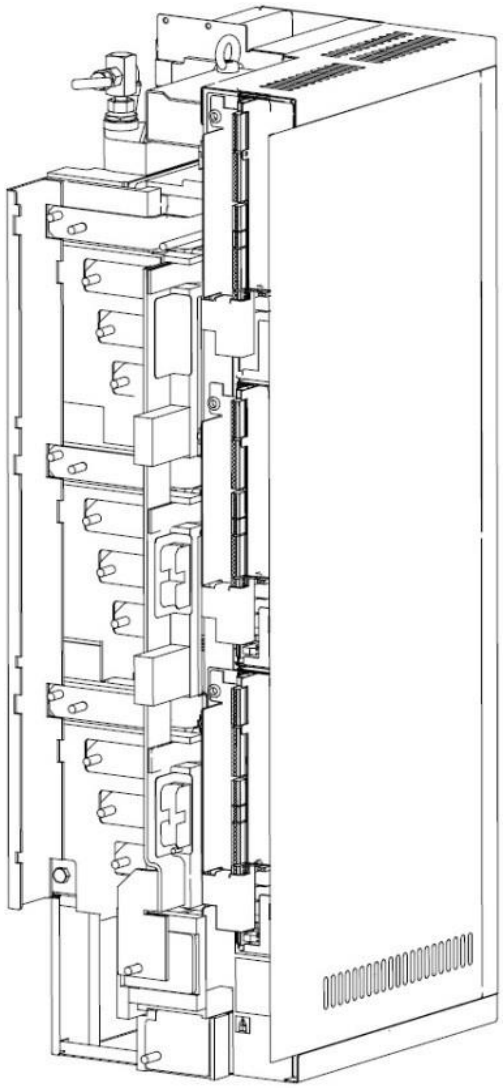

REV 02
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Contents

1.1 Introduction

- AE221A are Liquid-Cooled Avid Extreme Drives (AED) which provide three motor outputs of 221A @ 110% overload rating per channel.
- The modules are available in two ratings:
  - AE221A6A which is nominally rated at 600/690V AC
  - AE221A4A which is nominally rated at 440/480V AC
- Both modules contain three independent SKiiP®7 IGBTs which are the latest generation offering all the benefits and improvements of intelligent power modules from preceding SKiiP generations.
- Each drive contains three independent drive controllers allowing each motor to be controlled separately. Additionally, each motor can be controlled in either vector or VF mode.

2. WARNINGS

Operation of this equipment requires detailed installation and operation instructions provided in this manual; this information should be retained with this product.

- This equipment may be connected to more than one live circuit.
- All power supplies must be switched off and isolated before working on the equipment, failure to do so could result in death or serious injury.
- Wait at least 8 minutes after isolating supplies and check that the voltage between DC+ and DC- has reduced to a safe level before working on the equipment.
- Risk of burn - surfaces on the coolant pipes, cables and busbars can reach high temperatures and remain hot for some time after power is removed.
- Ensure that all coolant has cooled to a safe temperature and the equipment is suitably drained and isolated before the external pipework is disconnected from the equipment.
- The unit is heavy: 220kg (485 lb.)
- The Liquid Cooled Basic Drive Modules are of IP00 construction and must be built into an enclosure or cabinet.
- If the Power Drive System that utilizes the modules is configured to auto-restart, the motor may start rotating without an operator input. Precautions Must be taken to prevent injury to personnel.
- Units are designed and manufactured to comply with EN 61800-5-1 and UL 61800-5-1.

3. Electrical – Power Section

Specification	AE221A4A	AE221A6A
Supply Voltage :	440 to 480V AC rms (nominal), +/- 10% long term, +/- 15% for 0.5 to 30 cycles with loss of performance but no trip.	600 to 690V AC rms (nominal), +/- 10% long term, +/- 15% for 0.5 to 30 cycles with loss of performance but no trip.
Operational Supply Frequency Range:	45 to 63Hz	
Output Frequency Range :	0 to 200Hz	
Maximum Continuous Operating Voltage:	1170V DC (limited by SMPS over-voltage trip)	
Maximum DC Surge Voltage :	1275V DC (SMPS limit must be respected)	
Maximum DC Link Capacitor Bank Voltage:	1315V DC (SMPS limit must be respected)	
Maximum Silicon Voltage (VCES) :	1700V DC (SMPS limit must be respected)	
Current Rating with 1.1 x Overload* :	221A	
Current Rating with 1.5 x Overload* :	165A	
Instantaneous Over-current Trip Level :	625A	
Brick-wall Current Level :	419A	

3.1 Electrical Supply

Specification	***Value***
Network Type	TN or TT (i.e. earthed/grounded neutral). Can also be connected to IT network (i.e. isolated neutral) if IT network separated from public mains supply by an isolating transformer.
Voltage Unbalance	Negative sequence voltage not to exceed 3%
Output Switching Frequency - Default Setting	1.25 kHz, 2.5 kHz, 5 kHz and 7.5 kHz for all drives (programmable by P35.00).
Output - Overload Current	50% or 10% for one minute, once every 10 minutes, as selected.
Insulation - Standards	Designed to meet UL 61800-5-1/EN 61800-5-1 TN or TT network: Overvoltage Category III IT network: Overvoltage Category II

3.2 Losses

Specification	***Value***
Losses at 1.1 Current Rating	6,966 W (IGBT and rectifier bridges)
Losses at 1.5 Current Rating	4,884 W (IGBT and rectifier bridges)

NOTE: Losses are based on nominal voltage and current, 1.25 kHz PWM frequency and 40°C (104°F) coolant temperature. Refer to Avid Controls for losses under other operating conditions.

3.3 High Voltage / Power Connections

Connection	***Value***	***Size***
AC Power Customer Supply Terminals	2 x M10 studs per phase	Min: 2 x 95mm^2 cable per phase Max: 2 x 150mm^2 cable per phase
AC Power Customer Motor Terminals	1 x M10 studs per phase	Min: 1 x 50mm^2 cable per phase Max: 1 x 150mm^2 cable per phase
DC Power Customer Terminals	3 x M10 studs each for DC+ and DC-	Min: 3 x 120mm^2 cable per phase Max: 3 x 150mm^2 cable per phase
Ground Connection	1 x M10 bolt	
Low Voltage Control Connections	Multiple Terminal Blocks for Customer Interface Control	

- Recommended fastening torque for power terminals is 35Nm (26 ft-lbs.).
- All power cables must have insulation rated to a minimum temperature of 125°C. Recommended insulation materials include high temperature silicone rubber and extruded radiation-crosslinked polyolefin.
- AC and GROUND cables must have insulation rated to a minimum of 690V AC.
- DC cables must have insulation rated to a minimum of 1200V DC.
- Suitable cable types include:
  - Nexans - SIWO-KUL B10 1x120 1.1Kv YE
  - Huber and Shuner - Radox 125 600/1000V AC

4. Specifications

4.1 Cooling

Specification	***Value***
Coolant Type[*1]	Water / Ethylene Glycol Maximum 50% Ethylene Glycol With suitable corrosion inhibitors
Minimum Coolant Flow	25 liters/min (6.6 US-GPM)
Maximum Coolant Inlet Pressure	300kPa (45psi)
Maximum Coolant Inlet Temperature	60°C
Minimum Coolant Inlet Temperature	0°C
Coolant Strainer	Coolant must be strained to remove particles Maximum recommended strainer mesh is 0.7mm (0.028”) Inspect and clean strainer every six months
Coolant Lifetime	Check coolant constituent concentration every six months Remove coolant, flush system with de-ionized water and refill with new coolant every 24 months.
Coolant Connection Options	2x Quick-Disconnect at bottom of unit [*2]

*1: The materials used in ***all*** cooling system components must be compatible with ethylene glycol. Incompatible materials may be corroded or degraded over time causing leakage. Therefore, it is important to check the compatibility of the coolant with all components.

*2: Modules are fitted with Self-sealing Staubli RME 16 connectors.

4.2 Environmental

Specification	***Value***
Ambient Temperature (Internal cabinet temperature) - Operating	0 to 50°C
Temperature – Storage or Transport	-13°F to 131°F (-25 to +55°C)
Altitude – Operating	Up to 3280ft. (1000m) ASL. Between 3280ft. (1000m) and 6551ft. (2000m) apply derating of 7.5% per 3280ft. (1000m).
Altitude – Storage	Up to 9842ft. (3000m) ASL
Altitude - Transport	Will withstand air transport
Vibration – Transport	IEC 60721-3-2:1997 Class 2M1, in transport packaging.
Humidity – Operating, Storage or Transport	5% to 95% RH, Non-condensing.
Cabinet air – Operating	Pollution Degree 2 as per IEC60664-1, UL 840 & CSA C22.2 No. 0.2-93 i.e. clean, free from dust, condensation and conductive or corrosive gases. Maximum chemicals 15ppm H_2S, 25ppm NO_2, 25ppm SO_2

4.3 Mechanical

Specification	***Value***
Dimensions	338mm W x 1263mm H x 544mm D (13.3” W x 49.7” H x 21.4” D)
Enclosure	IP00 (IEC 60529:1989; BS EN 60529:1992) NEMA 1 Must always be installed within suitable enclosure with restricted access
Mass	220kg (485 lb.)

5. Fusing

- Fuse selection depends on many external factors, including:
  - The current/time loading conditions
  - Number of starts per hour/day etc.,
  - Fuse cooling
  - Ambient temperature
  - Continuous running or intermittent running
  - Fuse connection/mounting arrangements.

The fuse information detailed here is intended to provide a basic fusing arrangement for a single unit operating at rated current and voltage with an overload occurring for 60s once every 10 minutes and one stop/start per day.

Specification	***Value***
1.1 Overload Rating 480/525 V AC	Bussmann 170M6114
	Ferraz 7.5 URD 44 TTQF 1200, Ref No. : N229 207A
1.5 Overload Rating 480/525 V AC	Bussmann 170M6114
	Ferraz 6.9 URD 33 TTF 0900, Ref No. : A 300 081A

6. Contact Details: Sales, Service and Support

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7. Document Revision History

Rev.	Date	Author	Changes
00	3rd Feb 2025	Mark Woods	Document Created
01	27th April 2025	Mark Woods	Update Model Number
02	15th July 2025	Mark Woods	Correction to width dimension