LI	Qι	ם ו ר	c	OOLED	ALTERN	ATORS
т	Y	Р	E	A A L	AAN	ААР





# MAIN TECHNICAL DATA

Туре	AAL	AAN	ААР		
Nominal voltage	14 V				
Nominal current	150 A	190 A	350 A		
Current at 1800 rpm / 6000 rpm (At 23°C Air / 40° Coolant)	90 A / 150 A	120 A / 190 A			
Current at 1800 rpm / 6000 rpm (At 100°C Air / 90° Coolant)	70 A / 140 A	100 A / 160 A	250 A / 320 A		
Turn on speed	1200± 15% RPM	1450± 15% RPM	Externally controlled		
Stator diameter	130 mm	144 mm	150 mm		
Weight (without coolant)	~7 kg	~9 kg	~19.8 kg		
Max. speed	18000 rpm	18000 rpm	15000 rpm		
Regulator	Multifunction	Multifunction	Multifunction with BSS interface		
Pulleys	Different types according to customers' requirements				
Electrical terminals on regulator	L/DFM - 2 pole connector L(D+) - M5	L/DFM - 2 pole connector	COM line (BSS) / DFM- 2 pole connector		
Electrical terminals on alternator	B+ - M8				
Drive end bearings	17x52x17	17x52x17	20x62x17.6		
Rear end bearings	15x35x11 (Type 6202)	15x35x11 (Type 6202)	17x40x12 (Type 6203)		
Rectifier	Press fit diode bridge (50 A diodes)	Press fit diode bridge (2x35 A diodes)	With MOSFET transistors		
Ambient temperature	-40 °C ÷ +130 °C	-40 °C ÷ +130 °C	-40 °C ÷ +120 °C		
Coolant	50 % water, 50 % glycol				
Coolant quantity in generator	~240 ml	~240 ml	~555 ml		
Max. inlet coolant temperature	120 °C (130 °C peak)				
Max. coolant pressure	5 bar				
Min. coolant flow at 1800 rpm	1.5 l/min	1.5 l/min	1.8 l/min		
Min. coolant flow at 6000 rpm	5.0 l/min	5.0 l/min	6.0 l/min		
Cooling liquid outlet dimension	ø 17H8 - hole ø 16 external (tube)	ø 17H8 - hole ø 18H8 - hole	Special		
Cooling liquid inlet dimension	ø 17H8 - hole ø 16 external (tube)	ø 17H8 - hole Special	Special		

## CHARACTERISTICS AND CONNECTION DIAGRAMS

## ALTERNATORS TYPE AAL





#### Without NTC 16 U,[V] 14.73 14,63 15 14,47 14 14.12 14.00 13.82 13 -40 -20 0 20 40 60 80 100 120 140 T<sub>NTC</sub>[°C]

Rated voltage settings



#### Connection diagram



NTC - Thermistor for temperature sensing. Available versions with or without NTC.

## **ALTERNATORS TYPE AAN**

## Performance curve



## Rated voltage settings



## Connection diagram



NTC - Thermistor for temperature sensing. Available versions with or without NTC.

## ALTERNATORS TYPE AAP

#### Performance curve



## Rated voltage settings

Default voltage seting is 13.8 V. Output voltage can be varied by vehicle CPU (BSS) from 10.7 V to 16.0 V.

T<sub>NIC</sub>(\*C)

## Connection diagram



## ALTERNATOR COOLING

The alternator is cooled by the coolant liquid, which is used by the internal combustion engine for its cooling. The required coolant flow is ensured by water pump of the engine.

When starting a cold engine, this system enables faster warm-up of the engine to the operating temperature, because of the additional alternator heat, what indirectly enables faster warm-up of the passenger compartment and reduces the emissions of hazardous gases to the environment.

The main advantages of liquid cooling are quiet operation and efficient alternator cooling, what guarantees long life and high specific powers.

## SOME POSSIBLE CONNECTION TO THE COOLING SYSTEM



#### Serial connection of alternator with heater core

#### Parallel connection of alternator with heater core



#### Connection of alternator to the returning cooling liquid



Note: Real mounting should be defined by engine producer.



## APPLICATION

Specific advantages of liquid-cooled alternators in comparison to classic air-cooled alternators are high output powers appropriate mostly for use on the systems with high consumption of electric energy. They are most suitable for:

- Personal vehicles of the upper class with high consumption of electric energy
- Applications in heavy duty operating conditions (excavators, wheel loaders, combines, tractors and others)
- Road and other vehicles with high consumption of electric energy (buses, trucks)
- Marine applications
- Special military applications

## FEATURES

- High specific power
- Low noise level (alternator design without a fan)
- High output current already at idle running
- High efficiency
- Long life
- Faster warm-up of a cold engine to the operating temperature
- Additional heating of passenger compartment
- Lowering the temperature in the engine compartment
- Smaller dimensions

## ALTERNATOR INSTALLATION

When building in the liquid-cooled alternators, it is necessary to ensure the appropriate flow of the coolant through the alternator by the pump on the engine. Installation of liquid-cooled alternators can in this way be performed in three different ways:

- Classic installation with alternator holder to the engine block and connection of the coolant liquid by the pipe
- Direct assembly of the alternator to the engine block with connection of the coolant liquid by the pipe
- Direct alternator assembly to the engine block with direct connection of the coolant liquid from the motor

## DESIGN

Basically, the liquid-cooled alternator is a three-phase 12-pole synchronous generator with a built-in electronic regulator and rectifier. Efficient alternator cooling is carried out by the coolant that is used by the installed internalcombustion engine for its own cooling. The between rotor claw poles additionally installed permanent magnets increase electric power, mostly in the lower range of alternator's characteristics. The firm design and chosen materials enable favourable characteristics and long life of the alternator also in the harshest operating condition, such as low temperatures, salt spray fog, humidity, vibrations and aggressive liquids.

## Stator

Stator consists of a three-phase delta connected winding, coiled to the laminations pack (alternator types AAN and AAP have on the stator two three-phase windings that are connected parallelly). The chosen technology and materials, high filling factor of the winding in the slots of the stator stack, and large surface of the stator stack fit to the alternator housing with the coolant ensure high electric characteristics, high efficiency, and quiet operation of the alternator.

## Housing

Alternator housing is made of cast aluminium. Channels, through which the coolant flows and enables an efficient cooling of the alternator, are designed to additionally reduce the noise of the alternator. On the rear end bracket there are also connections for inlet and outlet of the coolant.

## Rotor

Alternator types AAL and AAN have a single rotor, whereas alternator type AAP has a double one (two pairs of claw poles, excitation windings are connected parallelly). The excitation is carried out through the slip rings and brushes. Additionally installed permanent magnets between the claw poles of the rotor improve the electric characteristics in the entire range of operation, above all in operation with lower number of revolutions.

## **Rectifier and regulator**

Alternator types AAL and AAN have the rectifier with the built-in zener press fit diodes that protect the consumers on the vehicle against over voltage. The rectifier is placed to the rear end bracket, ensuring efficient cooling of the rectifier by the help of the coolant. AAL and AAN alternators have built-in multifunction regulator with additional possibility of engine compartment temperature sensing.

The rectifier in alternators type AAP is designed by MOSFET transistors that together with the regulator make an autonomous unit and enable two autonomous alternator outputs. AAP alternators have built-in multifunction regulator with BSS interface that enable communication between regulator/alternator assembly and engine CPU. In this way, optimal alternator operation is ensured, regardless the conditions in which the alternator operates.

#### DISTRIBUTION NETWORK

#### BELARUS

IskRa o. o. o. UI. Dombrovskogo 69 230002 Grodno Tel.: +375 152 487 484 Tel/Fax: +375 152 487 485 E-mail: iskra@mail.grodno.by

#### **BOSNIA AND HERZEGOVINA**

Iskra AE Komponente, d. o. o. Nemanjina 35 78250 Laktaši Tel.: +387 51 53 07 85 Fax: +387 51 53 53 15 E-mail: iskra-ae@inecco.net

#### BRAZIL

Iskra do Brasil Ltda. Rua Testa n. 81 -Jardim Sao Sebastiao Jaguariuna - (SP) CEP 13820-000 Tel.: +55 19 3837 2363 Fax: +55 19 3837 3185 E-mail: uros.kravos@iskra-ae.com www.iskra-ae.com.br

#### CHINA

Iskra Suzhou Autoelectric Co., Ltd. Wenzhou Industrial Zone Shuangfeng Taicang, Jiangsu Province Tel: +86 512 8160 6888 Fax: +86 512 8160 7799 E-mail: iskrasuzhou@iskra-ae.com www.iskra-ae.com.cn

#### Changchun Fawer

Iskra Automotive Electrical Co., Ltd. No. 2258 Pudong Road Changchun Economic Technology Development Zone Changchun, Jilin Province Tel.: +86 431 461 5016 Fax: +86 431 461 5017 E-mail: zhj\_fa@faw.com.cn

#### FRANCE

Iskra Autoelectrique S.A.S. ZA du Chapeau Rouge 56000 Vannes Tel.: +33 2 97 45 59 90 Fax: +33 2 97 45 59 99 E-mail: iskra@iskra-sa.fr www.iskra-ae.fr

#### GERMANY

Iskra Deutschland GmbH Danziger Strasse 1 71691 Freiberg am Neckar Tel.: +49 7141 702 69 0 Fax: +49 7141 702 69 33 E-mail: info@iskra-ae.de www.iskra-ae.de

#### **GREAT BRITAIN**

Iskra UK Ltd. Redlands Ullswater Crescent, Coulsdon Surrey CR5 2HT Tel.: +44 208 668 7141 Fax: +44 208 668 3108 E-mail: sales@iskra-agency.co.uk www.iskra-ae.co.uk

#### IRAN

Iskra Autoelectric Iran JVC No.28, East Mirdamad Avenue Tehran 15469-34311 Tel.: +98 21 2 226 237 1 - 4 Fax: +98 21 2 226 237 6 E-mail: info@iskra-iran.com

#### ITALY

Iskra Autel S. r. l. Via G. Cantore, 2 34170 Gorizia Tel.: +39 0481 536 800 Fax: +39 0481 536 810 E-mail: info@iskra-autel.it www.iskra-autel.it

#### RUSSIA

Iskra Avtoelektrika Representative Office Storozhevaya str., 4, building 1 office 123 111020 Moscow Tel.: +7 095 726 93 94 Fax: +7 095 225 84 06 E-mail: info@iskra-ae.ru www.iskra-ae.ru

Pramo Iskra o.o.o. Zubcovskoe shosse 21 172387 Rzhev, Tverskaya obl. Representation office in Moscow Elektrozavodskaya str. 21 107023 Moscow Tel. / Fax: +7 495 995 2512 E-mai: iskra@pramo.ru

#### **SPAIN**

Iskra Autoelectrique Spain S.A. Calle Llobatona No. 6-D 08840 Viladecans Tel.: +34 93 647 40 83 Fax: +34 93 647 40 84 E-mail: iskra@iskra-ae.es

## USA

Iskra AE Inc. 10 Corbin Drive, Suite 4 Darien, CT-06820 Tel.: +1 800 474 1996 Tel.: +1 203 655 2884 Fax: +1 203 655 1965 E-mail: iskra@iskraae.com www.iskraae.com

Iskra AE, Inc. (OEM Sales Office) 4814 American Road Rockford, IL 61109 Tel.: +1 815 874 4022 Fax: +1 815 874 4024

#### Iskra Avtoelektrika, d. d.

Polje 15, Slovenia, 5290 Šempeter pri Gorici Tel.: +386 5 33 93 000, Fax: +386 5 33 93 801 E-mail: info@iskra-ae.com www.iskra-ae.com