

A C C O N T R O L L E R S

T Y P E S AES AEK



Iskra Avtoelektrika d.d.

Iskra's AC controllers are designed for electric motors drives based on the battery supplied AC induction motors and are a result of long-term development and experience in manufacture of different drive systems.

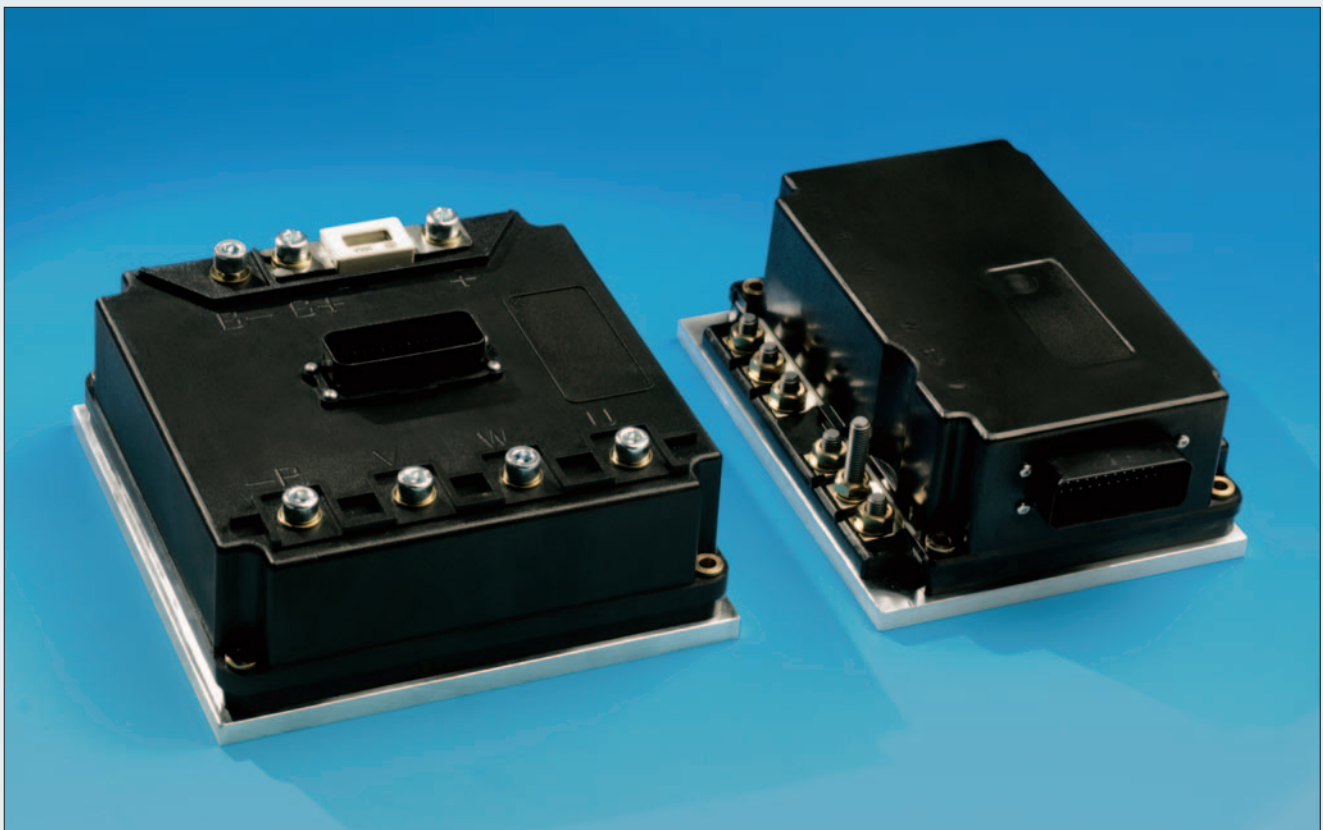
They are designed by high-efficient DSP microprocessor that controls the vector of the magnet flow of AC induction motor in the real time. The result is excellent motor dynamics and high efficiency in the entire operating range. The output power stage of the controller is designed by the modern MOSFET technology. The installed CANOpen interface is used for communication with the other electric units of a drive system in vehicles such as Master CAN Controller, graphic display and electronic controller of steering motor.

Iskra manufactures AC controllers of type AEK, which are designed to control an AC induction motors and AC controllers of type AES, which are designed to control an AC induction motors and additionally include control function to control DC commutator motors.

Distinguished for programmability of parameters and functions of the controller's inputs and outputs, Iskra's AC controllers are easy to use.

Iskra's AC controllers can be adapted to specific application requirements in terms of software and hardware.

AC controllers in combination with Iskra's AC motors ensure extraordinary driving abilities, dynamics, and long life of vehicles without additional maintenance.



DESCRIPTION

Electronic controllers AES enable conversion of DC voltage to three-phase voltage for supply and regulation of AC induction motors. The final MOSFET power stage in combination with a sophisticated DSP microprocessor controls the vector of the magnet flow of AC induction motor in the real time. The result of this is excellent adjustability of drives dynamics at the concurrent silent operation, high efficiency and reduced maintenance. In addition, these controllers include control of DC commutator motors to drive hydraulic pumps. The installed CANOpen with additional analog and digital inputs and outputs enables adaptation of the controller to requirements of different selected applications. The settings are adjusted by a PC at the installation.

APPLICATIONS

The AES controllers are designed to concurrently control traction AC induction motors and DC commutator motors that drive hydraulic pumps for the needs of the logistic equipment. They are used on the forklifts, pallet movers, stackers, personnel carriers and other similar logistic equipments.

CONTROLLER FEATURES

- State of the art design for control PC board and MOSFET power stage
- Control is performed using proprietary Flux Vector control algorithm running on dedicated motion control DSP microcontroller
- Space vector modulation is used for increased efficiency
- Sensorless algorithm for pump motor available
- Smooth acceleration from zero to full speed
- Full 4-quadrant operation
- Adjustable field weakening (top speed) is possible
- Hold in stop position when zero speed is requested
- Max starting and braking torque (also in stand still) is possible according to phase current limits
- Truck Speed dynamics can be set by reprogramming controller parameters
- Speed loop regulation gives the opportunity for small speed differences of the truck depending on load of the truck (difference in weight can be 1:3)
- Very smooth operation is performed at low motor speeds (up to 30% of the nominal motor speed)
- Direction inversion is performed softly to avoid load sliding off the forks
- CANOpen protocol built-in
- RS232 or CAN communication are used for reprogramming controller parameters by PC
- Controllers are designed to meet UL requirements
- Controllers are designed to meet EMC requirements

Some of controller features regarding clients' requirements

- May have selectable sets of drive modes (rabbit, standard, turtle and other)
- Programmable maximum current limit for traction motor
- Programmable maximum current limit for hydraulic motor
- Current limit and timeout for hydraulics at the predetermined maximum current
- Proportional lowering valve controlled by a variable current driver
- Diagnostics via PC or status indicator
- Internal reverse polarity protection (fuse or main contactor must be controlled by controller)
- Continuous diagnostics during operation, microprocessor power-on self test
- Output drivers short circuit protected and built-in coil spike protection provided
- Positive battery connection for all inputs
- Fully protected outputs
- Internal and external software watchdog circuits
- IP rating IP65

MAIN TECHNICAL DATA FOR AC CONTROLLERS TYPE AES

TYPE	AES H24V 220/350A T/H 5/1	AES H24V 300/180A T/H 5/1	AES H24V 350/300A T/H 5/1	AES H24V 450/300A T/H 5/1	AES H48V300/300A T/H 5/1
GENERAL DATA					
Supply Voltage, Rated	24V	24V	24V	24V	48V
Ambient Temperature Operating Range	-30°C < Tamb < 45°C	-20°C < Tamb < 45°C	-20°C < Tamb < 45°C	-20°C < Tamb < 45°C	-20°C < Tamb < 45°C
Controller Temperature Operating Range	-30°C < Tc < 80°C	-20°C < Tc < 80°C	-20°C < Tc < 80°C	-20°C < Tc < 80°C	-20°C < Tc < 80°C
TRACTION PART					
Max. Phase Current (RMS)	5 sec 240A	5 sec 330A	5 sec 380A	5 sec 480A	5 sec 320A
Max. Phase Current (RMS)	1 min 220A	2 min 300A	2 min 350A	2 min 450A	2 min 300A
Operating Mode S2	60 min 120A	60 min 200A	60 min 200A	60 min 200A	60 min 150A
Operating Frequency	10 kHz	10 kHz	10 kHz	10 kHz	10 kHz
HYDRAULIC PART					
Max. Current (DC)	5 sec 350A	5 sec 200A	5 sec 330A	5 sec 330A	5 sec 320A
Max. Current (DC)	2 min 300A	2 min 180A	2 min 300A	2 min 300A	1 min 300A
Operating Mode S2	60 min 180A	60 min 100A	60 min 150A	60 min 150A	60 min 140A
Operating Frequency	10 kHz	10 kHz	10 kHz	10 kHz	10 kHz
DIMENSIONS AND DRAWINGS					
Outline dimensions mm	212.8 x 158 x 80	200 x 200 x 89.5	200 x 200 x 89.5	200 x 200 x 89.5	200 x 200 x 89.5
Connection diagram	Fig. I	Fig. II	Fig. II	Fig. II	Fig. II
Technical drawing	Fig. 1	Fig. 2	Fig. 2	Fig. 2	Fig. 2

CONNECTION DIAGRAMS

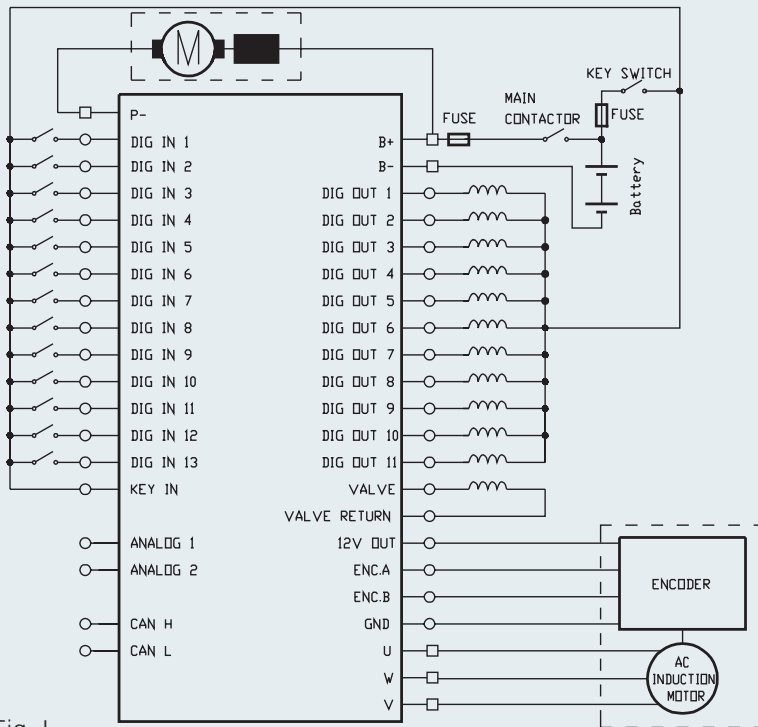


Fig. I

Vehicle installation should be made in accordance with 35 pin connector on Iskra controller. The controller has 13 digital inputs, 11 digital outputs, 2 analog inputs, proportional valve output and input, two terminals for CAN communication, key in terminal, terminals for 12 V power output supply, two terminals for encoder sensing and GND terminal.

Truck behavior depends on the software that is made according to customer request.

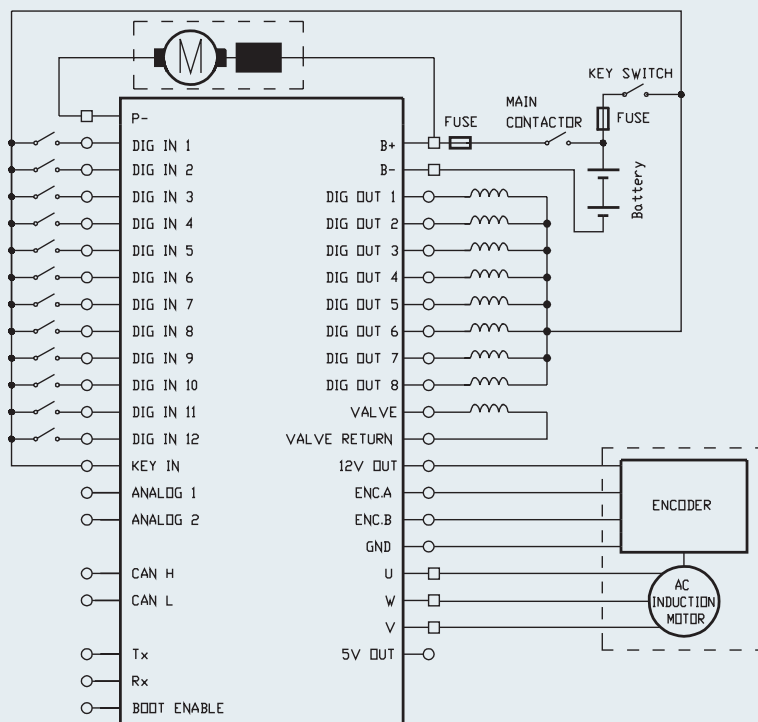


Fig. II

Vehicle installation should be made in accordance with 35 pin connector on Iskra controller. The controller has 12 digital inputs, 8 digital outputs, 2 analog inputs, proportional valve output and input, two terminals for CAN communication, two terminals for serial communications, boot enable terminal, key in terminal, terminals for 5 V and 12 V power output supply, two terminals for encoder sensing and GND terminal.

Truck behavior depends on the software that is made according to customer request.

OUTLINE DIMENSIONS

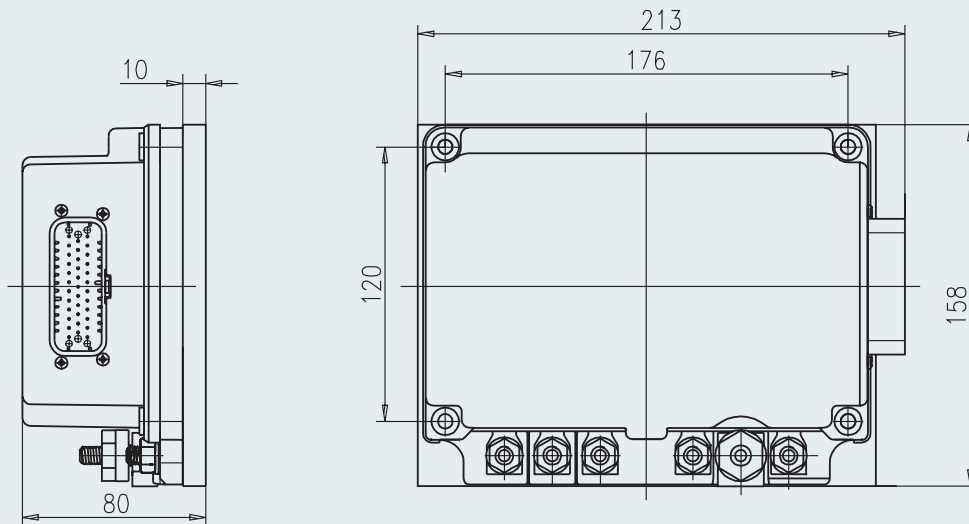


Fig. 1

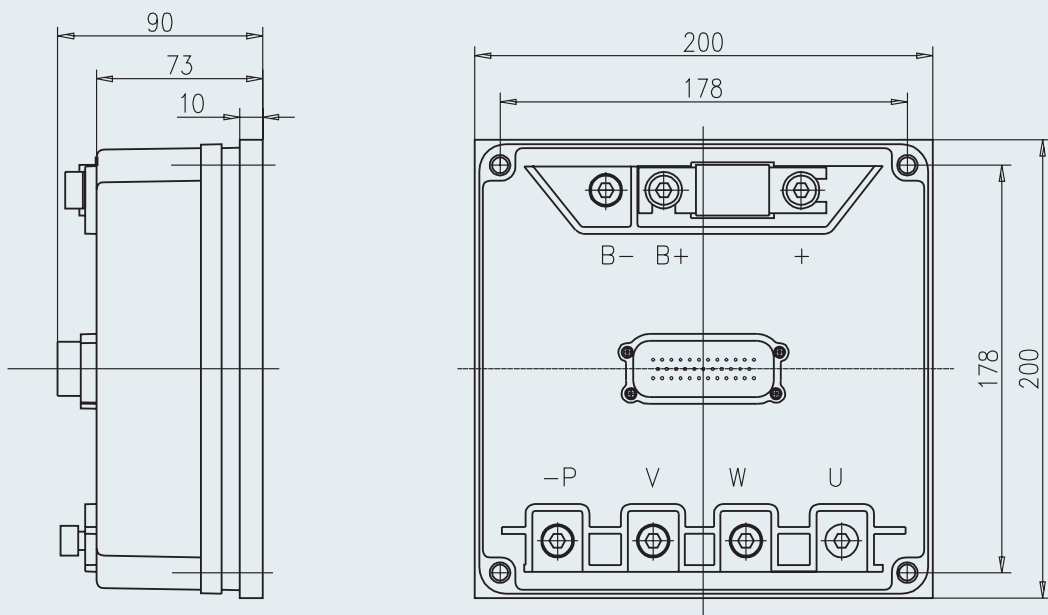


Fig. 2

DESCRIPTION

Iskra's electronic controllers of type AEK are converters of DC voltage to three-phase alternating voltage to supply AC motors. They are designed based on DSP processors that enable control of the vector of the magnet flow of AC induction motor in the real time. Result of such hardware together with sophisticated software is excellent adjustability of high dynamics and efficiency of the asynchronous drive. The installed CANOpen protocol and additional inputs and outputs enable it great adjustment to the changing requirements of different installations. The settings are adjusted by the help of a PC.

APPLICATIONS

Controllers of type AEK are designed exclusively to control traction AC induction motors and intended for use in drive systems to drive battery-supplied electric vehicles such as golf carts, pallet movers, airport luggage carts, smaller electric cars and other applications.

CONTROLLER FEATURES

- State of the art design to control PC board and MOSFET power stage
- Control is performed by using proprietary Flux Vector control algorithm running on dedicated motion control DSP microcontroller
- Space vector modulation is used for increased efficiency
- Smooth acceleration from zero to full speed
- Full 4-quadrant operation
- Adjustable field weakening (top speed) is possible
- Hold in stop position when zero speed is requested
- Max starting and braking torque (also in stand still) is possible according to phase current limits
- Truck Speed dynamics can be set by reprogramming controller parameters
- Speed loop regulation gives the opportunity for small speed differences of the truck depending on load of the truck (difference in weight can be 1:3)
- Very smooth operation is performed at low motor speeds (up to 30% of the nominal motor speed)
- Direction inversion is performed softly to avoid load sliding off the forks
- CANOpen protocol built-in
- RS232 or CAN communication are used for reprogramming controller parameters by PC
- Controllers are designed to meet UL requirements
- Controllers are designed to meet EMC requirements

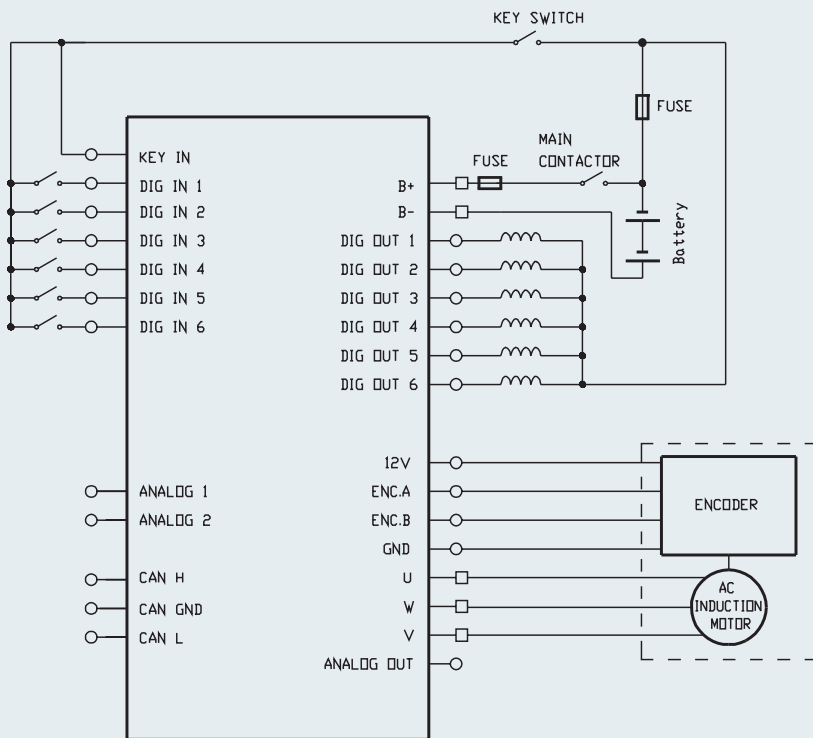
Some of controller features regarding clients' requirements

- May have selectable sets of drive modes (rabbit, standard, turtle...)
- Programmable maximum current limit for traction motor
- Diagnostics via PC or status indicator
- Internal reverse polarity protection (fuse or main contactor must be controlled by controller)
- Continuous diagnostics during operation, microprocessor power-on self test
- Output drivers short circuit protected and built-in coil spike protection provided
- Positive battery connection for all inputs
- Fully protected outputs
- Internal and external software watchdog circuits
- IP rating IP65

MAIN TECHNICAL DATA FOR AC CONTROLLERS TYPE AEK

TYPE	AEK H24V 250A T5	AEK H48V 230A T5	AEK H72V 200A T5
Supply Voltage, Rated	24V	48V	72V
Ambient Temperature Operating Range	-20°C < Tamb < 45°C	-20°C < Tamb < 45°C	-20°C < Tamb < 45°C
Controller Temperature Operating Range	-20°C < Tc < 80°C	-20°C < Tc < 80°C	-20°C < Tc < 80°C
Max. Phase Current (RMS)	5 sec 250A	5 sec 230A	5 sec 200A
Max. Phase Current (RMS)	1 min 240A	1 min 230A	1 min 190A
Operating Mode S2	60 min 110A	60 min 100A	60 min 90A
Operating Frequency	10 kHz	10 kHz	10 kHz
Outline dimensions mm	195.95 x 154.8 x 91.78	195.95 x 154.8 x 91.78	195.95 x 154.8 x 91.78

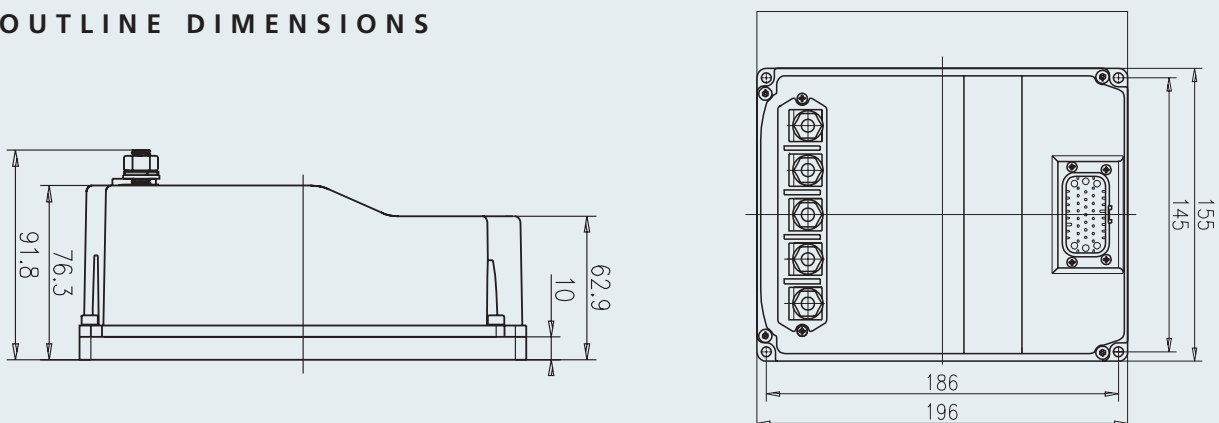
CONNECTION DIAGRAM



Vehicle installation should be made in accordance with 23 pin connector on Iskra controller. The controller has 6 digital inputs, 6 digital outputs, 2 analog inputs, one analog output, 3 terminals for CAN communication, key in terminal, terminals for 5 V and 12 V power output supply, two terminals for encoder sensing and GND terminal. Analog inputs could be used as digital inputs if such configuration is needed.

Truck behavior depends on the software that is made according to customer request.

OUTLINE DIMENSIONS



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