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PRODUCT EXPERTISE



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NEW PARTS – FULL RANGE

By removing the deposit, there is no necessity to return used parts as part of a risky and complex procedure. The guarantee process is conveniently handled by wholesalers. The relevant starters and alternators are sold in HELLA's yellow and blue packaging featuring "New parts without deposit".

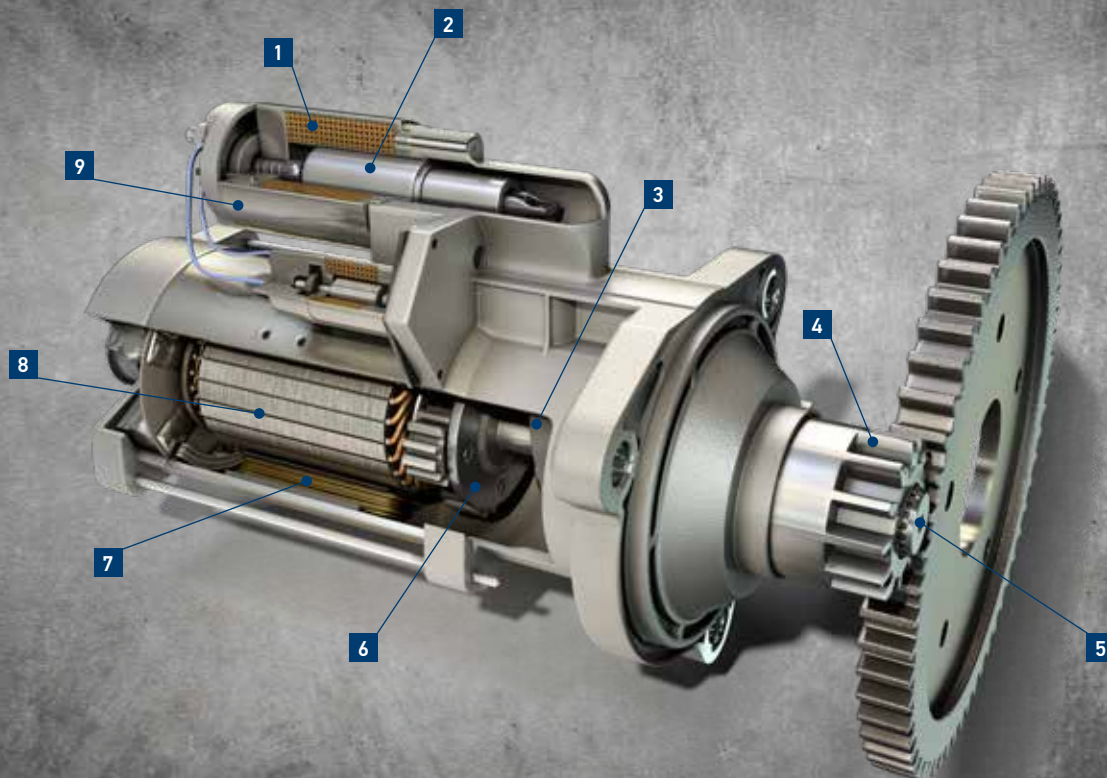
STARTERS AND ALTERNATORS YOUR BENEFITS AT HELLA

- Starters, alternators and spare parts in OE quality
- Comprehensive range for cars, vans and commercial vehicles
- High levels of reliability and long lifetime
- Ample product range
- High availability and market coverage
- Innovative technologies/products, e.g. Start/stop starters
- Fast and reliable delivery



Important

The following product illustrations are an extract from the HELLA starter and alternator range. Please refer to TecDoc for the complete product range.



1. Solenoid winding | 2. Through-bolts | 3. Engaging lever | 4. Pinion | 5. Drive shaft
6. Planetary gear | 7. Field winding | 8. Armature | 9. Starter solenoid

Basics

Internal combustion engines cannot start themselves, they have to be started with external energy. This starting procedure can either be electrical, hydraulic or pneumatic.

Electric motors, usually referred to as starters, are used for this purpose in most vehicles. Since large amounts of resistance from friction and compression have to be overcome when starting the vehicle, a DC series-wound motor is particularly well suited because it provides high initial torque.

The starter converts electrical energy into kinetic energy. Diesel vehicles or vehicles with a start/stop system are equipped with a more powerful starter. A reduction gearbox frequently ensures the gear reduction required here to achieve the necessary torque to start the vehicle. A solenoid switch generally helps to 'engage' the starter pinion. In petrol engines, starting the vehicle will place a load of approximately 100A and up to 400A in diesel engines on the battery. The latter coming as a result of the higher compression in diesel engines. The minimum power of a starter not only depends on the type of engine (petrol, diesel), but also on the displacement, the minimum starting speed of the unit and the engine oil formulation specified (oil viscosity). For modern, turbocharged downsizing engines with a lower displacement, a smaller starter with less power is sufficient.

Design

A starter motor is usually composed of the following assemblies:

- Electric starter motor
- Engaging relay (solenoid switch)
- Drive-end bearing with single-pinion gear

The electric starter motor consists in principle of a tubular pole housing accommodating the pole shoes, excitation winding and permanent magnets. The electrical armature with armature winding is situated in this pole housing. The engaging relay, also known as a solenoid switch, is a combination of a relay and solenoid magnet. It is mounted at the top in the drive-end bearing. The single-pinion gear with pinion, free-running roller, engaging lever, carrier and in-line spring are situated in the drive-end bearing.

How they work

The engaging relay is actuated when the motor is started via the ignition lock. The flow of current in the pull-in and hold-in winding attracts the relay armature. This actuates the engaging lever and pushes the carrier unit with pinion and freewheel against the ring gear of the engine flywheel. Once the pinion has meshed completely, the contact bridge in the starter solenoid closes the main circuit for the starter motor. The starter is switched on and turns.

STARTER



Starter

Voltage	12 V
Power	1.8 kW
Pinions	10 / 11
Basic pinion position	52 mm
Design	Counterclockwise direction of rotation
Flange diameter	76 mm
Number of fixing holes	2

Suitable for:

Audi A2 (8Z0), A3 (8L1)
Ford Galaxy (WGR)
Seat Alhambra (7V8, 7V9), Arosa (6H), Cordoba (6K1, 6K2, 6L2), Cordoba Vario (6K5) Ibiza II (6K1), Ibiza III (6L1), Inca (6K9), Leon (1M1), Toledo I (1L), Toledo II (1M2)
Skoda Fabia I (6Y2), Fabia I station wagon (6Y5) Fabia I notchback (6Y3) Octavia I (1U2), Octavia I station wagon (1U5)
VW Bora (1J2), Bora station wagon (1J6) Caddy II box body (9K9A) Caddy II station wagon (9K9B) Golf III (1H1), Golf III convertible (1E7) Golf III station wagon (1H5) Golf IV (1J1), Golf IV convertible (1E7) Golf IV station wagon (1J5) Lupo (6X1, 6E1), New Beetle (9C1, 1C1), New Beetle convertible (1Y7) Passat (3A2, 35I), Passat station wagon (3A5, 35I) Polo (6N2, 9N_) , Polo Classic (6V2) Polo notchback (9A4, 9A2, 9N2, 9A6) Polo station wagon (6V5) Sharan (7M8, 7M9, 7M6), Vento (1H2)

8EA 011 610-561



Starter

Voltage	12 V
Power	1 kW
Pinions	10
Basic pinion position	52.5 mm
Design	Counterclockwise direction of rotation
Flange diameter	76 mm
Number of fixing holes	2

Suitable for:

Audi A1 Sportback (8XA, 8XF) A3 (8P1), A3 Sportback (8PA)
Seat Altea (5P1) Altea XL (5P5, 5P8), Cordoba (6L2), Ibiza III (6L1), Ibiza IV (6J5, 6P1), Ibiza IV Sportcoupe (6J1, 6P5) Ibiza IV ST (6J8, 6P8), Leon (1P1)
Skoda Fabia I (6Y2), Fabia I station wagon (6Y5) Fabia I Praktik (6Y5), Fabia I notchback (6Y3) Fabia II (542), Fabia II station wagon (545) Octavia II (1Z3), Octavia II station wagon (1Z5) Rapid (NH3), Roomster (5J) , Roomster Praktik (5J)
VW Golf IV station wagon (1J5) Golf Plus (5M1, 521), Golf V (1K1), Golf V station wagon (1K5) Golf VI (5K1), Golf VI station wagon (AJ5) Jetta III (1K2), Polo (6R1, 6C1), Polo (9N_) , Polo notchback (602, 604, 612, 614)

8EA 012 527-531



Starter

Voltage	12 V
Power	1.1 kW
Pinions	10
Basic pinion position	19 mm
Design	Clockwise direction of rotation
Flange diameter	68 mm
Number of fixing holes	2

Suitable for:

Chevrolet Aveo/Kalos hatchback (T200, T250, T255) Aveo/Kalos notchback (T250, T255) Cruze (J300), Lacetti (J200), Lacetti station wagon (J200) Lacetti hatchback (KLAN) Nubira station wagon, Nubira notchback, Rezzo MPV (U100)
Fiat Stilo (192_)
Opel Agila (A) (H00), Ascona C (J82), Ascona C CC (J82), Astra F (T92), Astra F convertible (T92) Astra F station wagon (T92) Astra F CC (T92), Astra F Classic station wagon (T92) Astra F Classic CC (T92) Astra F Classic notchback (T92) Astra F Van (T92), Astra G convertible (T98) Astra G CC (T98), Astra G coupe (T98) Astra G box body (F70) Astra G notchback (T98) Astra H (A04), Astra H station wagon (A04) Astra H GTC (A04), Astra H TwinTop (A04), Combo (71_) , Combo box body/station wagon, Combo Tour, Corsa A CC (S83) Corsa A box body (S83) Corsa A TR (S83), Corsa B (S93), Corsa B box body (S93) Corsa C (X01), Corsa D (S07), Kadett E (T85), Kadett E convertible (T85) Kadett E station wagon (T85) Kadett E CC (T85), Kadett E Combo (T85), Kadett E box body (T85) Meriva A MPV (X03) Tigra (S93), Tigra TwinTop (X04), Vectra A (J89), Vectra A CC (J89), Vectra B (J96), Vectra B station wagon (J96) Vectra B CC (J96), Vectra C (Z02), Vectra C CC (Z02), Zafira / Zafira Family B (A05), Zafira A MPV (T98)

8EA 011 610-411



Starter

Voltage	12 V
Power	1.4 kW
Pinions	9
Basic pinion position	22 mm
Design	Clockwise direction of rotation
Flange diameter	76 mm
Number of fixing holes	3

Suitable for:

BMW 3 (E36, E46), 3 Series convertible (E30, E36, E46) 3 Compact (E36, E46), 3 Series coupe (E36, E46) 3 Touring (E36, E46), 5 (E34, E39, E60), 5 Touring (E34, E39, E61), 7 (E38, E65, E66, E67), X3 (E83), X5 (E53), Z3 coupe (E36) Z3 Roadster (E36), Z4 Roadster (E85)

8EA 012 526-841



Starter

Voltage	12 V
Power	2 kW
Pinions	10
Basic pinion position	42.5 mm
Design	Counterclockwise direction of rotation
Flange diameter	76 mm
Number of fixing holes	2

Suitable for:

Audi A3 (8P1), A3 convertible (8P7) A3 Sportback (8PA) TT (8J3, 8N3), TT Roadster (8J9, 8N9)
Seat Altea (5P1), Altea XL (5P5, 5P8), Leon (1P1), Toledo III (5P2)
Skoda Octavia II (1Z3), Octavia II station wagon (1Z5) Superb II (3T4), Superb II station wagon (3T5)
VW Caddy III box body (2KA, 2KH, 2CA, 2CH) Caddy III station wagon (2KB, 2KJ, 2CB, 2CJ) CC (358), Eos (1F7, 1F8), Golf IV (1J1), Golf Plus (5M1, 521), Golf V (1K1), Golf V station wagon (1K5) Golf VI (5K1), Golf VI station wagon (AJ5) Jetta III (1K2), New Beetle (9C1, 1C1), Passat (362, 3C2), Passat CC (357), Passat station wagon (365, 3C5) Scirocco (137, 138), Touran (1T1, 1T2)

8EA 012 526-191



Starter

Voltage	12 V
Power	1 kW
Pinions	10
Basic pinion position	14 mm
Design	Clockwise direction of rotation
Flange diameter	70 mm
Number of fixing holes	2

Suitable for:

Mercedes-Benz A-Class (W168, W169) B-Class (W245) Vaneo (414)

8EA 012 527-301

STARTER



How does start/stop technology affect the starter?

Start/stop technology has already been used for over 10 years. According to measurements on the basis of the new European driving cycle (NEDC) these technologies can save around 8% in terms of consumption and emissions. In actual city traffic these savings can be significantly higher.

Start/stop starters are geared towards associated, frequent starting procedures by having boosted their lifetime for these special applications. The optimised design makes it possible for the starter to cope with the more frequent starts across the vehicle's lifetime.

For this purpose, the following measures are required:

- Highly stressed bearings are reinforced
- Planetary gear additionally improved
- Use of reinforced single-pinion mechanism
- Optimised commutator for longer service life



Starter	
Voltage	12 V
Power	0.9 kW
Pinions	9
Basic pinion position	-4 mm
Design	Clockwise direction of rotation
Flange diameter	58 mm
Number of fixing holes	3

Suitable for:

Citroën AX (ZA-), Berlingo (B9), Berlingo/Berlingo First MPV (MF, GJK, GFK) Berlingo / Berlingo First box body (M-) Berlingo box body (B9) BX (XB-), C2 (JM-), C3 I (FC-, FN-), C3 II (SC-), C3 Pluriel (HB-), C4 coupe (LA-) C4 I (LC-), C4 I notchback, Nemo box body (AA-) Nemo station wagon, Saxo (S0, S1) Xsara (N1), Xsara Break (N2), Xsara coupe (N0) Xsara Picasso (N68), ZX (N2), ZX Break (N2)
Fiat Fiorino box body/station wagon (225-) Qubo (225-)
Peugeot 1007 (KM-), 106 I (1A, 1C), 106 II (1A-, 1C-), 205 I convertible (741B, 20D) 205 II (20A/C), 205 box body, 206 CC (2D) 206 hatchback (2A/C) 206 notchback, 206 SW (2E/K) 207 (WA-, WC-), 207 SW (WK-), 306 (7B, N3, N5), 306 Break (7E, N3, N5), 306 convertible (7D, N3, N5) 306 hatchback (7A, 7C, N3, N5) 307 (3A/C), 307 Break (3E), 307 CC (3B), 307 SW (3H), 309 II (3C, 3A), 405 I Break (15E), Bipper (AA-), Bipper Tepee, Partner Combispacer (5-, G-) Partner box body, Partner box body (5-, G-) Partner Tepee

8EA 011 610-441



Starter	
Voltage	12 V
Power	1.7 kW
Pinions	9/10
Basic pinion position	8 mm
Design	Clockwise direction of rotation
Flange diameter	82 mm
Number of fixing holes	3

Suitable for:

Alfa Romeo 147 (937-), 156 Sportwagon (932-) 159 (939-), 159 Sportwagon (939-) GT (937-), Mito (955-)
Cadillac BL5
Fiat Brava (182-), Bravo I (182-), Bravo II (198-), Croma (194-), Doblo Cargo (223-), Doblo MPV (119-, 223-, 263-) Doblo box body/station wagon (263-) Doblo platform/chassis (263-) Grande Punto (199-), Idea (350-), Linea (323-, 110-), Multipla (186-), Punto (188-), Stilo (192-), Stilo Multi Wagon (192-), Strada Pick-up (178-)
Lancia Delta III (844-), Musa (350-)
Opel Astra H (A04), Astra H station wagon (A04) Astra H GTC (A04), Astra H box body (L70) Astra J (P10), Astra J station wagon (P10) Astra J GTC, Cascada (W13), Insignia A (G09), Insignia A Sports Tourer (G09) Insignia A notchback (G09) Vectra C (Z02), Vectra C station wagon (Z02) Vectra C CC (Z02), Zafira / Zafira Family B (A05), Zafira Tourer C (P12)
Saab 9-3 (YS3F, E79, D79, D75), 9-3 Cabriolet (YS3F) 9-3 station wagon (YS3F) 9-5 (YS3E, YS3G), 9-5 station wagon (YS3E)

8EA 012 527-771



Starter	
Voltage	12 V
Power	1.1 kW
Pinions	9 / 10
Basic pinion position	32 mm
Design	Counterclockwise direction of rotation
Flange diameter	76 mm
Number of fixing holes	3

Suitable for:

Agila (A) Vento (1H2)
Audi A3 (8L1), yyy, yyy
Ford Galaxy (WGR)
Seat Alhambra (7V8, 7V9), Cordoba (6K1, 6K2), Cordoba Vario (6K5) Ibiza II (6K1), Leon (1M1), Toledo II (1M2)
Skoda Fabia I (6Y2), Octavia I (1U2), Octavia I station wagon (1U5)
VW Bora (1J2), Bora station wagon (1J6) Caddy II box body (9K9A) Caddy II station wagon (9K9B) Golf III (1H1), Golf III convertible (1E7) Golf III station wagon (1H5) Golf IV (1J1), Golf IV convertible (1E7) Golf IV station wagon (1J5) New Beetle (9C1, 1C1), New Beetle convertible (1Y7) Passat (3A2, 35I), Passat station wagon (3A5, 35I) Polo Classic (6V2) Sharan (7M8, 7M9, 7M6), Vento (1H2)

8EA 011 610-041



Starter	
Voltage	12 V
Power	1.4 kW
Pinions	13
Basic pinion position	21 mm
Design	Clockwise direction of rotation
Flange diameter	78 mm
Number of fixing holes	2

Suitable for:

Opel Astra G station wagon (T98) Astra G CC (T98), Astra G notchback (T98) Astra H (A04), Astra H station wagon (A04) Astra H GTC (A04), Astra H notchback (A04) Astra J station wagon (P10) Opel box body/station wagon, Combo Tour, Corsa C (X01) Corsa C box body (X01) Corsa D (S07), Meriva A MPV (X03) Meriva B MPV (S10) Zafira / Zafira Family B (A05), Zafira Mk II (B) (A05)

8EA 011 610-661

STARTER



Starter	
Voltage	12 V
Power	1.1 kW
Pinions	10
Basic pinion position	53 mm
Design	Counterclockwise direction of rotation
Flange diameter	76 mm
Number of fixing holes	2
Suitable for:	
Audi A2 (8Z0) Seat Coridoba (6L2), Ibiza III (6L1) Skoda Fabia I (6Y2), Fabia I station wagon (6Y5) Fabia I Praktik (6Y5), Fabia I notchback (6Y3) VW Bora (1J2), Bora station wagon (1J6) Fox hatchback (5Z1, 5Z3, 5Z4) Golf IV (1J1), Golf IV station wagon (1J5) Lupo (6X1, 6E1), New Beetle (9C1, 1C1), New Beetle convertible (1Y7) Polo (9N_) Polo notchback (9A4, 9A2, 9N2, 9A6) Polo station wagon (6V5)	

8EA 012 527-401



Starter	
Voltage	12 V
Power	0.9 kW
Pinions	9
Basic pinion position	-2 mm
Design	Clockwise direction of rotation
Flange diameter	83 mm
Number of fixing holes	4
Suitable for:	
Seat Arosa (6H), Cordoba (6K1, 6K2), Cordoba Vario (6K5) Ibiza II (6K1), Inca (6K9) VW Caddy II box body (9K9A) Caddy II station wagon (9K9B) Golf III (1H1), Golf III station wagon (1H5) Lupo (6X1, 6E1), Polo (6N1, 6N2), Polo Classic (6V2) Polo van box body/hatchback (6N1) Polo station wagon (6V5) Vento (1H2)	

8EA 011 611-041



Starter	
Voltage	12 V
Power	1.2 kW
Pinions	11
Basic pinion position	22 mm
Design	Counterclockwise direction of rotation
Flange diameter	79 mm
Number of fixing holes	2
Suitable for:	
Audi A1 Sportback (8XA, 8XF) A3 (8V1, 8VK), A3 Sportback (8VA, 8VF) A3 Sportback (8VA, 8VF) Seat Leon (5F1) Skoda Octavia III (5E3, NL3, NR3), Octavia III station wagon (5E5) Superb III (3V3), Superb III Estate (3V5) VW Beetle (5C1, 5C2), Golf VII (5G1, BQ1, BE1, BE2), Passat (362, 3G2, CB2), Passat CC (357), Passat Estate (365), Polo (6R1, 6C1)	

8EA 011 611-581



Starter	
Voltage	12 V
Power	1.1 kW
Pinions	9
Basic pinion position	18 mm
Design	Clockwise direction of rotation
Flange diameter	68 mm
Number of fixing holes	2
Suitable for:	
Opel Adam (M13), Astra J coupe, Astra J Sports Tourer (P10) Corsa D (S07), Corsa E (X15), Meriva B MPV (S10), Mokka / Mokka X (J13)	

8EA 011 611-491



Starter	
Voltage	12 V
Power	1.7 kW
Pinions	12
Basic pinion position	52 mm
Design	CCW
Flange diameter	76 mm
Number of fixing holes	3
Suitable for:	
Audi A1 Sportback (8XA, 8XF) A3 Sportback (8PA) Seat Altea (5P1), Ibiza Mk IV (6J5, 6P1) Skoda Octavia II station wagon (1Z5) VW Caddy IV Estate (SAB, SAJ), Golf Plus Van (521), Golf Van VI station wagon (AJ5) Golf VI Van (5K1_), Passat (3C2), Polo Van (6R), Transporter/Caravelle Mk V van (7HB, 7HJ, 7EB, 7EJ, 7EF, 7EG, 7HF, 7EC) Transporter/Caravelle Mk VI van (SGB, SGG, SGJ, SGC, SHB)	

8EA 011 612-221



Starter	
Voltage	12 V
Power	1.4 kW
Pinions	11
Basic pinion position	14 mm
Design	Clockwise direction of rotation
Flange diameter	66 mm
Number of fixing holes	3
Suitable for:	
Citroën Berlingo / Berlingo First MPV (MF, GJK, GFK), C4 coupe (LA_) C4 I (LC_), Xsara (N1) Peugeot 307 (3A/C), 407 SW (6E_)	

8EA 011 610-181

STARTER



Starter	
Voltage	12 V
Power	2 kW
Pinions	10
Basic pinion position	52 mm
Design	Counterclockwise direction of rotation
Flange diameter	76 mm
Number of fixing holes	3
Suitable for:	
VW Transporter IV van (70B, 70C, 7DB, 7DK, 70J, 70K, 7DC, 7DJ) Transporter IV box body (70A, 70H, 7DA, 7DH) Transporter IV platform/chassis (70E, 70L, 70M, 7DE, 7DL)	

8EA 011 611-051



Starter	
Voltage	12 V
Power	2.2 kW
Pinions	10
Basic pinion position	61.5 mm
Design	Counterclockwise direction of rotation
Flange diameter	76 mm
Number of fixing holes	2
Suitable for:	
VW Multivan V (7HM, 7HN, 7HF, 7EF, 7EM, 7EN), Transporter V van (7HB, 7HJ, 7EB, 7EJ, 7EF, 7EG, 7HF, 7EC) Transporter V box body (7HA, 7HH, 7EA, 7EH) Transporter V platform/chassis (7JD, 7JE, 7JL, 7JY, 7JZ)	

8EA 012 526-111



Starter	
Voltage	12 V
Power	2.5 kW
Pinions	9
Basic pinion position	1.5 mm
Design	Clockwise direction of rotation
Flange diameter	81.5 mm
Number of fixing holes	3
Suitable for:	
Fiat Ducato van (250_, 290_) Ducato box body (250_, 290_) Ducato platform/chassis (250_, 290_)	

8EA 012 527-651



Starter testing

Since an internal combustion engine cannot start by itself, a functioning starter is essential for a roadworthy vehicle. Starters are fundamentally maintenance-free and will do their job over the entire life of a vehicle. Should they however fail or malfunction, in many cases this is due to oxidised or faulty electrical connections, defective solenoid switches, to damaged electric motors or worn single-pinion gears, to the driving pinion (wear or "clogging-up") or the freewheel. Learn everything about possible problems and how you can remedy the individual cases here.

Symptoms

The following symptoms may indicate a fault in the starter if the engine fails to start:

- No response when actuating the ignition switch
- The starter "clacks", but does not engage
- The starter audibly turns, but without driving the engine

Cause of failure

A starter malfunction can have different causes:

- Electrical connections faulty
- Solenoid switch (engaging relay) stiff or faulty
- Electric motor damaged electrically
- Single-pinion gear, starter pinion or freewheel damaged

Important

A fault-free supply of power to the starter is imperative for its successful function. The vehicle battery and the positive and ground contact of the starter should be included in the fault diagnostics.

Refer to page 13 for detailed information on troubleshooting.

STARTER



Starter

Voltage	12 V
Power	1.9 kW
Pinions	11 / 12
Basic pinion position	-4 mm
Design	Clockwise direction of rotation
Number of fixing holes	3

Suitable for:

Citroën C4 coupe (LA_) C4 Grand Picasso I (UA_), C4 I (LC_), C4 II (B7), C4 Picasso I MPV (UD_) C5 II (RC_), C5 II Break (RE_), C5 III (RD_), C5 III Break (RW_), C8 (EA_, EB_), Jumpy (VF7), Jumpy box body
Fiat Scudo (270_, 272_), Scudo box body (270_, 272_) Scudo platform/chassis (270_, 272_)
Peugeot 307 (3A/C), 307 Break (3E), 307 CC (3B), 307 SW (3H), 406 (8B), 406 Break (8E/F), 406 coupe (8C) 407 (6D_), 407 coupe (6C_) 407 SW (6E_), 508 I (8D_), 508 SW I (8E_), 607 (9D, 9U), 807 (E), Expert box body (VF3A_, VF3U_, VF3X_) Expert platform/chassis, Expert Tepee (VF3X_) RCZ

8EA 011 610-281



Starter

Voltage	12 V
Power	2 kW
Pinions	10 / 11
Basic pinion position	26 mm
Design	Clockwise direction of rotation
Flange diameter	83 mm
Number of fixing holes	2

Suitable for:

Mercedes-Benz C-Class (W202, W203) C-Class coupe (CL203) C-Class station wagon (S202, S203) CLK (C209), E-Class (W210, W211) E-Class station wagon (S210, S211, S124) G-Class (W463) M-Class (W163) S-Class (W220) Sprinter 2 t van (901, 902) Sprinter 2 t box body (901, 902) Sprinter 2 t platform/chassis (901, 902) Sprinter 3 t van (903, 906) Sprinter 3 t box body (903, 906) Sprinter 3 t platform/chassis (903, 906) Sprinter 3.5 t van (906) Sprinter 3.5 t box body (906) Sprinter 3.5 t platform/chassis (906) Sprinter 4 t van (904) Sprinter 4 t box body (904) Sprinter 4 t platform/chassis (904) Sprinter 4.6 t platform/chassis (906) Sprinter 5 t box body (906) Sprinter 5 t platform/chassis (905) Sprinter dump truck (905) V-Class (638/2) Viano (W639), Vito/Mixto box body (W639) Vito van (638, W639) Vito box body (638)

8EA 011 610-001



Starter

Voltage	12 V
Power	2 kW
Pinions	12
Basic pinion position	19 mm
Design	Clockwise direction of rotation
Flange diameter	89 mm
Number of fixing holes	2

Suitable for:

Citroën Jumper van, Jumper box body, Jumper platform/chassis
Fiat Ducato van (250_, 290_) Ducato box body (250_, 290_) Ducato platform/chassis (250_, 290_)
Ford Transit van (FD_, FB_, FS_, FZ_, FC_) Transit box body (FA_) Transit platform/chassis (FM_, FN_) Tourneo Custom V362 van (F3) Transit Custom V362 van (F3) Transit Custom V362 box body (FY, FZ) Transit Tourneo
Land Rover Defender convertible (L316) Defender Pick-up (L316), Defender platform/chassis (L316) Defender Station Wagon (L316)
Peugeot Boxer van, Boxer box body, Boxer platform/chassis

8EA 012 527-611



Starter

Voltage	12 V
Power	1.7 kW
Pinions	10 / 11
Basic pinion position	55 mm
Design	Counterclockwise direction of rotation
Flange diameter	76 mm
Number of fixing holes	3

Suitable for:

Audi A3 (8P1), A3 convertible (8P7) A3 Sportback (8PA) TT (8N3), TT Roadster (8N9)
Seat Altea (5P1), Altea XL (5P5, 5P8), Ibiza III (6L1), Ibiza IV (6J5, 6P1), Ibiza IV Sportcoupe (6J1, 6P5) Cordoba (6L2), Leon (1P1), Toledo III (5P2)
Skoda Fabia I (6Y2), Fabia II (542), Fabia I station wagon (6Y5) Fabia II station wagon (545) Fabia I notchback (6Y3) Octavia II (1Z3), Octavia II station wagon (1Z5) Roomster (5J), Roomster Praktik (5J), Superb II (3T4)
VW Caddy III box body (2KA, 2KH, 2CA, 2CH) Caddy III station wagon (2KB, 2KJ, 2CB, 2CJ) Golf Plus (5M1, 521), Golf V (1K1), Golf V station wagon (1K5) Jetta III (1K2), Multivan V (7HM, 7HN, 7HF, 7EF, 7EM, 7EN), Passat (362, 3C2), Passat station wagon (365, 3C5) Polo (9N_), Polo notchback (9A4, 9A2, 9N2, 9A6) Touran (1T1, 1T2), Transporter V van (7HB, 7HJ, 7EB, 7EJ, 7EF, 7EG, 7HF, 7EC) Transporter V box body (7HA, 7HH, 7EA, 7EH) Transporter V platform/chassis (7JD, 7JE, 7JL, 7JY, 7JZ)

8EA 011 610-221



Starter

Voltage	12 V
Power	1.7 kW
Pinions	10
Basic pinion position	62 mm
Design	Counterclockwise direction of rotation
Flange diameter	76 mm
Number of fixing holes	2

Suitable for:

Audi A3 (8P1), A3 convertible (8P7) A3 Sportback (8PA) TT (8J3), TT Roadster (8J9)
Seat Altea (5P1), Altea XL (5P5, 5P8), Ibiza III (6L1), Ibiza IV (6J5, 6P1), Ibiza IV SPORTCOUPE (6J1, 6P5) Leon (1P1), Toledo III (5P2)
Skoda Octavia II (1Z3), Octavia II station wagon (1Z5) Superb II (3T4), Superb II station wagon (3T5) Yeti (5L)
VW Caddy III box body (2KA, 2KH, 2CA, 2CH) Caddy III station wagon (2KB, 2KJ, 2CB, 2CJ) EOS (1F7, 1F8), Golf Plus (5M1, 521), Golf V (1K1), Golf V station wagon (1K5) Golf VI (5K1), Golf VI station wagon (AJ5) Jetta III (1K2), Multivan V (7HM, 7HN, 7HF, 7EF, 7EM, 7EN), Passat (362, 3C2), Passat CC (357), Passat station wagon (3C5) Scirocco (137, 138), Tiguan (5N_), Touran (1T1, 1T2), Transporter V van (7HB, 7HJ, 7EB, 7EJ, 7EF, 7EG, 7HF, 7EC) Transporter V box body (7HA, 7HH, 7EA, 7EH) Transporter V platform/chassis (7JD, 7JE, 7JL, 7JY, 7JZ)

8EA 011 610-231



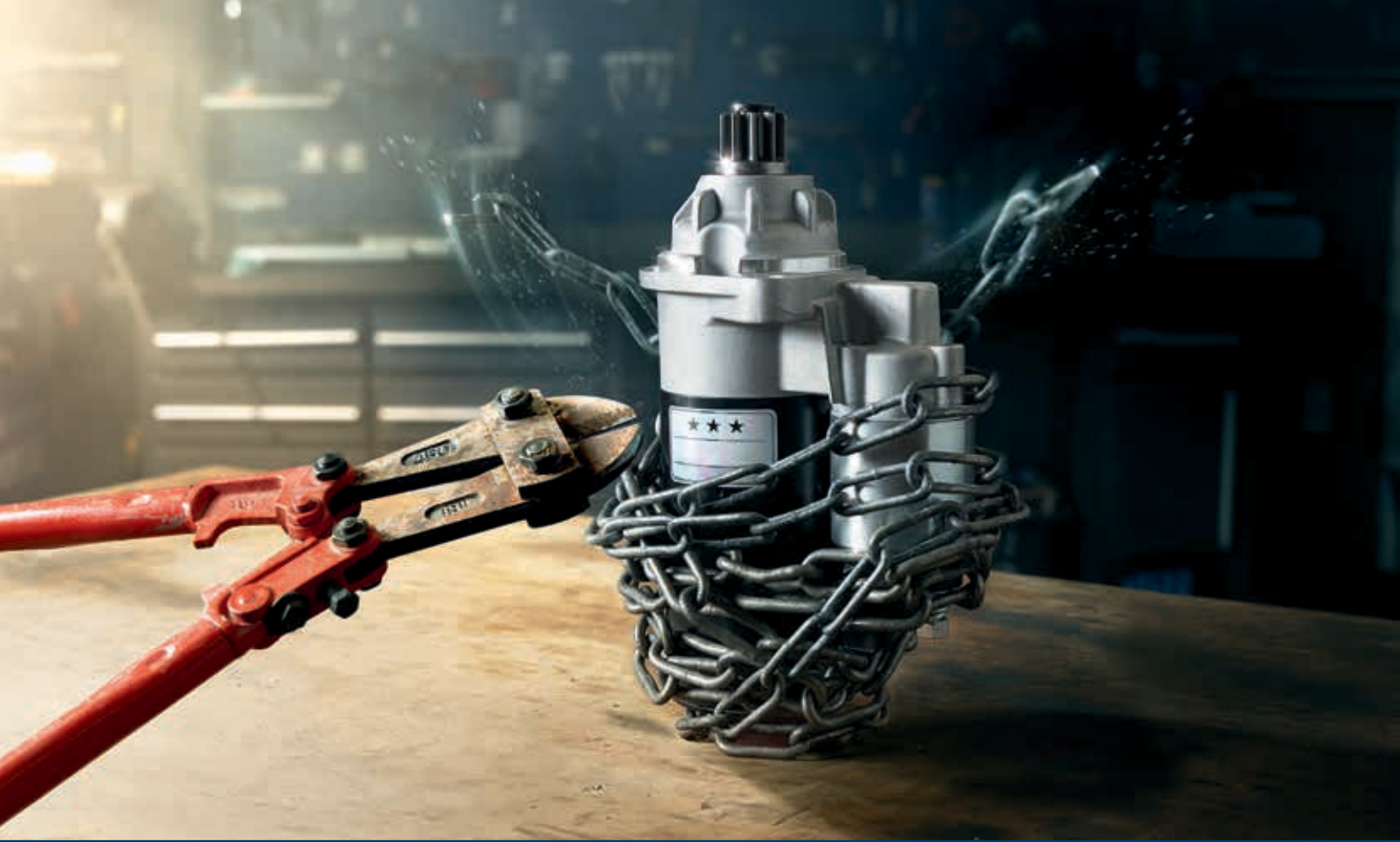
Starter

Voltage	12 V
Power	1.2 kW
Pinions	9
Basic pinion position	26 mm
Design	Clockwise direction of rotation
Flange diameter	82.5 mm
Number of fixing holes	2

Suitable for:

Daewoo Korando (KJ), Korando convertible (KJ) Musso (FJ)
Mercedes-Benz C-Class (W202, W203) C-Class coupe (CL203) C-Class station wagon (S202, S203) CLK (C208), CLK convertible (A208) E-CLASS (W124, W210) E-Class convertible (A124) E-Class coupe (C124) E-Class station wagon (S124, S210) M-Class (W163) MB100 box body (KPA) MB140 box body (KPA) SLK (R170), Sprinter 2 t van (901, 902) Sprinter 2 t box body (901, 902) Sprinter 2 t platform/chassis (901, 902) Sprinter 3 t van (903) Sprinter 3 t box body (903) Sprinter 3 t platform/chassis (903) Sprinter 4 t van (904) Sprinter 4 t box body (904) Sprinter 4 t platform/chassis (904) T1/TN box body/station wagon, T1/TN platform/chassis, V-Class (638/2) Vito van (638) Vito box body (638)
SsangYong Korando (KJ), Korando convertible (KJ) Musso (FJ)
VW LT 28-35 II van (2DB, 2DE, 2DK) LT 28-46 II box body (2DA, 2DD, 2DH) LT 28-46 II platform/chassis (2DC, 2DF, 2DG, 2DL, 2DM)

8EA 012 527-271



STARTER



Starter	
Voltage	24 V
Power	4 kW
Pinions	9
Basic pinion position	48 mm
Design	Clockwise direction of rotation
Flange diameter	89 mm
Number of fixing holes	3
Suitable for:	
Mercedes-Benz Atego, Atego 2, Axor, Axor 2, Citaro (O 530), Cito (O 520), Conecto (O 345), Econic, LK/LN2, Tourino (O 510), Unimog, Zetros	

8EA 012 586-011



Starter	
Voltage	24 V
Power	5.5 kW
Pinions	12
Basic pinion position	48 mm
Design	Clockwise direction of rotation
Flange diameter	92 mm
Number of fixing holes	3
Suitable for:	
MAN TGA, TGS, TGX	

8EA 012 586-381



Starter	
Voltage	24 V
Power	4 kW
Pinions	9
Basic pinion position	48 mm
Design	Clockwise direction of rotation
Flange diameter	89 mm
Number of fixing holes	3
Suitable for:	
Mercedes-Benz LK/LN2, LP, MK, NG, O 301, O 309, Unimog	

8EA 012 586-121



Starters with different numbers of teeth

As part of product revisions it may be possible that starters with a different number of teeth are installed in a vehicle.

The decisive factor in the equation here is not the actual number of teeth but the shifting of the centre of the armature in order to balance out the difference on the ring gear.

The offset armature shaft corresponds to half a module per tooth, whereby the module is always the ratio of the split p to the number pi (n) thus meaning that the diameter of the ring section or working diameter results from the product of module and number of teeth. Wheel and counter wheel must always have the same module.

For instance, if the objective is to replace a starter with 11 teeth with one featuring 12, the armature shaft with a module of 2.05 is removed further away from the ring gear by 1.025 mm. The ring circumference's point of contact at the pinion and the ring gear thus remains identical despite a different number of teeth. If a starter with a different number of teeth is thus supplied, it can be installed without any issues – provided the vehicle has been correctly assigned.

STARTER



Starter	
Voltage	24 V
Power	4.5 kW
Pinions	10
Basic pinion position	50 mm
Design	Clockwise direction of rotation
Flange diameter	89 mm
Number of fixing holes	3

Suitable for:

Iveco EuroTech MH, EuroTrakker, LK/LN2, Stralis, Trakker

8EA 012 586-001



Starter	
Voltage	24 V
Power	4 kW
Pinions	9
Basic pinion position	46 mm
Design	Clockwise direction of rotation
Flange diameter	88 mm
Number of fixing holes	3

Suitable for:

Mercedes-Benz Atego, Atego 2, Citario (O 530), Cito (O 520), Conecto (O 345), Econic, LK/LN2, T2/LN1 platform/chassis, Unimog, Vario van, Vario box body/combination body, Vario dump truck, Vario platform/chassis, Vario cab with engine

8EA 012 586-201



Starter	
Voltage	24 V
Power	7 kW
Pinions	12
Basic pinion position	49 mm
Design	Clockwise direction of rotation
Flange diameter	91.5 mm
Number of fixing holes	3

Suitable for:

Mercedes-Benz Actros, Actros MP2 / MP3, Actros MP4 / MP5, Antos, Axor, Axor 2, Integro (O 550), Touro (O 500), Travego (O 580)

8EA 012 586-231



STARTER

Electrical faults in the starter are mainly caused by overloads.

This can manifest itself in ground and winding short circuits in the field and armature winding, but sometimes also in the coils of the control elements (solenoid switches).

Carbon brushes and collectors are subjected to high loads and are more susceptible to faults than the alternator. While, for example, clamping carbon brushes in the alternator do not cause voltage to arise and thus relieve the alternator, clamping carbon brushes in the starter lead to the formation of significant arcs due to the high currents. These arcs often destroy the collector. A multimeter and a clip-on ammeter are required for troubleshooting. Fault sources (such as the pinion) can, however, also be located through audible perception.

Please also refer to the technical information about "Ground (31)" on page 21.



Starter	
Voltage	24 V
Power	5.5 kW
Pinions	10
Basic pinion position	47 mm
Design	Clockwise direction of rotation
Flange diameter	92 mm
Number of fixing holes	3
Suitable for:	
Iveco EuroStar, EuroTech MP, EuroTrakker, Stralis, Trakker	

8EA 012 586-251



Starter	
Voltage	24 V
Power	4 kW
Pinions	11
Basic pinion position	29 mm
Design	Clockwise direction of rotation
Flange diameter	89 mm
Number of fixing holes	3
Suitable for:	
MAN TGA, TGL, TGM	

8EA 012 586-311



Starter	
Voltage	24 V
Power	5 kW
Pinions	10
Basic pinion position	26.5 mm
Design	Clockwise direction of rotation
Flange diameter	89 mm
Number of fixing holes	3
Suitable for:	
Volvo FL II	

8EA 012 586-281



Starter	
Voltage	24 V
Power	6.6 kW
Pinions	9
Basic pinion position	84 mm
Design	Clockwise direction of rotation
Flange diameter	92 mm
Number of fixing holes	3
Suitable for:	
MAN TGA, E2000, F2000, F90, M90, LION S, NL, NÜ, R, SD, SD, SR, SU, UL Mercedes SK, MK, NG, O NEOPLAN Tourliner N	

8EA 012 586-041

STARTER TROUBLESHOOTING – INDIVIDUAL FAULTS

Malfunction: Starter not rotating upon actuation of the ignition switch.

Causes	Remedy
Switch on lighting (low beam).	→ Check battery cables and connections → Clean battery poles and terminals → Establish electrically secure connection between starter, battery and ground → Measure battery voltage → Check battery, if necessary charge or replace → Check alternator
Lighting weak or not working = → Cable or ground connection break → Insufficient current flow due to loose or oxidised connections → Battery is discharged → Alternator faulty	
Solenoid switch not energising: Bypass terminal 30 and 50 at the starter	→ Replace ignition switch → Repair break
Starter running/engaging = → Ignition switch faulty or → cable break	
Solenoid switch energises: Bypass terminal 30 at the starter with the underlying terminal.	→ Clean/replace solenoid switch or contacts
Starter starts up = → Solenoid switch contact dirty or worn	

Malfunction: Starter not rotating if the battery cable is positioned directly on the contact screw below terminal 30 or the starter is not rotating fast enough or does not energise the engine.

Causes	Remedy
Carbon brushes worn	Replace carbon brushes
Clamp carbon brushes	Clean carbon brushes and guides of the brush brackets
Springs tensioned enough, carbon brushes have not established contact	Replace springs
Collector contaminated	Clean collector
Collector grooved or burned	Refurbish or replace starter
Armature or field winding faulty	Refurbish or replace starter

Malfunction: Starter does not engage and energise. The engine rotates only with jolts or not at all.

Causes	Remedy
Battery is discharged	Charge, check battery
Poor conductance of electricity due to loose or oxidised connections	Clean and tighten battery poles and terminals
Clamp carbon brushes	Clean carbon brushes and guides of the brush brackets
Carbon brushes worn	Replace carbon brushes
Collector contaminated	Clean collector
Collector grooved or burned	Refurbish or replace starter
Armature or field winding faulty	Refurbish or replace starter

Fault: Drive pinion does not disengage. Starter engages and energises. The engine only turns with jolts or not at all.

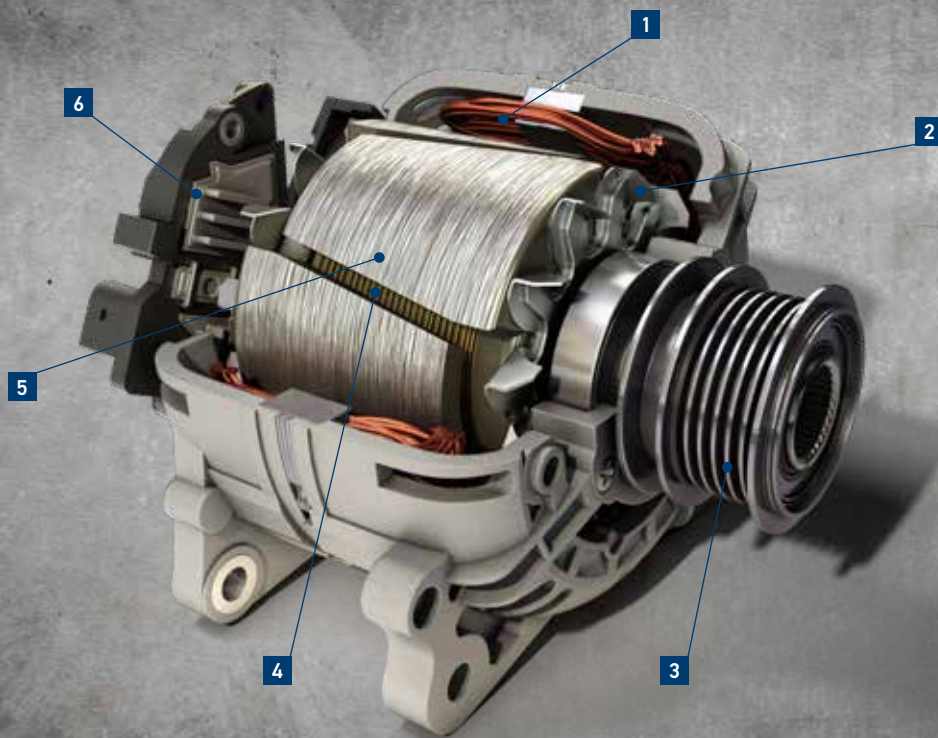
Causes	Remedy
Drive pinion faulty	Replace drive pinion
Ring gear on the flywheel faulty	Rework ring gear, replace if necessary

Fault: Drive pinion does not disengage.

Causes	Remedy
Pinion or steep thread dirty or damaged	Refurbish or replace starter
Solenoid switch faulty	Replace solenoid switch
Return spring worn or broken	Replace return spring

Malfunction: Starter continues to run after having released the ignition switch.

Causes	Remedy
Ignition switch or relay faulty	Switch off the engine immediately! Check switch and relay, and replace if necessary



1. Stator winding | 2. Fan | 3. Pulley
4. Excitation winding | 5. Claw pole rotor | 6. Regulator

Basics

The task of the alternator is to supply all electrical consumers within the vehicle with energy while charging the battery at the same time.

Alternators convert kinetic energy to electrical energy and ensure that a vehicle battery is charged, the vehicle electrical system remains stable and that all consumers in the vehicle are supplied with electricity. Alternators are driven via engine-side V- or V-ribbed belts, which are regularly checked for wear and may have to be replaced. An alternator freewheel decouples the belt drive from the crankshaft, with vibrations being dampened. Due to the coupling function of the alternator freewheel clutch, the torque only acts in the running direction.

The energy itself is generated between the armature and coil according to the principle of electromagnetic induction. The alternating voltage generated here is converted by a rectifier to the direct-current voltage required for the vehicle electrical system.

Three-phase alternators are generally installed in contemporary vehicles. The alternator power, battery capacity and the total power requirements of the vehicle's electrical system are matched to each other.

Design

The alternator is usually composed of the following components:

- Housing
- Anchor
- Alternator rotor
- Alternator regulator

The stator with three-phase winding is mounted in the alternator housing. Claw poles, excitation winding, fan and slip rings are mounted on the shaft of the alternator rotor. The pulley is mounted on the front of the external part of the shaft. The electronic control unit with carbon brush brackets is attached in the rear area of the alternator.

How they work

Induction is used to generate electricity in the three-phase alternator. An electrical voltage is generated in the stator winding when the magnetic field within this winding changes. This change in the magnetic field is generated by the rotating alternating rotor. Alternating the north and south poles of the magnetic field generates a sinusoidal AC voltage. This alternating voltage, which is unsuitable for the electrical system in the vehicle, is converted to direct-current voltage by the rectifier. The control unit adjusts the alternator voltage to the respective operating state of the motor and to the voltage requirements of all consumers in the system.

ALTERNATORS



Alternator

Charging voltage	14 V
Charging current	90 A
Design	With V-ribbed belt pulley
Pulley diameter	56 mm
Number of ribs	6

Suitable for:

Audi A3 (8L1), Ypsilon (843_), TT (8N3), TT Roadster (8N9)
Seat Altea XL (5P5, 5P8), Cordoba (6K1, 6K2, 6L2), Ibiza II (6K1), Ibiza III (6L1), Leon (1M1, 1P1), Toledo II (1M2), Toledo III (5P2)
Skoda Fabia I (6Y2), Fabia I station wagon (6Y5) Fabia I notchback (6Y3) Octavia I (1U2), Octavia I station wagon (1U5) Octavia II (1Z3), Octavia II station wagon (1Z5)
VW Bora (1J2), Bora station wagon (1J6) Caddy III box body (2KA, 2KH, 2CA, 2CH) Caddy III station wagon (2KB, 2KJ, 2CB, 2CJ) Golf IV (1J1), Golf IV station wagon (1J5) Golf Plus (5M1, 521), Golf V (1K1), Golf V station wagon (1K5) New Beetle (9C1, 1C1), New Beetle convertible (1Y7) Polo (9N_), Polo Classic (6V2) Polo notchback (9A4, 9A2, 9NZ, 9A6) Polo station wagon (6V5)

8EL 011 710-311



Alternator

Charging voltage	14 V
Charging current	140 A
Design	With overrunning alternator pulley
Pulley diameter	61.4 mm
Number of ribs	6

Suitable for:

Alfa Romeo 159 (939_), 159 Sportwagon (939_)
Fiat Bravo II (198_), Croma (194_), Grande Punto (199_), Linea (323_, 110_), Sedici I (FY_)
Lancia Delta III (844_)
Suzuki SX4 (EY, GY)

8EL 012 430-801



Alternator

Charging voltage	14 V
Charging current	100 A
Design	With multi-pulley
Pulley diameter	53.5 mm
Number of ribs	5

Suitable for:

Chevrolet Corsa Pick-up
Holden Astra convertible (TS)
Opel Astra F convertible (T92) Astra F station wagon (T92) Astra G convertible (T98) Astra G station wagon (T98) Astra G CC (T98), Astra G coupe (T98) Astra G box body (F70) Astra G notchback (T98) Astra H station wagon (A04) Astra H GTC (A04), Astra H TwinTop (A04), Combo box body/station wagon, Combo Tour, Corsa C (X01) Meriva A MPV (X03) Omega B (V94), Omega B station wagon (V94) Speedster (E01), Tigra TwinTop (X04), Vectra C (Z02), Vectra C station wagon (Z02) Vectra C CC (Z02), Zafira / Zafira Family B (A05), Zafira A MPV (T98)
Vauxhall Astra Mk IV (G) convertible (T98) Astra Mk IV (G) CC (T98), Astra Mk IV (G) coupe (T98) Astra Mk IV (G) station wagon (T98) Astra Mk IV (G) notchback (T98) Astra Mk V (H) station wagon (A04) Astra Mk V (H) Sport Hatch (A04) Astravan Mk IV (G) (T98), Combo Mk II (C) box body/station wagon (F25) Combo Tour Mk II (C) (F25), Corsa Mk II (C) (X01), Meriva Mk I (A) (X03), Signum (Z03), Tigra TwinTop (X04), Vectra Mk II (C) (Z02), Vectra Mk II (C) CC (Z02), Vectra Mk II (C) station wagon (Z02) VX220 convertible (E01) Zafira Mk I (A) (T98)

8EL 012 427-451



Alternator

Charging voltage	14 V
Charging current	120 A
Design	With V-ribbed belt pulley
Pulley diameter	50 mm
Number of ribs	6

Suitable for:

BMW 3 (E46), 3 Series convertible (E46) 3 Compact (E46), 3 Series coupe (E46) 3 Touring (E46), 5 (E39), 5 Touring (E39), 7 (E38), X5 (E53), Z3 coupe (E36) Z3 Roadster (E36)

8EL 012 428-141



Alternator

Charging voltage	14 V
Charging current	105 A
Design	With multi-pulley
Pulley diameter	54 mm
Number of ribs	4

Suitable for:

Fiat 500 (312_), 500L (351_, 352_), Bravo II (198_), Grande Punto (199_), Punto Van (199_), Stilo Van (192_)
Ford KA (RU8)

8EL 011 713-501



Alternator

Charging voltage	14 V
Charging current	120 A
Design	With multi-pulley
Pulley diameter	50 mm
Number of ribs	7

Suitable for:

Dacia Logan MCV II, Sandero II
Renault Captur I (J5_, H5_), Clio IV (BH_)
Smart Fortwo coupe (453)

8EL 011 713-111

ALTERNATORS



Alternator sizes

The rated voltage (voltage) is the standardised battery voltage (6 V, 12 V, 24 V). The charging voltage is the voltage adjusted by the alternator regulator installed in the alternator, which is used to charge the battery and supply the vehicle electrical system with energy. As a rule, these are: 7 V, 14 V and 28 V.



Alternator

Charging voltage	14 V
Charging current	120 A
Design	With V-ribbed belt pulley
Pulley diameter	68 mm
Number of ribs	6

Suitable for:

Volvo S60 I (384), S70 (874), S80 I (184), V70 I (875, 876), V70 II (285), XC70 Cross Country (295), XC90 I (275)
 VW LT 28-35 II van (2DB, 2DE, 2DK) LT 28-46 II box body (2DA, 2DD, 2DH) LT 28-46 II platform/chassis (2DC, 2DF, 2DG, 2DL, 2DM) Transporter IV van (70B, 70C, 70D, 70K, 70J, 70K, 70C, 70J) Transporter IV box body (70A, 70H, 70A, 70H, 70H) Transporter IV platform/chassis (70E, 70L, 70M, 70E, 70L)

8EL 012 427-541



Alternator

Charging voltage	14 V
Charging current	85 A
Design	With overrunning alternator pulley
Pulley diameter	58 mm
Number of ribs	7

Suitable for:

Toyota Hiace IV van (_H1_, _H2_) Hiace IV box body (LXH1_, RZH1_, LH1_) Hilux VI Pick-up (_N1_), Hilux VII Pick-up (_N1_, _N2_, _N3_), Land Cruiser 90 (_J9_), Land Cruiser Prado (_J12_)

8EL 011 711-331

Overrunning alternator pulleys in alternators

Features

- Variant that has been sealed on both sides against any ingress of dust and water
- Specifically developed for application in three-phase alternators
- Decoupling of the alternator from rotational irregularities of the crankshaft using the freewheel unit



Alternator

Charging voltage	14 V
Charging current	180 A
Design	With overrunning alternator pulley
Pulley diameter	50 mm
Number of ribs	6

Suitable for:

Mercedes-Benz Sprinter 3 t van (906) Sprinter 3 t box body (906) Sprinter 3 t platform/chassis (906) Sprinter 3.5 t van (906) Sprinter 3.5 t box body (906) Sprinter 3.5 t platform/chassis (906) Sprinter 4.6 t box body (906) Sprinter 4.6 t platform/chassis (906) Sprinter 5 t box body (906) Sprinter 5 t platform/chassis (906) Viano (W639), Vito/Mixto box body (W639) Vito van (W639)

8EL 012 430-201



Alternator

Charging voltage	14 V
Charging current	90 A
Design	With overrunning alternator pulley
Pulley diameter	50 mm
Number of ribs	6

Suitable for:

Mercedes-Benz C-Class (W202) C-Class station wagon (S202) Sprinter 2 t van (901, 902) Sprinter 2 t box body (901, 902) Sprinter 2 t platform/chassis (901, 902) Sprinter 3 t van (903) Sprinter 3 t box body (903) Sprinter 3 t platform/chassis (903) Sprinter 4 t van (904) Sprinter 4 t box body (904) Sprinter 4 t platform/chassis (904) Sprinter 5 t platform/chassis (905) Sprinter dump truck (905) V-Class (638/2) Vito van (638) Vito box body (638)

8EL 011 711-511





ALTERNATORS



Alternator

Charging voltage	14 V
Charging current	140 A
Design	With overrunning alternator pulley
Pulley diameter	56 mm
Number of ribs	6

Suitable for:

Audi A3 (8P1), A3 convertible (8P7) A3 Sportback (8PA) A4 (8E2, B6, 8EC, B7), A4 Avant (8E5, B6), A4 convertible (8H7, B6, 8HE, B7) TT (8J3), TT Roadster (8J9)
Seat Alhambra (7V8, 7V9), Altea (5P1), Altea XL (5P5, 5P8), Exeo (3R2), Exeo ST (3R5), Ibiza IV (6J5, 6P1), Ibiza IV Sportcoupe (6J1, 6P5) Ibiza IV ST (6J8, 6P8), Leon (1P1), Toledo III (5P2)
Skoda Fabia II (542), Fabia II station wagon (545) Octavia II (123), Octavia II station wagon (125) Roomster (5J), Superb II (3T4), Superb II station wagon (3T5) Yeti (5L)
VW Caddy III box body (2KA, 2KH, 2CA, 2CH) Caddy III station wagon (2KB, 2KJ, 2CB, 2CJ) Crafter 30-35 van (2E_) Crafter 30-50 box bodies (2E_) Crafter 30-50 platform/chassis (2F_) Eos (1F7, 1F8), Golf Plus (5M1, 521), Golf V (1K1), Golf V station wagon (1K5) Golf VI (5K1), Golf VI station wagon (AJ5) Jetta III (1K2), Multivan V (7HM, 7HN, 7HF, 7EF, 7EM, 7EN), Passat (362, 3C2), Passat CC (357), Passat station wagon (3C5) Polo (6R1, 6C1), Scirocco (137, 138), Sharan (7M8, 7M9, 7M6), Tiguan (5N_) Touran (1T1, 1T2), Transporter V van (7HB, 7HJ, 7EB, 7EJ, 7EF, 7EG, 7HF, 7EC) Transporter V box body (7HA, 7HH, 7EA, 7EH) Transporter V platform/chassis (7JD, 7JE, 7JL, 7JY, 7JZ)

8EL 011 710-791



Generator

Charging voltage	14 V
Charging current	120 A
Design	With overrunning alternator pulley
Pulley diameter	56 mm
Number of ribs	6

Suitable for:

Audi A3 (8L1), A4 (8D2, B5), TT (8N3), TT Roadster (8N9)
Ford Galaxy (WGR)
Seat Alhambra (7V8, 7V9), Cordoba (6K1, 6K2, 6L2), Cordoba Vario (6K5) Ibiza II (6K1), Ibiza IV (6J5, 6P1), Ibiza IV Sportcoupe (6J1, 6P5) Inca (6K9), Leon (1M1), Toledo II (1M2)
Skoda Fabia I (6Y2), Fabia I station wagon (6Y5) Fabia I Praktik (6Y5), Fabia I notchback (6Y3) Fabia II (542), Fabia II station wagon (545) Octavia I (1U2), Octavia I station wagon (1U5)
VW Bora (1J2), Bora station wagon (1J6) Caddy II box body (9K9A) Caddy II station wagon (9K9B) Golf IV (1J1), Golf IV station wagon (1J5) Golf V (1K1), LT 28-46 II box body (2DA, 2DD, 2DH) LT 28-46 II platform/chassis (2DC, 2DF, 2DG, 2DL, 2DM) Multivan V (7HM, 7HN, 7HF, 7EF, 7EM, 7EN), New Beetle (9C1, 1C1), New Beetle convertible (1Y7) Polo (9N_) Polo Classic (6V2) Polo notchback (9A4, 9A2, 9N2, 9A6) Polo station wagon (6V5) Roomster (5J), Sharan (7M8, 7M9, 7M6), Transporter V van (7HB, 7HJ, 7EB, 7EJ, 7EF, 7EG, 7HF, 7EC) Transporter V box body (7HA, 7HH, 7EA, 7EH) Transporter V platform/chassis (7JD, 7JE, 7JL, 7JY, 7JZ)

8EL 011 710-321



Alternator

Charging voltage	14 V
Charging current	90 A
Design	With overrunning alternator pulley
Pulley diameter	56 mm
Number of ribs	6

Suitable for:

Audi A3 (8L1), Allroad (4BH, C5)
Ford Galaxy (WGR)
Seat Alhambra (7V8, 7V9), Cordoba (6K1, 6K2, 6L2), Cordoba Vario (6K5) Ibiza II (6K1), Ibiza IV (6J5, 6P1), Ibiza IV Sportcoupe (6J1, 6P5) Inca (6K9), Leon (1M1), Toledo II (1M2)
Skoda Fabia I (6Y2), Fabia I station wagon (6Y5) Fabia I Praktik (6Y5), Fabia I notchback (6Y3) Fabia II station wagon (545) Octavia I (1U2), Octavia I station wagon (1U5), Roomster (5J)
VW Bora (1J2), Bora station wagon (1J6) Caddy II box body (9K9A) Caddy II station wagon (9K9B) Fox hatchback (5Z1, 5Z3, 5Z4) Golf IV (1J1), Golf IV station wagon (1J5) Golf V (1K1), Multivan V (7HM, 7HN, 7HF, 7EF, 7EM, 7EN), New Beetle (9C1, 1C1), New Beetle convertible (1Y7) Polo (9N_) Polo Classic (6V2) Polo notchback (9A4, 9A2, 9N2, 9A6) Polo station wagon (6V5) Sharan (7M8, 7M9, 7M6), Transporter V van (7HB, 7HJ, 7EB, 7EJ, 7EF, 7EG, 7HF, 7EC) Transporter V box body (7HA, 7HH, 7EA, 7EH) Transporter V platform/chassis (7JD, 7JE, 7JL, 7JY, 7JZ)

8EL 011 710-381



Alternator

Charging voltage	14 V
Charging current	90 A
Design	With V-ribbed belt pulley
Pulley diameter	50 mm
Number of ribs	6

Suitable for:

Seat Arosa (6H), Cordoba (6K1, 6K2, 6L2), Cordoba Vario (6K5) Ibiza II (6K1), Ibiza III (6L1), Ibiza IV (6J5, 6P1), Ibiza IV Sportcoupe (6J1, 6P5) Ibiza IV ST (6J8, 6P8), Inca (6K9)
Skoda Fabia I (6Y2), Fabia I station wagon (6Y5) Fabia I Praktik (6Y5), Fabia I notchback (6Y3) Fabia II (542), Fabia II station wagon (545) Roomster (5J), Roomster Praktik (5J)
VW Bora station wagon (1J6) Caddy II box body (9K9A) Caddy II station wagon (9K9B) Fox hatchback (5Z1, 5Z3, 5Z4) Lupo (6X1, 6E1), New Beetle (9C1, 1C1), Polo (6N2, 6R1, 6C1, 9N_) Polo Classic (6V2) Polo notchback (9A4, 9A2, 9N2, 9A6) Polo station wagon (6V5) Transporter IV box body (70A, 70H, 7DA, 7DH) Transporter IV platform/chassis (70E, 70L, 70M, 70E, 70E, 70L)

8EL 011 710-481



Alternator

Charging voltage	14 V
Charging current	150 A
Design	With overrunning alternator pulley
Pulley diameter	48.5 mm
Number of ribs	7

Suitable for:

Nissan Primastar van (X83) Primastar box body (X83)
Opel Vivaro A station wagon (X83) Vivaro A box body (X83) Vivaro A platform/chassis (X83)
Renault Espace IV (JK0/1_) Laguna II (BG0/1_) Laguna II Grandtour (KG0/1_) Trafic II box body (FL) Trafic II platform/chassis (EL) Vel Satis (BJ0_)
Vauxhall Vivaro A station wagon (X83) Vivaro A box body (X83) Vivaro A platform/chassis (X83)

8EL 012 426-051



Alternator

Charging voltage	14 V
Charging current	65 A
Design	With pulley
Pulley diameter	65 mm
Number of ribs	1

Suitable for:

Audi 100 (44, 44Q, C3, 4A2, C4), 100 Avant (44, 44Q, C3), 80 (81, 85, B2, 89, 89Q, 8A, B3, 8C2, B4), Coupe (81, 85, 89, 8B)
Seat Toledo I (1L)
VW Caddy I (14), Golf I convertible (155) Golf II (19E, 1G1), Jetta II (19E, 1G2, 165), LT 28-35 I van (281-363) LT 28-35 I box body (281-363) LT 28-35 I platform/chassis (281-363) LT 40-55 I box body (291-512) LT 40-55 I platform/chassis (293-909) Passat (32B, 3A2, 35), Passat notchback (32B) Passat station wagon (33B, 3A5, 35) Santana (32B), Scirocco (53B), Transporter III van, Transporter III platform/chassis, Transporter IV van (70B, 70C, 7DB, 7DK, 70J, 70K, 7DC, 7DJ) Transporter IV box body (70A, 70H, 7DA, 7DH) Transporter IV platform/chassis (70E, 70L, 70M, 7DE, 7DL)

8EL 012 427-381



ALTERNATORS



Alternator

Charging voltage	28 V
Charging current	100 A
Design	Without pulley

Suitable for:

Bova Futura, Magiq, Synergy
DAF 75 CF, 85 CF, CF 75, CF 85, XF 95
Solaris Vacanza

8EL 012 584-481



Alternator

Charging voltage	28 V
Charging current	80 A
Design	Without pulley

Suitable for:

Mercedes-Benz Actros, Actros MP2 / MP3, Atego, Atego 2,
Axor, Axor 2, Citaro (O 530), Econic, LK / LN2, Tourino (O 510),
Unimog, Zetros

8EL 012 584-011



Alternator

Charging voltage	28 V
Charging current	90 A
Design	With V-ribbed belt pulley
Pulley diameter	69 mm
Number of ribs	12

Suitable for:

Iveco EuroStar, EuroTech MP, EuroTrakker, Stralis, Trakker

8EL 012 584-001



Alternator

Charging voltage	28 V
Charging current	100 A
Design	Without pulley

Suitable for:

Mercedes-Benz Actros, Actros MP2 / MP3, Atego, Atego 2, Axor,
Axor 2, Citaro (O 530), Cito (O 520), Conecto (O 345), Econic,
Tourino (O 510), Unimog, Zetros

8EL 012 584-191



Alternator

Charging voltage	28 V
Charging current	120 A
Design	Without pulley

Suitable for:

MAN HOCL, TGA, TGS, TGX
Neoplan Tourliner
Temsu Diamond

8EL 012 584-461



Alternator

Charging voltage	28 V
Charging current	100 A
Design	Without pulley

Suitable for:

Mercedes-Benz Actros, Actros MP2 / MP3, Atego, Atego 2, Axor,
Axor 2, Citaro (O 530), Econic, Unimog, Zetros

8EL 012 584-151



Alternator

Charging voltage	28 V
Charging current	55 A
Design	Without pulley

Suitable for:

MAN E 2000, F 2000, L 2000, M 2000 L, M 2000 M, SÜ, TGA

8EL 012 584-091



Alternator

Charging voltage	28 V
Charging current	80 A
Design	Without pulley

Suitable for:

MAN TGA, TGL, TGM, TGS, TGX

8EL 012 584-251



Alternator

Charging voltage	28 V
Charging current	110 A
Design	Without pulley

Suitable for:

Renault Trucks Kerax, Magnum
Volvo 8700, 9700, B 12, FH, FM 12, FM, FM 12

8EL 012 584-271



ALTERNATORS



Alternator

Charging voltage	28 V
Charging current	140 A
Design	Without pulley

Suitable for:

Mercedes-Benz Citaro (O 530), Conecto (O 345), Integro (O 550), LK / LN2, LP, MK, O 303, O 402, O 403, O 404, O 405, O 407, O 408, SK, Tourino (O 510), Turismo (O 350), Travego (O 580)

8EL 012 584-361



Alternator

Charging voltage	28 V
Charging current	80 A
Design	With V-ribbed belt pulley
Pulley diameter	55 mm
Number of ribs	8

Suitable for:

DAF C65, LF45, LF55

8EL 012 584-721

Alternator testing

The alternator supplies all electrical components in the vehicle with electricity. Alternators can become damaged by the effects of humidity, contamination with oil (e.g. in the case of alternators with flange-mounted vacuum pump) and by corrosion. Short circuiting may occur (for example, with polarity reversal when jump-starting) or bearing damage. Should the alternator lose its full functionality, the electronics will fail after a certain period – the battery will no longer be charged, and the vehicle will no longer be roadworthy. Any faults must be identified in good time in order for this not to happen. We therefore provide you with various problem descriptions and detailed solutions in the following.

Symptoms

The following symptoms may indicate a fault in the alternator:

- Charging indicator lamp lights up
- Starting difficulties due to insufficiently charged vehicle battery
- Vehicle battery heats up due to overload
- The illuminance of the headlamp fluctuates depending on the engine RPM
- Bulbs burn out more quickly than normal

Cause of failure

An alternator malfunction can have different causes. The cause is not always due to an internal alternator fault, such as a faulty winding, rotor, rectifier or regulator. Before replacing the alternator, additional components must be considered and checked as a cause of failure.

- Prematurely aged or faulty vehicle battery
- Electrical connections on the alternator loose or faulty
- V-belt or V-ribbed belt loose or faulty
- Belt tensioner or free-running roller damaged

Important

As a rule, when performing welding work on the vehicle and when removing or installing the alternator, the battery must be disconnected.

Refer to page 20 for detailed information about troubleshooting.

ALTERNATOR TROUBLESHOOTING – INDIVIDUAL FAULTS

Malfunction: Charging indicator lamp flickering.

Causes	Remedy
V-belt too loose	Retighten V-belt

Malfunction: Charging indicator lamp lights up equally brightly at higher engine RPM.

Causes	Remedy
Short circuit to frame at cable D+/61	→ Rectify short circuit to frame → Replace cable
Regulator faulty	Replace regulator
→ Rectifier damaged → Short circuit in DF cable or in the rotor winding	Check alternator and repair or replace if necessary

Fault: Charging indicator lamp lights up brightly with the ignition switched on, but dims or flickers when the engine is running..

Causes	Remedy
Contact resistance in the charging current circuit or in the cable for the indicator lamp	Check cable and connections, and replace if necessary
Regulator faulty	Replace regulator
Alternator faulty	Check alternator, repair, or replace if necessary

Malfunction: Charging indicator lamp lights up when the ignition is switched on.

Causes	Remedy
Battery discharged or faulty	Charge battery, check, replace if necessary
Cables or connections damaged, loose or oxidised	Check cables and connections, attach, replace if necessary
→ Carbon brushes worn → Regulator faulty	→ Replace carbon brushes → Replace regulator
Short circuit of a positive diode	Immediately disconnect battery or B+ (otherwise discharge in situ) and repair/replace alternator
Oxide coating on the slip rings, break in the rotor winding	Repair/replace alternator
Indicator lamp faulty	Replace indicator lamp

Troubleshooting information

Observe the following fundamental rules when performing troubleshooting on the alternator:

- Do not disconnect, short circuit or mount battery or connection terminals when the engine is running or the alternator is in operation (voltage peaks can lead to damage)
- Do not measure voltage or current via short circuit (voltage peaks) - use a voltmeter or ammeter

Please also refer to the technical information about "Ground (31)" on page 21.

Fault: Battery not charging or merely insufficiently charging.

Causes	Remedy
V-belt too loose	Tighten V-belt
Cables or connections loose, damaged, oxidised	Check cables and connections between battery and alternator and the respective ground connection, replace if necessary
Battery faulty	Charge battery, check, replace if necessary
Regulator faulty	Replace regulator
→ Rectifier faulty	Check alternator, repair, or replace if necessary



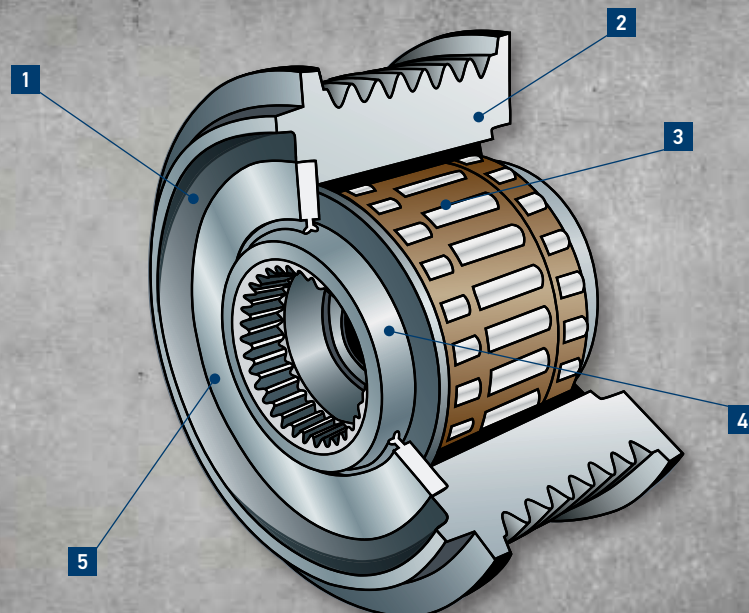
TROUBLESHOOTING AT GROUND (31) – FREQUENTLY NEGLECTED

Loose or oxidised ground connections frequently lead to malfunctions at electrical or electronic components. Areas outside the vehicle interior are particularly affected, for instance alternator, starter, battery, ABS, ignition and injection system (engine electronics). However, the lighting system may also be affected. Diagnostics usually starts by checking the voltage supply. In this process, the opposite connection (ground) to the body, engine or battery is not paid enough attention. However, this connection is just as significant. Small amounts of dirt on terminals or connections can already have significant consequences.

A formation of contact resistance can lead to voltage drops or leakage currents. These may lead to malfunctions or incorrect diagnoses. For this reason, check ground connections have been securely fastened and check they are clean. The metal must be clean and free from dirt, paint and oxidation.

Special contact sprays are available for protection. Also check the cable ends secured to the connectors and cable ends. These may have come loose as a result of temperature fluctuations and vibrations. Water that has penetrated the cables may cause internal corrosion and thus associated malfunctions. Measuring the resistance using a multimeter also forms part of the test scope as does measuring the voltage drop (if possible under load). The following overview provides some starting points for cable resistance, cross sections, maximum continuous current and voltage drops:

Cable cross section in mm ²	Max. Resistance/m (20 °C) mΩ/m	Permissible continuous current A
1	18.5	10
1.5	12.7	20
2.5	7.6	25
46	4.71	35
10	3.14	50
16	1.82	65
25	1.16	85
35	0.743	120
50	0.527	160
70	0.368	200
95	0.259	250
120	0.196	300
	0.153	350
Maximum permissible Starter	Voltage drop in Alternator	12 Volt vehicle electrical system (example) Lighting
→ Starter housing to body and/or to engine block: 0.1 V → Negative battery terminal to body and/or to engine block: 0.2 V → Negative battery terminal to starter housing: 0.3 V → Positive battery terminal to starter's main power connection: 0.5 V → Starter's main power connection under load (when starting): 3.5 V → Ignition switch to starter's control current connection: 1.5 V	→ Alternator housing to body and/or to engine block: 0.1 V → Negative battery terminal to body and/or to engine block: 0.2 V → Negative battery terminal to alternator housing: 0.3 V → Positive battery housing to alternator's main power connection: 0.4 V	Voltage drop at positive cable and (in overall circuit): → From light switch at terminal 30 to bulb < 15 W: 0.1 V (0.6 V) → From light switch at terminal 30 to bulb > 15 W: 0.5 V (0.9 V) → From light switch at terminal 30 to headlamps: 0.3 V (0.6 V)



1. Serrated inner ring | 2. Freewheel unit | 3. Radial support bearings
4. Outer ring with profiled track | 5. Overrunning alternator pulley

Basics

During an engine's combustion cycle, the rotary movement of the crankshaft is sped up and slowed down. This rotational irregularity is transferred to the unit drive as a result of the alternator's moment of inertia. Consequences: Extreme forces and large fluctuations which impact on the belt drive.

Resulting strong vibrations and thrashing noise of the belt. Decoupling the alternator with the freewheel unit compensated for the crankshaft's rotational irregularity.

How they work

Decoupling of the alternator from rotational irregularities of the crankshaft using the freewheel unit

Advantages:

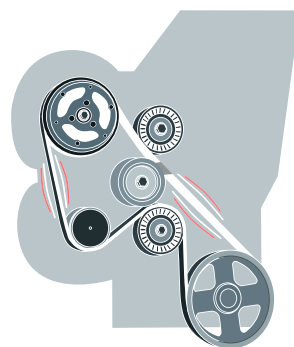
- Reduces the influence of the alternator's moment of inertia torque on the unit drive
- Reduces belt load
- Longer lifetime for all components
- Reduced fuel consumption
- Greater driving comfort and improved noise levels

Comparing the pulley and the overrunning alternator pulley

Without alternator freewheel clutch

A unit drive with rigid pulleys leads to rotational irregularities and causes a high degree of tension on the belt drive.

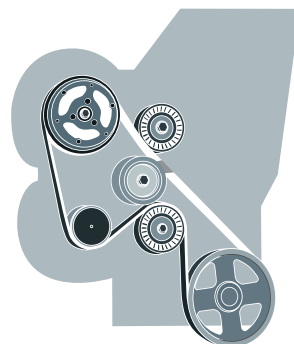
Normal pulley



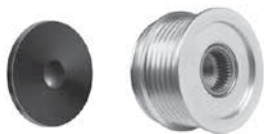
With alternator freewheel clutch

Unit drive with overrunning alternator pulley guarantees a significant reduction of strain on the belt.

Alternator freewheel clutch



ALTERNATOR FREEWHEEL CLUTCHES



Alternator freewheel clutch

Number of grooves	6
Internal diameter	17 mm
Design	Clockwise direction of rotation
Pulley diameter	56.2 mm
Thread dimension	M16 x 1.5

Suitable for:
Bosch, Hitachi, Valeo

9XU 358 038-041



Alternator freewheel clutch

Number of grooves	–
Internal diameter	17 mm
Design	Clockwise direction of rotation
Pulley diameter	62 mm
Thread dimension	M16 x 1.5

Suitable for:
Bosch, Delphi, Denso, Hitachi

9XU 358 038-721



Alternator freewheel clutch

Number of grooves	7
Internal diameter	17 mm
Design	Clockwise direction of rotation
Pulley diameter	64.7 mm
Thread dimension	M16 x 1.5

Suitable for:
Mitsubishi Electric

9XU 358 039-021



Alternator freewheel clutch

Number of grooves	7
Internal diameter	17 mm
Design	Clockwise direction of rotation
Pulley diameter	49 mm
Thread dimension	M17 x 1.5

Suitable for:
Mitsubishi Electric

9XU 358 038-871



Alternator freewheel clutch

Number of grooves	5
Internal diameter	17 mm
Design	Clockwise direction of rotation
Pulley diameter	54 mm
Thread dimension	M16 x 1.5

Suitable for:
Bosch

9XU 358 039-201



Alternator freewheel clutch

Number of grooves	6
Internal diameter	17 mm
Design	Clockwise direction of rotation
Pulley diameter	54 mm
Thread dimension	M16 x 1.5

Suitable for:
Valeo

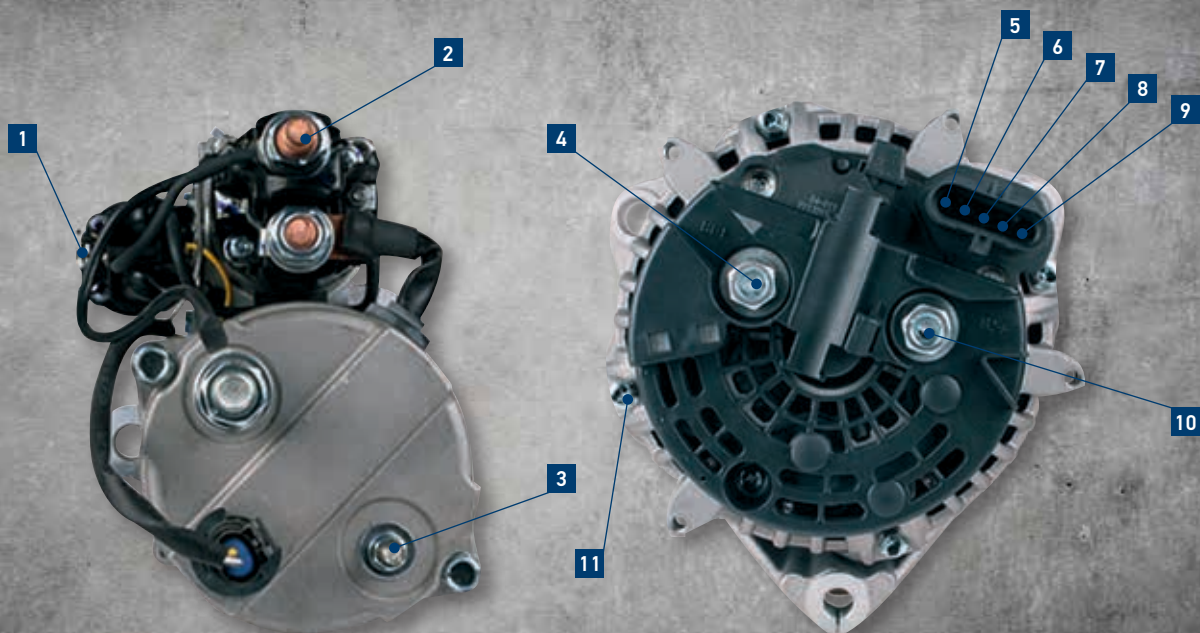
9XU 358 039-161



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1. Terminal 50c (15/15a) | 2. Terminal 30 (B+) | 3. Terminal 31 (B-) | 4. Terminal B+ (B1+) | 5. Connection W
6. Connection/terminal L | 7. Connection/terminal 15 | 8. Connection/terminal S (Sense) | 9. Connection/terminal DFM
10. Terminal B2+ (auxiliary connection) | 11. Terminal 31 (B-) (directly via the housing/vehicle chassis)

DIN 72552 terminal designations

The objective of the standard for electrical systems in motor vehicles is to eradicate connection errors of cables to devices as much as possible, most of all during repair work and when installing spare parts. The terminal and cable designations may deviate from each other because devices with different terminal designations may have been connected to both ends of a cable. For this reason, the designations must not be attached to the cables. Multiple plug connectors for which designations as part of DIN 72552 are no longer sufficient are assigned serial numbers or designations with letters for which the standard has not specified specific functions.

Battery

15	Positive battery terminal via switch, ignition lock, fuse
30	Direct input from positive battery terminal
30a	12/24 V battery changeover relay, input from battery 2 positive
31	Vehicle ground, negative battery terminal
31a	Return cable to second battery negative, 12/24 V changeover relay
31b	Return cable to negative battery terminal or to ground via switch
31c	Return cable to first battery negative, 12/24 V changeover relay

Alternator, alternator regulator

61	Charge controller from alternator
B+	Positive battery terminal
B-	Negative battery terminal
D+	Positive dynamo terminal
D-	Negative dynamo terminal
DF	Dynamo field
DF1	Dynamo field 1
DF2	Dynamo field 2
U, V, W	Three-phase current terminals

Starter

45	Separate starting relay, output, starter: input (principal current)
45a	2-starter parallel operation, starting relay for engagement current, output starter 1
45b	2-starter parallel operation, starting relay for engagement current, output starter 2
48	Terminal on starter and on starting repeat relay
50	Starter, start control direct
50a	Batter changeover relay, output for starter control
50b	Starter control, parallel operation of 2 starters with downstream control
50c	Input in starting relay for starter 1
50d	Input in starting relay for starter 2
50e	Start lock relay input
50f	Start lock relay output
50g	Starting repeat relay input

OE references

OE manufacturer	OE number			Part number	
Starter					
ALFA ROMEO	468 2354 3 517 8232 1 551 9248 2	551 9521 1 608 1700 2 717 9259 7	717 9453 0	8EA 012 527-771	
BMW	12 41 1 712 937 12 41 1 740 373 12 41 1 740 374 12 41 1 740 375	12 41 1 740 379 12 41 2 354 693 12 41 7 501 668 12 41 7 501 738	12 41 7 515 390 12 41 7 515 391 12 41 7 515 392 2 354 693	8EA 012 526-841	
CHEVROLET	96843578 25192447	96952006 25196021	96469963 55578921	8EA 011 610-411 8EA 011 611-491	
	004 151 89 01 004 151 92 01 004 151 97 01 005 151 13 01 005 151 66 01	007 151 89 01 007 151 92 01 A 004 151 89 01 A 004 151 92 01 A 004 151 97 01	A 005 151 13 01 A 005 151 66 01 A 007 151 89 01 A 007 151 92 01	8EA 011 610-00	
	001 151 69 01 004 151 69 01 005 151 06 01 005 151 34 01 005 151 36 01 005 151 46 01	005 151 53 01 005 151 73 01 A 001 151 69 01 A 004 151 69 01 A 005 151 06 01 A 005 151 34 01	A 005 151 36 01 A 005 151 46 01 A 005 151 53 01 A 005 151 73 01	8EA 012 527-271	
	004 151 85 01 005 151 11 01 005 151 21 01 005 151 47 01	006 151 03 01 A 004 151 85 01 A 005 151 11 01 A 005 151 21 01	A 005 151 47 01 A 006 151 03 01	8EA 012 527-301	
	004 151 84 01 005 151 20 01 005 151 97 01	006 151 22 01 A 004 151 84 01 A 005 151 20 01	A 005 151 97 01 A 006 151 22 01	8EA 012 586-011	
	000 151 28 01 001 151 97 01 002 151 02 01 003 151 46 01 004 151 61 01 80	005 151 28 01 A 000 151 28 01 A 001 151 97 01 A 002 151 02 01 A 003 151 46 01	A 004 151 61 01 80 A 005 151 28 01	8EA 012 586-041	
	001 151 73 01 001 151 96 01 002 151 07 01 003 151 04 01 003 151 08 01 003 151 18 01 80 003 151 74 01 003 151 86 01 003 151 88 01	004 151 59 01 80 004 151 73 01 151 010 03 18 80 A 001 151 73 01 A 001 151 96 01 A 002 151 07 01 A 003 151 04 01 A 003 151 08 01 A 003 151 18 01 80	A 003 151 74 01 A 003 151 86 01 A 003 151 88 01 A 004 151 59 01 80 A 004 151 73 01 A 151 010 03 18 80	8EA 012 586-121	
	004 151 62 01 005 151 22 01	006 151 21 01 A 004 151 62 01	A 005 151 22 01 A 006 151 21 01	8EA 012 586-201	
	005 151 64 01 006 151 15 01 006 151 69 01 007 151 02 01	007 151 02 01 007 151 04 01 A 005 151 64 01 A 006 151 15 01	A 006 151 69 01 A 007 151 04 01	8EA 012 586-231	
	FERRARI	963 7813 680 956 8144 7 551 9596 7	965 8144 780		8EA 011 610-181 8EA 012 527-611 8EA 012 527-651
		468 2354 3 517 8232 1 518 3295 4	551 9248 2 551 9521 1 608 1700 2	717 9259 7 717 9453 0	8EA 012 527-771
		9637813680 71739718 9609313280 95681447 55195967	55195211 60817002 71792597	71794530	8EA 011 610-181 8EA 011 610-411 8EA 011 610-441 8EA 012 527-611 8EA 012 527-651
		46823543 51782321 55192482 99432760			8EA 012 527-771 8EA 012 586-001
		1 072 156 1 007 765 1 059 564 1003308	95VW11000BC 1012221 1012395 1072559		8EA 011 610-041 8EA 011 610-561
		1 372 739 1 385 378 1 574 338 1 669 558	1 709 189 6C1T 11000 AF 6C1T 11000 AB 6C1T 11000 AC	6C1T 11000 AD 6C1T 11000 AE 7H12 11002 AB	8EA 012 527-611
		HONDA	31200-PLZ-D00		8EA 011 610-661
ISUZU	8971891180 8971891181	8973860620	8980147430	8EA 011 610-661	
IVECO	2995138 2995 988	99432760 99486046		8EA 012 586-001 8EA 012 586-251	
LANCIA	46823543 51782321 55192482	55195211 60817002 71792597	71794530	8EA 012 527-771	
MAN	51.26201.7057 51.26201.7061 51.26201.7087	51.26201.7110 51.26201.7123 51.26201.9057	51.26201.9061	8EA 012 586-041	
	51.26201-7222 51.26201-7237	51.26201-9236	51.26201-9237	8EA 012 586-311	
MAN	51.26101-7228 51.26201-7199 51.26201-7211	51.26201-7220 51.26201-7228 51.26201-7239	51.26201-9199 51.26201-9211 51.26201-9239	8EA 012 586-381	

OE manufacturer	OE number			Part number
OPEL (Vauxhall)	1202137	90421876	9117031	8EA 011 610-411
	1202142	90421877	9130838	
	1202172	90543871	93604828	
	1202174	9115191		
	6202075	9115192		
	06202103	6202087	97386062	8EA 011 610-661
	1202591	93169014	98014743	
	6202000	93174028	R1540010	
	6202043	97189118	R1540027	
1202217	25192447	95520113	8EA 011 611-491	
1202404	25196021			
1202419	55578921			
	55353857	55358857	6202074	8EA 012 527-771
PSA	5802AZ	5802Y6	9646679980	8EA 011 610-18
	5802YA	9637813680	9664016980	
	5802Y5	9640825280	9688268480	
	5802EF	5802Z7	9647157980	8EA 011 610-281
	5802Z5	9555507680	9648 242180	
	5802Z6	9646972280		
	5802EP	5802CG	9609313280	8EA 011 610-441
	5802N3	5802E8	9618725080	
	5802R4	5802P8	9648644680	
	5802Y3	5802J1	9658308780	
	5802C9	9633292480	97530824	
	5802AS	5802FC		8EA 012 527-611
RENAULT	50 00 049 122	50 00 241 777		8EA 012 586-041
TOYOTA	28100-YV010			8EA 011 610-181
VOLKSWAGEN AG	020 911 023 F	020 911 023 FX	02A 911 023 J	8EA 011 610-041
	020 911 023 FV			
	02Z 911 023 F	02Z 911 023 M	02Z 911 023 P	8EA 011 610-221
	02Z 911 023 H	02Z 911 023 MX	02Z 911 023 PX	
	02Z 911 023 FX	02Z 911 023 N	02Z 911 024 K	
	02Z 911 023 HX	02Z 911 023 NX	02Z 911 024 KX	
	02M 911 023 N	02M 911 024	02M 911 024 A	8EA 011 610-231
	02M 911 023 P			
	02A 911 023 J	02A 911 024 B	02A 911 023 RX	8EA 011 610-561
	02A 911 023 JX	02A 911 024 D	02A 911 023 TV	
	02A 911 023 R	02A 911 024 G	02A 911 024 BX	
	02A 911 024	02A 911 024 X		
	036 911 023 Q	085 911 023 BX	085 911 023 J	8EA 011 611-041
	036 911 023 QX	085 911 023 E	085 911 023 JX	
	085 911 023 B	085 911 023 EX		
	02B 911 023 D	02B 911 023 J	02B 911 023 N	8EA 011 611-051
	02B 911 023 DX	02B 911 023 L		
	0AM 911 021	0AM 911 023 KX	0AM 911 023 TX	8EA 011 611-581
	0AM 911 023 K	0AM 911 023 T		
	02Z 911 023 M	02Z 911 023 NX	02Z 911 024 K	8EA 011 612-221
	02Z 911 023 MX	02Z 911 023 P	02Z 911 024 KX	
	02Z 911 023 N	02Z 911 023 PX		
02M 911 023 Q	02M 911 023 QX		8EA 012 526-111	
02E 911 023 H	02E 911 023 LX	02E 911 023 HX	8EA 012 526-191	
02E 911 023 L				
02T 911 023 D	02T 911 023 G	02T 911 023 GX	8EA 012 527-401	
02T 911 023 E				
02T 911 023 R	02T 911 024 A	02T 911 024 CX	8EA 012 527-531	
02T 911 023 RX	02T 911 024 AX	02T 911 024 N		
02T 911 023 S	02T 911 024 BX	02Z 911 023 C		
02T 911 023 SX	02T 911 024 C			
Alternators				
ALFA ROMEO	51727333	51859044	52003538	8EL 011 713-501
	71746673	71789538	73501591	8EL 012 430-801
BMW	1 432 980	12 31 7 501 593	7 501 595	8EL 012 428-141
	1 432 986	12 31 7 501 595	7 501 597	
	1 432 987	12 31 7 501 597	7 501 599	
	12 31 1 432 980	12 31 7 501 599	7 501 690	
	12 31 1 432 986	12 31 7 501 690		
	12 31 1 432 987	7 501 593		
DACIA	231000643R	231006677R	231007842R	8EL 011 713-111
DAF	1377860	1697024	1697322	8EL 012 584-481
	1697023			
	1387388	1400520	1400520R	8EL 012 584-721
	1387388R			
DAIMLER	010 154 95 02	013 154 17 02	A 012 154 22 02	8EL 011 711-511
	011 154 06 02	A 010 154 95 02	A 013 154 17 02	
	012 154 20 02	A 011 154 06 02		
	012 154 22 02	A 012 154 20 02		
	453 906 41 00	A 453 906 41 00		8EL 011 713-111
	646 154 01 02	A 646 154 01 02 80	A 646 154 11 02 80	8EL 012 430-201
	646 154 11 02 80			
	011 154 86 02	013 154 78 02 80	A 012 154 68 02	8EL 012 584-011
	012 154 04 02	014 154 53 02	A 013 154 28 02	
	012 154 10 02	A 011 154 86 02	A 013 154 78 02 80	
	012 154 68 02	A 012 154 04 02	A 014 154 53 02	
	013 154 28 02	A 012 154 10 02		
	011 154 87 02	013 154 43 02	A 012 154 67 02	8EL 012 584-151
	012 154 05 02	013 154 79 02	A 013 154 42 02	
	012 154 11 02	A 011 154 87 02	A 013 154 43 02	
	012 154 67 02	A 012 154 05 02	A 013 154 79 02	
013 154 42 02	A 012 154 11 02			
009 154 99 02	011 154 89 02	A 010 154 89 02	8EL 012 584-191	
010 154 00 02	013 154 71 02	A 010 154 92 02		
010 154 89 02	A 009 154 99 02	A 011 154 89 02		
010 154 92 02	A 010 154 00 02	A 013 154 71 02		
008 154 78 02	013 154 73 02	A 011 154 50 02	8EL 012 584-361	
011 154 50 02	A 008 154 78 02	A 013 154 73 02		

OE references

OE manufacturer	OE number			Part number
FIAT	51727333	51859044	52003538	8EL 011 713-501
	71746673	71789538	73501591	8EL 012 430-801
FORD	1 100 712	3M21 10300 BA	98VW 10300 EA	8EL 011 710-321
	1 253 624			
	1 100 711	1 580 264	98VW 10300 CA	8EL 011 710-381
	1 253 623	3M21 10300 AA		
IVECO	1 705 484	9S51 10346 HA	BS51 10346 AA	8EL 011 713-501
	1 719 535			
	2995980	504109413 3	504028095	8EL 012 584-001
	5003159433	504114396 6	504114396	
LANCIA	5003317366	504114397 7	504114397	
	5003373944	500315943	504349338	
LEYLAND	5040280955	500331736	9947 7271	8EL 011 713-501
	5040657766	500337394		
	51727333	51859044	52003538	
	71746673	71789538	73501591	
MAN	51 26101 7241	51 26101 7233	51 26101 9266	8EL 012 584-091
	51 26101 7231	51 26101 7266		
	51 26101 7249	51 26101 7271	51 26101 9271	8EL 012 584-251
	51 26101 7278	51 26101 7287	51 26101 7296	8EL 012 584-461
OPEL (Vauxhall)	51 26101 7283			8EL 012 426-051
	93161735			
	10480459	6204109	9133600	8EL 012 427-451
	1204123	6204155	9192823	
RENAULT	13156051	6204192	9195753	
	24463063	6204204	9201489	
SMART	4431340	6204209	93175795	8EL 011 713-111
	55556070	90561970	93180415	
	55556071	90561971	93183436	
	6204073	9117851	93184064	
SUZUKI	6204076	9117931		8EL 011 710-381
	6204098	9129823		
	77 01 473 735			
	23 10 006 43R	23 10 066 77R	23 10 078 42R	
TOYOTA	82 00 404 459			8EL 012 426-051
	50 01 868 213	74 20 466 317	74 20 862 899	8EL 012 584-271
	50 10 589 551			
	453 906 41 00	A 453 906 41 00		8EL 011 713-111
VOLVO	31400-79J00			8EL 012 430-801
	27060-0L020	27060-30020	27060-30150	8EL 011 711-331
	27060-0L021	27060-30040	27060-30152	
	27060-30010	27060-30050		
VOLVO TRUCKS	2 040 924 0	2 084 935 2	8 500 062 9	8EL 012 584-271
	2 073 977 8	2 142 978 9	8 500 064 4	
	2 084 935	8 500 062 8	8 500 335 7	
	8 111 119	9 442 130	9 459 093	
VOLVO TRUCKS	8 111 122			8EL 012 427-541
	2 040 924 0	2 142 978 9	8 500 064 4	8EL 012 584-271
	2 073 977 8	8 500 062 8	8 500 335 7	
	2 084 935 2	8 500 062 9		
VOLKSWAGEN AG	028 903 028 D	038 903 018 X	06A 903 026 A	8EL 011 710-311
	028 903 028 DX	038 903 023 A	06A 903 026 AX	
	030 903 023 J	06A 903 023		
	030 903 023 JX	06A 903 026		
VOLKSWAGEN AG	021 903 025 K	028 903 030	038 903 024 F	8EL 011 710-321
	028 903 026 H	028 903 030 A	038 903 024 G	
	028 903 028 E	038 903 018 Q	038 903 024 GX	
	028 903 029 G	038 903 023 S	074 903 025 T	
VOLKSWAGEN AG	037 903 025 M	038 903 018 R	047 903 015 H	8EL 011 710-481
	037 903 025 T	038 903 018 RX	047 903 018 A	
	038 903 018 A	038 903 018 AX		
	06F 903 023 A	06F 903 023 H	07K 903 025 A	
VOLKSWAGEN AG	06F 903 023 C	06F 903 023 J		8EL 011 710-791
	06F 903 023 F	06F 903 023 FX		
	038 903 018 P	038 903 023 R	038 903 024 E	
	038 903 018 PX	038 903 024 A	074 903 026	
VOLKSWAGEN AG	038 903 023 L	038 903 024 D		8EL 011 710-381
	026 903 015 A	026 903 017 A	026 903 023 B	
	026 903 015 E	026 903 017 AX	037 903 023 P	
	026 903 015 EX	026 903 023 A	076 903 023 J	
VOLKSWAGEN AG	074 903 025 J	074 903 025 Q	074 903 025 R	8EL 012 427-541
Alternator freewheel clutches				
FIAT	77363468			9XU 358 039-161
FORD	1 469 755	6M21 10344 BA		9XU 358 038-041
LANCIA	77363468			9XU 358 039-161
DAEWOO	A2 52C5 64FE			9XU 358 039-021
NISSAN	23151-EB301	23151-EB30A		9XU 358 039-021
	23151-JG71B			9XU 358 038-871
VOLVO	31285818			9XU 358 039-161
	30667682			9XU 358 039-201
VOLKSWAGEN AG	021 903 119 G	028 903 119 AM	038 903 119 T	9XU 358 038-041
	022 903 119 A	038 903 119 A	L03 890 311 9S	
	022 903 119 C	038 903 119 S		
	070 903 201 C	070 903 201 E		

OEM REFERENCES

OEM MANUFACTURER	OEM number			Part number
BOSCH	Starter			
	0 124 325 003	0 124 325 135	0 124 325 137	8EL 011 710-311
	0 124 515 010	0 124 515 117	0 124 515 124	8EL 011 710-321
	0 124 515 011	0 124 515 119	0 124 515 125	
	0 124 515 012	0 124 515 121	0 124 515 127	
	0 124 515 110	0 124 515 123		
	0 124 325 001	0 124 325 101	0 124 325 149	8EL 011 710-381
	0 124 325 088	0 124 325 131		
	0 124 325 013	0 124 325 032	0 124 325 150	8EL 011 710-481
	0 124 525 039	0 124 525 067	0 124 525 102	8EL 011 710-791
	0 124 525 050	0 124 525 091	0 124 525 525	
	0 124 525 066	0 124 525 092	0 124 525 539	
	0 124 315 033			
	0 123 320 051	0 124 325 039	0 124 325 093	8EL 011 711-511
	0 123 320 065	0 124 325 046	0 124 325 105	
	0 120 489 185	0 120 489 370	9 127 041 201	8EL 012 427-381
	0 120 489 364	0 120 489 499		
	0 120 489 365	9 127 041 200		
BOSCH	0 124 225 002	0 124 225 050	0 124 425 025	8EL 012 427-451
	0 124 225 024	0 124 415 002		
	0 124 225 046	0 124 425 022		
	0 124 515 013	0 124 515 021	0 124 515 068	8EL 012 427-541
	0 124 515 020	0 124 515 038		
	0 123 515 022	0 124 515 050	0 124 515 052	8EL 012 428-141
	0 123 525 502			8EL 012 584-001
	0 124 555 004	0 124 555 032	0 124 555 002	8EL 012 584-011
	0 124 555 022	0 124 555 001	0 124 555 065	
	0 123 325 500	0 123 325 507		8EL 012 584-091
	0 124 655 001	0 124 655 004	0 124 655 023	8EL 012 584-151
	0 124 655 002	0 124 655 016		
	0 120 468 143	6 033 GB3 010	0 120 469 119	
	0 120 468 145	6 033 GB3 023	6 033 GB3 083	8EL 012 584-191
	0 124 555 013			8EL 012 584-251
DELCO REMY	0 124 655 008	0 124 655 019	0 124 655 499	8EL 012 584-271
	0 124 655 012			
	0 120 689 535	0 120 689 571	0 120 689 587	8EL 012 584-361
	0 124 655 025			8EL 012 584-461
	0 124 655 003	0 124 655 037	0 124 655 039	8EL 012 584-481
	0 124 655 036			
	0 124 555 006			8EL 012 584-721
	19092036			8EL 012 584-011
	19070013			8EL 012 584-151
	19025112			8EL 012 584-191
	19092046			8EL 012 584-251
	19092000			8EL 012 584-271
	10480225	3493225	3493459	8EL 012 427-451
	8600788			8EL 012 584-481
	19092045			8EL 012 584-721
DENSO	102211-2310	104210-8020	104210-9010	8EL 011 711-331
	102211-2810	104210-8021	104210-9011	
	102211-5600	104210-8240		
	102211-8690	102211-8691		
HITACHI	102211-8270	101210-0990		8EL 012 430-801
	8600498			8EL 012 584-001
	LR1120-701			8EL 011 710-321
	063533250010			8EL 011 710-381
MAGNETI MARELLI	063533250130			8EL 011 710-481
	63377031			8EL 011 713-501
	63321940	63377005	063377005010	8EL 012 430-801
	9517413			8EL 011 710-381
MAGNETON	9517212			8EL 011 710-481
	A004TA0592	A004TA8292	A4TA8292	8EL 012 584-001
	A4T A0592	A004TA8492	A4TA8492	
	A4TR5592	A4TR5592ZT		8EL 012 584-271
VALEO	2542241	2543320	SG9B059	8EL 011 710-311
	2542767	SG9B013	SG9B087	
	2542237	SG12B015	SG12B090	8EL 011 710-321
	2542949			
	2542245	SG9B015	SG9B078	8EL 011 710-381
	2542948			
	2541998	A13VI223	SG9B024	8EL 011 710-481
	2542282			
	2542695	TG14C011	TG16C016	8EL 011 710-791
	2542898	TG14C015		
	TG12C125	TG12C166	TG12S272	8EL 011 713-111
	TG12C164			
	2542966	TG15C058		8EL 012 426-051
	2541434	2940305	VA256	8EL 012 427-381
	2541434A	2940375		
	2542543	SG7S021		8EL 012 427-451
	2541963	A14VI22	SG12B029	8EL 012 428-141
	2542377			8EL 012 430-201
	TG17C061			



OEM REFERENCES

OEM MANUFACTURER	OEM number			Part number
ALTERNATORS	0 001 109 014	0 001 109 250	0 001 109 290	8EA 011 610-001
	0 001 109 036			
	0 001 121 006	0 001 121 028	0 001 121 029	8EA 011 610-041
	0 001 121 007			
	0 001 123 012	0 001 123 013		8EA 011 610-221
	0 001 123 014	0 001 123 038	0 001 123 039	8EA 011 610-231
	0 001 123 015			
	0 001 106 011	0 001 107 401	0 001 112 035	8EA 011 610-411
	0 001 106 015			
	0 001 112 019	0 001 112 041	F 000 AL0 327	8EA 011 610-441
	0 001 112 029			
	0 001 124 001	0 001 125 008	0 001 125 042	8EA 011 610-561
	0 001 124 002	0 001 125 012	0 001 125 043	
	0 001 125 007	0 001 125 013		
	0 001 112 027	0 001 112 044	0 001 113 013	8EA 011 611-041
	0 001 112 028	0 001 112 045	0 001 113 014	
	0 001 124 005	0 001 125 002	0 001 125 032	8EA 011 611-051
	0 001 124 006	0 001 125 011		
	0 001 125 001	0 001 125 031		
	0 001 107 521	0 001 192 009	0 001 192 080	8EA 011 611-491
	0 001 107 522	0 001 192 069	0 001 192 086	
	0 001 123 028	0 001 123 029		8EA 011 612-221
	0 001 125 605	0 001 125 606		8EA 012 526-111
	0 001 123 016	0 001 123 036	0 001 123 037	8EA 012 526-191
	0 001 123 017			
BOSCH	0 001 107 442	0 001 108 157	0 001 108 230	8EA 012 526-841
	0 001 107 443	0 001 108 190		
	0 001 108 054	0 001 108 401		
	0 001 107 037	0 001 107 072	0 001 107 403	8EA 012 527-271
	0 001 107 048	0 001 107 096	0 001 107 416	
	F 000 AL0 101	F 000 AL0 127	F 009 AL0 101	8EA 012 527-301
	0 001 120 400	0 001 121 016	0 001 121 017	8EA 012 527-401
	0 001 120 401			
	0 001 120 406	0 001 120 407		8EA 012 527-531
	0 001 109 205	0 001 109 324	0 001 109 329	8EA 012 527-611
	0 001 109 304	0 001 109 325	0 001 109 391	
	0 001 109 305	0 001 109 328		
	0 001 108 202	0 001 108 235	0 001 108 239	8EA 012 527-771
	0 001 108 234	0 001 108 224	0 001 108 240	
	0 001 231 002	0 001 231 133	0 001 263 049	8EA 012 586-011
	0 001 231 032	0 001 263 015		
	0 001 231 033	0 001 263 016		
	0 001 330 065	0 001 411 024	0 001 417 038	8EA 012 586-041
	0 001 410 088	0 001 411 324	0 001 417 051	
	0 001 411 009	0 001 417 001	0 001 410 024	
	0 001 360 022	0 001 368 035	0 001 816 326	8EA 012 586-121
	0 001 360 037	0 001 368 055	0 001 816 570	
	0 001 360 052	0 001 368 062	9 000 083 065	
	0 001 360 065	0 001 368 300	9 000 143 601	
	0 001 368 022	0 001 368 307	9 120 600 027	
	0 001 368 024	0 001 368 309		
	0 001 330 050			
	0 001 231 023	0 001 231 034		8EA 012 586-311
	0 001 241 005	0 001 241 009	0 001 241 021	8EA 012 586-381
DELCO REMY	96550792			8EA 011 610-411
	8000032			8EA 012 527-651
	8200242			8EA 012 586-001
	19084014			8EA 012 586-011
	19024051			8EA 012 586-041
	19024204			8EA 012 586-121
	10461470	8200138	8200297	8EA 012 586-201
	10479626			
	19081009	8200519		8EA 012 586-231
	19085003			8EA 012 586-251
	19084007			8EA 012 586-311
	19081019			8EA 012 586-381
DENSO	428000-1640			8EA 011 610-181
	428000-1620			8EA 011 610-281
	428000-6700	428000-6702	428080-6702	8EA 011 612-221
	428000-6701			
	428000-0670			8EA 012 526-841
	228000-5640	228000-5641		8EA 012 586-001
	228000-7550	228000-7551		8EA 012 586-251
HITACHI	S114-829	S114-829B	S114-925	8EA 011 610-661
	S114-829A	S114-869		
MAGNETI MARELLI	063521092500			8EA 011 610-001
	063521210280			8EA 011 610-041
	063521230120			8EA 011 610-221
	063521230140			8EA 011 610-231
	0632 80090			8EA 011 610-281
	063521120410			8EA 011 610-441
	063521250420			8EA 011 610-561
	63223039	063293039010	063521120440	8EA 011 611-041
	0632 93039			

OEM MANUFACTURER	OEM number			Part number
MAGNETON	443115141313	443115141394		8EA 011 610-041
	9141319	9141414		8EA 011 611-051
	915101A	9999984		8EA 012 527-531
MITSUBISHI	M0T22472			8EA 011 610-181
	M1T30071	M001T30071	M001T30072	8EA 012 527-771
	M1T30072			
	M008T61671	M8T61671		8EA 012 586-001
	M009T20171	M9T80472	M9T83671	8EA 012 586-231
	M9T20171	M9T80473		
	M8T62471	M8T62471AM		8EA 012 586-281
NIKKO	M8T62771			8EA 012 586-311
	M009T61971	M9T61971	M9T62071	8EA 012 586-381
	0-23000-2350	0-23000-2358	0-23000-2590	8EA 012 586-201
VALEO	D7R19	D7R43	ND162	8EA 011 610-001
	D7R28	D7R46		
	D7R281	D7RP123		
	D6RA110	TS14E110		8EA 011 610-181
	191335	D7GS8	TS18E1	8EA 011 610-221
	D7GS10	TS18E3	TS18ER123	8EA 011 610-231
	D8R27	D8R29		8EA 011 610-281
	D6RA132	D6RA293	D7EP12	8EA 011 610-411
	D6RA162	D6RA32	ND134	
	D6RA163	D6RA62		
	D6RA249	D6RA93		
	D6G3	D6RA572	D7E5	8EA 011 610-441
	D6RA100	D7E16	ND131	
	D6RA37	D7E2	ND212	
	D6RA57	D7E23	TS8E2	
	D6RA571	D7E25	VS272	
	D7RS130	D7RS30	D7RS301	8EA 011 610-561
	D7RS131	D7RS31		8EA 011 611-051
	TS12ER22	TS12ER22M		8EA 011 611-581
	TS18ER121	TS18ER121A	TS18ER121B	8EA 011 612-221
	D6G5	D7E38	ND209	8EA 012 527-301
	D6RA83	D7E4		
	D7E18	D7E8		
	D6GS12			8EA 012 527-531

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