 Jump start test
- 7.6 Load dump test
- 7.7 Superimposed alternating voltage test
- 7.8 Slow supply voltage decrease and increase test
- 7.9 Start pulses test
- 7.10 Reset behavior test
- 7.11 Short interruptions test
- 7.12 Pin interruption test
- 7.13 Connector interruption test
- 7.14 Polarity reversal test
- 7.15 Ground offset test
- 7.16 Quiescent current test
- 7.17 Feedback test
- 7.18 Dual-supply component test
- 7.19 Equalizing current test for components with several supply voltages

Software module PSA / Renault

Testing according to PSA B21 7110 (2012-07)

7.1 ELECTRICAL RESISTANCE TESTS FOR THE EQUIPMENT CONNECTED TO THE LOW VOLTAGE NETWORK (12V)

- 7.1.1. EQ/TE 01: Resistance to usual power supply voltages
- 7.1.2. EQ/TE 08: Resistance to the variations of supply voltage in the usual "voltage control" range
(HARDWARE REQUIREMENT: Option OPT.24: programmable internal resistance of the LVA)
- 7.1.3. EQ/TE 07: Resistance to exceptional supply voltage
- 7.1.4. EQ/TE 02: Resistance to slow decrease and increase power of supply voltage
- 7.1.5. EQ/TE 03: Re-initialization test
- 7.1.6. EQ/TE 04: Resistance to unusual power supply voltages
- 7.1.7. EQ/TE 05: Resistance to ground and to the positive supply voltages short circuit
(HARDWARE REQUIREMENT: Electronic switch EMS 100 including option EMS.K.2.16)
- 7.1.9. EQ/IC 01: Resistance to pulses 1 and 2a
(HARDWARE REQUIREMENT: CAR-TEST-SYSTEM 14)
- 7.1.10. EQ/IC 10: Resistance to pulses on the outputs switching inductive loads
(HARDWARE REQUIREMENT: CAR-TEST-SYSTEM 14)
- 7.1.11. EQ/IC 02: Resistance to pulses 3a and 3b
(HARDWARE REQUIREMENT: CAR-TEST-SYSTEM 14)
- 7.1.12. EQ/IC 03: Resistance to 5b pulses
(HARDWARE REQUIREMENT: Load dump generator LDS)
- 7.1.13. EQ/IC 04: Resistance to power supply micro interruptions
(HARDWARE REQUIREMENT: Electronic switch EMS 100 including option EMS.SSW)
- 7.1.14. EQ/IC 05: Resistance to pulses 4 BIS
(HARDWARE REQUIREMENT: Option OPT.24: programmable internal resistance of the LVA)
- 7.1.15. EQ/IC 12: Resistance to re-start pulse
(HARDWARE REQUIREMENT: Option OPT.24: programmable internal resistance of the LVA)
- 7.1.16. EQ/IC 13: Resistance to "voltage control" voltage pulse
(HARDWARE REQUIREMENT: Option OPT.24: programmable internal resistance of the LVA)
- 7.1.17. EQ/IC 06: Resistance to voltage ripples

7.3 EMC IMMUNITY TESTS (GENERAL CASE)

- 7.3.1. EQ/IC 07 Immunity to the transients on the signal lines
(HARDWARE REQUIREMENT: CAR-TEST-SYSTEM 14 with capacitive coupling clamp CDN 2012)

7.4 EMC EMISSION TESTS (GENERAL CASE)

- 7.4.1. EQ/MC 01 Measurement of switching noises

Testing according to Renault 36-00-808/--M (2012-07)

6.1 RESISTANCE TO ELECTRICAL DISTURBANCES TESTS

- 6.1.1. EQ/TE 01: Resistance to power supply voltages
- 6.1.2. EQ/TE 02: Resistance to slow decrease and increase power of supply voltages
- 6.1.3. EQ/TE 03: Re-initialisation test
- 6.1.4. EQ/TE 04: Resistance to non-usual power supply voltages
- 6.1.5. EQ/TE 05: Resistance to ground and positive supply voltages short circuit
(HARDWARE REQUIREMENT: Electronic switch EMS 100 including option EMS.K.2.16)
- 6.1.6. EQ/IC 01: Resistance to pulses 1 and 1bis and 2a
(HARDWARE REQUIREMENT: CAR-TEST-SYSTEM 14)
- 6.1.7. EQ/IC 02: Resistance to pulses 3a and 3b
(HARDWARE REQUIREMENT: CAR-TEST-SYSTEM 14)
- 6.1.8. EQ/IC 10: Resistance of inductive load connected circuits
(HARDWARE REQUIREMENT: CAR-TEST-SYSTEM 14)
- 6.1.9. EQ/IC 03: Resistance to pulses 5b
(HARDWARE REQUIREMENT: Load dump generator LDS)
- 6.1.10. EQ/IC 04: Resistance to power supply micro interruptions
(HARDWARE REQUIREMENT: Electronic switch EMS 100 including option EMS.K.2.16)
- 6.1.11. EQ/IC 05: Resistance to starting profile
- 6.1.12. EQ/IC 06: Resistance to on-board power system voltage ripples

6.2 IMMUNITY TO CONDUCTED DISTURBANCE TEST

- 6.2.1. EQ/IC 07: Immunity to signal line transients
(HARDWARE REQUIREMENT: CAR-TEST-SYSTEM 14 with capacitive coupling clamp CDN 2012)

Software module VW 80000

Testing according to VW 80000 (2017-10)

- E-01 Long-term overvoltage
- E-02 Transient overvoltage
- E-03 Transient undervoltage
- E-04 Jump start
- E-05 Load dump
- E-06 Component immunity to ripple on power supply leads
(HARDWARE REQUIREMENT: Option OPT.24: programmable internal resistance of the LVA)
- E-07 Slow decrease and increase of the supply voltage
- E-08 Slow decrease, quick increase of the supply voltage
- E-09 Reset behaviour
- E-10 Short interruptions
(HARDWARE REQUIREMENT: Electronic switch EMS 100)
- E-11 Start pulses / cranking profile
 - Test 1 - Cold start
 - Test 2 - Warm start
- E-12 Voltage curve with IGR
- E-13 Pin interruption
(HARDWARE REQUIREMENT: Electronic switch EMS 100 including Option EMS.SSW.1.16)
- E-14 Connector interruption
(NOTE: For this test E-14 the LVA system provides only the voltage source)
- E-15 Reverse polarity
(HARDWARE REQUIREMENT: Option OPT.24: programmable internal resistance of the LVA)
- E-16 Ground offset
(HARDWARE REQUIREMENT: Electronic switch EMS 100 including option EMS.K.2.16 or EMS.SSW and an additional amplifier or an external battery)
- E-17 Short circuit in signal circuit and load circuits
(HARDWARE REQUIREMENT: Electronic switch EMS 100 including option EMS.K.2.16 or EMS.SSW)
- E-19 Closed circuit current
(HARDWARE REQUIREMENT: External current measurement unit)
- E-21 Backfeeds
(HARDWARE REQUIREMENT: Electronic switch EMS 100)
- E-23 Equalizing currents of multiple supply voltages

Software module VW TL81000

Testing according to VW TL 80101 (2016-02)

- (HARDWARE REQUIREMENT: CAR-TEST-SYSTEM 14)
- 3.4.2.1 Test pulse 1 (for 12/24/42/48V)
- 3.4.2.2 Test pulse 2 (for 12/24/42/48V)
- 3.4.2.3 Test pulse 3a / 3b (for 12/24/42/48V)
- 3.4.2.4 Test pulse 5b (for 42/48V)
- 3.4.2.5 Test pulse 6 (for 12/24/42/48V)
- 3.4.4.2 Interference emission measurement
(HARDWARE REQUIREMENT: CAR-TE 14)
- 3.4.5 Pulse interference on sensor cables
- 3.4.5.1 Capacitive coupling clamp
(HARDWARE REQUIREMENT: CAR-TEST-SYSTEM 14 with capacitive coupling clamp CDN 2012)
- 3.4.5.2 Current injection probe

Testing according to VW TL 80101 (2018-03)

- (HARDWARE REQUIREMENT: CAR-TEST-SYSTEM 14)
- 5.4.2.1 Test pulse 1 (for 12/24/42/48V)
- 5.4.2.2 Test pulse 2 (for 12/24/42/48V)
- 5.4.2.3 Test pulse 3a / 3b (for 12/24/42/48V)
- 5.4.2.4 Test pulse 5b (for 42/48V)
- 5.4.2.5 Test pulse 6 (for 12/24/42/48V)
- 5.4.4.2 Interference emission measurement
(HARDWARE REQUIREMENT: CAR-TE 14)
- 5.4.5 Pulse interference on sensor cables
- 5.4.5.1 Capacitive coupling clamp
(HARDWARE REQUIREMENT: CAR-TEST-SYSTEM 14 with capacitive coupling clamp CDN 2012)
- 5.4.5.2 Current injection probe

Software module Volvo 31850329

Testing according to Volvo 31850329 (2014-06)

- 11.2.2 CI01 Transient immunity on Power Lines
- 11.2.3 CI02 Transient immunity on Signal Lines

Software module Volvo 31822854

Testing according to Volvo 31822854 (2018-02)

- 4.2 Direct current supply voltage
 - 4.3 Overvoltage
 - 4.4 Superimposed alternating voltage (50Hz ... 25kHz)
 - 4.5 Slow decrease and increase of supply voltage
 - 4.6 Discontinuities in supply voltage
 - 4.6.1 Momentary drop in supply voltage
 - 4.6.2 Reset behaviour at voltage drop
 - 4.6.3 Starting profile
 - 4.6.4 Load dump
 - (HARDWARE REQUIREMENT: Load dump generator LDS)
 - 4.7 Reversed voltage (test at the negative voltage)
 - 4.10 Short-circuit protection
 - Signal circuits (short circuits are applied to the signal circuits)
 - Load circuits (short circuits are applied to the load circuits)
- (HARDWARE REQUIREMENT: Electronic switch EMS 100 including option EMS.K.2.16)

Software modules under development – available soon...

Software module FCA CS.00054 Testing according to FCA CS.00054:2018-01	
Software module Fiat 9.90111-01 Testing according to Fiat 9.90111-01:2012-06	
Software module MAN M 3285 Testing according to MAN M 3285:2017-07	
Software module MBN LV 148 Testing according to MBN LV 148:2013-11	
Software module Mitsubishi ES-X82114 Testing according to Mitsubishi ES-X82114:2007-04	
Software module Nissan 28401NDS02 Testing according to Nissan 28401NDS02:2002-04	