

Section 3 Electrical system

Group 31 Battery

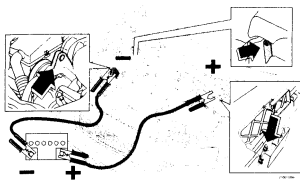
System voltage, with ignition off: 12.5 - 12.7 V
 A newly charged battery may have a higher voltage.

Battery capacity

Cold start current* CCA SAE	Capacity	Reserve capacity** RC SAE	Recommended charge current
520 A	55 Ah	90	5.5 A
600 A	65 Ah	115	6 A
680 A	90 Ah	160	8 A

* **Cold start current (CCA, SAE)** is the discharge current which a battery can provide for 30 seconds, at a temperature of -18°C (0°F) without voltage dropping below 7.2 V.

** **Reserve capacity (RC, SAE)** is the time taken at a temperature of $+27^{\circ}\text{C}$ (81°F), and a discharge current of 25 A, to reduce the voltage of a fully charged battery to 10.5 V.



M3100100

Terminal for jump starting:

The battery positive lead is routed to the terminal for jump starting located beside the engine compartment relay / fusebox.

Battery discharge protection:

To avoid involuntary battery discharge through the cargo compartment electrical outlet there is a control circuit in the rear electronic control module.

If the current in the circuit exceeds 60 mA the following occurs:

- 1) A text message is posted in the DIM when the key is turned from I to 0.
- 2) A short warning signal is heard when the ignition key is removed from the ignition switch.

Group 32 Generator / Charge regulator

Generators, electrical and mechanical data:

Generator (GEN) Type:	BOSCH NCB1 14 V / 120 A
Petrol engine. Generator (GEN) without freewheel Volvo P/N	94 42 841
Petrol engine. Generator (GEN) with freewheel Volvo P/N	94 59 092
Direction of rotation, petrol engines Direction of rotation, diesel engines	Anticlockwise Clockwise
Current strength at 13.5 V A Measured at a temperature of 25°C (77°F). Stabilised output voltage. Engine speed (RPM): 38.3rps/680rpm.	70
Current strength at 13.5 V A Measured at a temperature of 25°C (77°F). Stabilised output voltage. Engine speed (RPM): 11.3 rps/2300 rpm.	120
Nominal output W	1680
Maximum speed r/s (rpm)	113 (6800)
Carbon brushes, minimum length	5.0 mm (0.197")
Tightening torques:	
Mounting screw for rear cover, use B+ terminal .. Nm / lbf ft.	30/22
Mounting screw for rear cover, do not use B+ terminal Nm / lbf ft.	12/9
Mounting screw for rear cover, fixing screw Nm / lbf ft.	4/3
Mounting screw for rear cover, ground screws .. Nm / lbf ft.	1.7/1.2
Mounting screw for regulator, phase connector .. Nm / lbf ft.	0.8/0.6
Nut with left-hand thread for fixed pulley Nm / lbf ft.	65/48
Nut with left-hand thread for freewheel pulley Nm / lbf ft.	80/60
Test values:	
Resistance, rotor winding Ω	2.6
Resistance, stator winding Ω/phase	0.06
NOTE: Measured with a low ohm voltmeter	

Charge regulators, electrical and mechanical data:

Charge regulator	BOSCH	
Type:		
Volvo P/N	94 59 741	
	Measured in the car	Measured at the test bench
Conditions:		
Battery charging	75%	100%
Air temperature °C (°F)	25° (77°)	25° (77°)
Temperature, regulator warm °C (°F)	60° - 80° (140° - 176°)	60° - 80° (140° - 176°)
Test values:		
Generator (GEN) speed r/s (rpm)	100 (6000)	
Engine speed (RPM) r/s (rpm)	38.3 (2300)	
Generator (GEN) load A	25 - 45	25 - 45
Vehicle basic load		
Control voltage between the B+ connection and the generator housing. The voltage reading should be made at the earliest 10 seconds after starting.		
Generator:		
94 42 841, 94 59 092 V	13.7 - 14.6	14.1 - 14.9

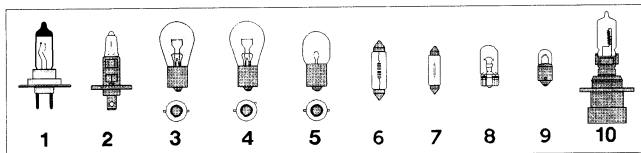
Group 33 Starter motor

P/N and test data:

Starter motor Type / Test data	Bosch 12 V
1.4 kW Hot climate markets Volvo P/N.	91 62 617
1.4 + kW Cold climate markets Volvo P/N.	91 62 618
Control solenoid:	
Lowest connection voltage V	7.4

Starter motor, type	Bosch 12 V / 1.4 kW
Volvo P/N.	91 62 617 91 62 618
Direction of rotation	Clockwise
Test value, starter motor unloaded:	
11.3 V and maximum 70 A, min. rpm (r/s)	2900 (48.3)
11.3 V and maximum 140 A, min. rpm (r/s)	
Test value, starter motor locked:	
4.0 V and 0 rpm A	650-750
4.0 V and 0 rpm A	
Control solenoid:	
Lowest connection voltage V	7.0

Group 35 Lighting



Bulbs (Market dependent)

	Power W	Lamp type	Fig. no.
Headlamps low beam	55	H7	1
Headlamps high beam	60	HB3	10
Fog lamps	55	H1	2
Front parking lamps	5	W 5 W	8
Tail lamps	10	P 10 W	5
Turn signal lamps			
front	21	PY 21 W	3
rear	21	PY 21 W	3
side	5	WY 5W	8
Stop (brake) lamps			
standard	21	P 21 W	4
high mounted	4	LED	-
Rear fog lamps	21	P 21 W	4
Reversing lamps	21	P 21 W	4
Number plate lighting	5	W 5 W	8
Courtesy lighting	5	C 5 W	6
Roof lighting	10	SV 8.5 / 6cp	6
Rear reading lamps	10	W 5 W	8
Cargo compartment lighting	5	SV 8.5	6
Glove compartment lighting	2	BA 9 s	9
Vanity mirror lighting	1.2	SV 5.5	7
Courtesy lighting, rear	5	W 2.1 x 9.5 d	8

Group 37 Fuses

11A		
Main fuses in the engine compartment, integrated relay / fusebox		
Fuse number:	Function	A
1	Automatic glow plug system relay, Diesel	60
2	Fuses 11C/32-37, parking lamps relay	60
3	Fuses 11B/17-18, 11C/3-6, 11C/16-19 Via overload relay 2/31 15+) Via overload relay 2/30 X+)	60
4	Fuses 11B/10, 12-13, 16, 11C/21-24, 11C/25-29	60
5	-	
6	-	
7	Fuses 11B/1-2, Engine cooling fan (FC) control module	60
8	Fuses 11B/20-21, Diesel	60

11B		
Fuses and relays in the engine compartment		
Fuse number:	Function	A
1	Control module, Parking heater	25
2	Accessories, auxiliary lamps	15
3	-	-
4	Heated oxygen sensors (HO2S)	20
5	Canister purge (CP) valve, camshaft position sensor, EVAP canister shut-off valve	15
6	Engine control module (ECM), fuel injection pump, mass air flow (MAF) sensor, injectors	15
7	Electronic throttle body control module	10
8	Air conditioning (A/C) relay, accelerator pedal (AP) position sensor	10
9	Horn	15
10	-	-
11	Automatic glow plug system relay, A/C relay, ignition module with ignition coils, EGR controller, turbocharger (TC) control valve, engine pad solenoid valve, PTC resistor air preheating, Diesel	20
12	Brake lamp switch	5
13	Windscreen wipers	25
14	ABS control module	30

11B		
Fuses and relays in the engine compartment		
Fuse number:	Function	A
15	Relay bifuel	15
16	Windscreen and headlight washer pump	15
17		
18		
19	Control module for ABS/dynamic stability and traction control (DSTC)	30
20	-	-
21	-	-
22	Relay starter motor	25
23	Main relay engine management system	5
24	-	-

11C		
Passenger compartment fuses		
Fuse number:	Function	A
1	Left low beam	10
2	Right low beam	10
3	Relay low beam	15
4	Relay high beam	20
5	Power driver's seat	30
6	Power passenger seat	30
7	Heated seat left	15
8	Heated seat right	15
9	ABS brakes, steering angle sensor control module	5
10	Left high beam	15
11	Right high beam	15
12	Headlamp wipers, Headlamp range adjustment	15
13	Cigarette lighter outlet 12 V front the rear	20
14	Electric switch seat belt buckle, power passenger seat, central electronics module (CEM), supplementary restraint system (SRS) control module	5
15	Radio, RTI Display	5

11C		
Passenger compartment fuses		
Fuse number:	Function	A
16	Radio	20
17	Amplifier	30
18	Front fog lamps	15
19	RTI display	10
20	-	-
21	Overload relay; TCM and inhibited shifting	10
22	CEM; turn signal lamps	20
23	Light switches module, Data link connector (DLC), Climate control switches module, Steering wheel stalk module	5
24	Extended X-supply via relay: Climate control switch module, combined instrument panel (dash-board instrument module), power driver's seat, additional heater control module, Geartronic, shift-Lock	10
25	Ignition switch: Starter motor relay, Engine control module (ECM), Central electronics module (CEM), Fuse 11/C7, Supplementary restraint system (SRS) control module, Antenna ring, Relay 15/X	10
26	Blower fan control module	30
27	Front door switch modules (DDM/PDM) central locking, Power windows, Door open warning lamps, Heated door mirrors, Power door mirrors, Door mirror lighting	15
28	Roof lighting, upper electronics module	10
29	Carphone PHM	10
30	Parking lamps left front and rear	10
31	Parking lamps right front and rear, number plate lighting	10
32	Fuse 11C/38, interior lighting, electronic power steering, glove compartment lighting	10
33	Fuel pump	15
34	Sun roof	15
35	Electrical switch module DDM and PDM Left front door	25
36	Electrical switch module DDM and PDM Right front door	25
37	Rear power windows, child safety block	30
38	Alarm siren SCM	5

11E Main Fuses, cargo compartment, at battery		
Fuse number:	Function	A
1	15l-supply rear, fuses 11D/15-16	40
2	Fuses 11D/12-14	40
3	Heated rear window	40
4	-	-
5	Fuses 11D/6-11	40
6	-	-
7	Fuses 11D/1-5	40

11D Fuses in cargo compartment		
Fuse number:	Function	A
1	Rear electronic module, cargo compartment lighting	10
2	Rear fog lamps	10
3	Stop (brake) lamps	15
4	Back-up (reversing) lamps	10
5	Rear demist, control voltage, relay 15l	5
6	Boot lid opening, boot lid locking	10
7	Folding down headrest	10
8	Central locking rear doors, fuel tank filler flap 11E/5	15
9	Tow hitch for trailer, 30 supply	15
10	CD-ROM changer, RTI control module, antenna	10
11	Accessory control module	15
12	-	-
13	-	-
14	-	-
15	Tow hitch for trailer, 15 supply	20
16	Power socket in cargo compartment, accessory	15
17	-	-
18	-	-

Relays	
Located in engine compartment	
Position	Function
FMA1	-
FMA2	Main relay for the engine management system 2/32
FMA3	Automatic glow plug system relay 2/14 Diesels
FMA4	Relay for the starter motor 2/35
FMA5	
FMI1	Air conditioning (A/C) relay 2/22
FMI2	Horn relay 2/17
FMI3	Front washer pump relay 2/92
FMI4	-
FST1	Intermittent windscreen wiper relay 2/91
FST2	Replace bifuel 2/33
FST3	Windscreen wiper low-/high speed relay 2/90

Relays	
Located in the passenger compartment	
Position	Function
CMA1	-
CMA2	X-supply overload relay 2/30
CMA3	15-supply overload relay (2/31)
CMA4	-
CMI1	Left rear power window up relay 2/116
CMI2	Left rear power window down relay 2/118
CMI3	Power window child safety block relay rear doors 2/120
CMI4	High beam relay 2/63
CMI5	Parking lamp relay 2/61
CMI6	-
CMI7	Low beam relay 2/62
CMI8-10	-
CMI11	Fog lamp relay, front 2/34
CMI12	Fuel pump (FP) relay 2/23
CMI13-20	-
CMI21	Extended D supply relay automatic gearbox 2/101
CMI22	Extended X-supply relay 2/29
CMI23	Right rear power window down relay 2/119
CMI24	Power window up relay right rear 2/117
CMI25	-
CSH1	Left turn signal lamp shunt in CEM 20/32
CSH2	Right turn signal lamp shunt in CEM 20/34
CSH3	-
CSH4	Low beam shunt in CEM 20/27
CSH5-6	-
CST1	-

Relays Located in cargo compartment	
Position	Function
RMA1	Relay 15I-supply rear 2/52
RMA2	-
RMA3	Rear windscreen heater relay 2/82
RMA4	-
RMI1	Central locking relay locking left rear door 2/111
RMI2	(2/112) Left rear central unlocking relay
RMI3	Central locking rear door deadlocking relay 2/115
RMI4	Reversing lamp relay 2/80
RMI5	Brake lamp relay 2/79
RMI6	Fog tail lamp relay 2/49
RMI7	Trailer fog lamp relay 2/83
RMI8-10	-
RMI11	Pager relay 1 2/136
RMI12	Pager relay 2 2/137
RMI13	-
RMI14	-
RMI15	-
RMI16	-
RMI17-18	-
RMI19	-
RMI20	Tailgate locking relay 2/67
RMI21	Fuel tank filler cover unlocking relay 2/59
RMI22	Fuel tank filler cover locking 2/58
RMI23	Right rear central unlocking relay 2/114
RMI24	Central locking relay locking right rear door 2/113
RMI25	-
RSH1	-
RSH2	Rear fog lamp shunt 20/29
RSH3	-
RSH4	Shunt parking lamps group 1, 20/28
RSH5	Shunt parking lamps 2, 20/33

Relays Located in cargo compartment	
Position	Function
RSH6	Shunt brake lamp 20/31
RST1	-

Group 38 Instruments, sensors

Fuel level sensor:	Volume litres:	Volume US gal:	Fuel tank unit, left-hand side: Measured across the terminal pin 5 and 6. Resistance Ω	Fuel tank unit, right-hand side: Measured across the terminal pin 6 and 7. Resistance Ω
Empty fuel tank	0	0	374	393
Half tank	40/35/36	9.2/6.5/10.6	136/136/133	129/133/115
Full fuel tank	70/72/80	18.5/19.0/ 21.1	12	12

Engine coolant temperature (ECT) sensor:						
Temperature: $^{\circ}\text{C}$ ($^{\circ}\text{F}$)	0 $^{\circ}$ (32 $^{\circ}$)	10 $^{\circ}$ (50 $^{\circ}$)	20 $^{\circ}$ (68 $^{\circ}$)	40 $^{\circ}$ (104 $^{\circ}$)	80 $^{\circ}$ (176 $^{\circ}$)	100 $^{\circ}$ (212 $^{\circ}$)
Resistance Ω	5740	3700	2450	1150	318	184
Voltage Volt	2.65	2.10	1.62	0.92	0.29	0.17

Speedometer

Speedometer, resistance in sensor	Cannot be measured. Check using a VADIS station.
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