DNV·GL

Certificate No:
TAE00002U9

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Frequency Converter

with type designation(s)
MV3000 / MV3000E Series and accessories

Issued to
Avid Controls, Inc.
Waller, TX, USA

is found to comply with
DNV GL rules for classification – Ships, offshore units, and high speed and light craft

Application :

Product approved by this certificate is accepted for installation on all vessels classed by DNV GL.

Issued at **Høvik** on **2018-04-26**
This Certificate is valid until **2023-04-25**.
DNV GL local station: **Houston, Approval CMC**

Approval Engineer: **Nicolay Horn**

for **DNV GL**

Andreas Kristoffersen
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

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Product description

Frequency converter assemblies and accessories, comprising the following types:

Type Designation	Mains Supply	Output at Nominal Voltage at 40ºC	Configuration	Frame Size
MVD300-3702-A	600/690VAC	300A	DELTA Tr Br	ACD
MVD300-460X-A	690VAC	300A	DELTA Tr Br	ACD
MVD377-450X-A	480VAC	377A	DELTA Tr Br	ACD
MVD500-4501-A	525VAC	500A	DELTA Tr Br	ACD
MVD500-4701-A	690VAC	500A	DELTA Tr Br	ACD
MVDL800-4701-A	690VAC	800A	DELTA Tr Br	LCD
MVDL800-470X-A	690VAC	800A	DELTA Tr Br	LCD
MVDL800-x79xxxxx-A	690VAC	800A	DELTA Tr Br	LCD
MVDL1000-4701-A	690VAC	1000A	DELTA Tr Br	LCD
MVDL1000-4703-A	690VAC	1000A	DELTA Tr Br	LCD
MVDL1000-x79xxxxx-A	690VAC	1000A	DELTA Tr Br	LCD
MVR1600-4601-A	690VAC	1600A	DELTA Rect Br	ACD
MVRL2100-4601-A	690VAC	2100A	DELTA Rect Br	LCD
GDR872-4401-A	380-480VAC	872A	DELTA Rect Br	ACD
GDR872-4601-A	500-690VAC	872A	DELTA Rect Br	ACD
GDR1168-4401-A	380-480VAC	1168A	DELTA Rect Br	ACD
GDR1168-4601-A	500-690VAC	1168A	DELTA Rect Br	ACD
MV3662A6A4	600/690VAC	662A	LC BDM	8
MV3221R6A4	600/690VAC	221A	3 Motor LC BDM	8
MV3750J6A4	600/690VAC	750A	LC BDM	8
MV3250M6A4	600/690VAC	250A	3 Motor LC BDM	8
MV31000J6A4	600/690VAC	1000A	LC BDM	8
DELTA Controllers & Power Supplies				
MVC3001-4003-A			DELTA Controller	
MVC3001-4003-A			100MHz DELTA Controller	
MVC3001-4002-A			DELTA Controller	
MVC3002-4001-A			DELTA I/O Panel	
MVC3003-4001-A	380-440VAC		DELTA SMPS	
MVC3003-4002-A	460-525VAC		DELTA SMPS	
MVC3003-4003-A	575-690VAC		DELTA SMPS	
MVC3003-4020-A	575-690VAC		DELTA SMPS	
MVC3003-4025-A	575-690VAC		DELTA SMPS	
MVC3003-4030-A	575-690VAC		DELTA SMPS	
MVC3006-4001-A			DELTA Mains Voltage Monitor	
MVC3006-4003-A			DELTA Mains Voltage Monitor	
MVC3006-4004-A			DELTA Mains Voltage Monitor	
MVC3006-4005-A			DELTA Mains Voltage Monitor	
MVC3006-4006-A			DELTA Mains Voltage Monitor	
MVC3006-3003-A			DELTA Mains Voltage Monitor	

Application/Limitation

Supply Voltage Range:	380 - 440 V, 460 - 525 V, 575 - 690 V
Voltage Variation (steady state):	± 10 %
Frequency Variation:	45 – 63 Hz
Output frequency:	0 – 200 Hz
Temperature range in operation:	0 - 40 ºC (Above 40 ºC see below)
Temperature class:	A
Vibration class:	A
Humidity class:	A
EMC class:	IEC 61800-3 - To be used on EMC class A locations (see Application / limitation)

The MV3000 product must be regarded as a component. The actual installation to be designed according to GE Energy Power Conversion (GE PC) technical documentation and to the applicable DNV Rules for the actual application.

The frequency converter is to be derated to a power rating according to 45 ºC ambient temperature as per the following data:

- For MicroCubicle Drives (Basic Drive Modules – BDM's) above 40 ºC de-rate by 12.5 % to obtain the rating at 45 ºC.
- For Air and Liquid Cooled MV DELTA modules (MVD282, 300, 377 and MVDLxxxx products respectively), the actual product rating is dependent upon the operating conditions (e.g. supply voltage, cooling arrangement, overload type, ambient temperature, PWM frequency, etc.) For this reason the system integrator is required to check the rating using the MV3000 DELTA Rating Table found in the DELTA Technical Manuals e.g. T1689 Appendix D. This rating table provides details of ratings at 40 ºC and 50 ºC and the system integrator must interpolate between these figures to obtain a rating at 45 ºC. A change in the module configuration or quantity operating in parallel may be required to achieve the required rating.
- For air cooled DELTA modules (MVD500), the actual product rating is application dependent upon the operating conditions (e.g. supply voltage, cooling arrangement, overload type, ambient temperature, PWM frequency, etc.). Above 40 ºC, de-rate the current rating by 5% to obtain the rating at 45 ºC. A change in the module configuration or quantity may be required to achieve the required rating.
- For reactors, transformers and DC link inductors above 40 ºC, de-rate the current rating or the kVA rating by 5 % to obtain the rating at 45 ºC. This will ensure that the temperature rise limits for the equipment is not exceeded.

The equipment must be mounted in a suitable enclosure to ensure that the IP rating achieved complies with the required level for the final location of the equipment in accordance with the DNV Rules.

It is mandatory that suitable anti-vibration mounts are fitted to reduce the vibration levels seen by the MV3000 to the required level. Suggested suppliers of anti-vibration mounts are detailed in the Technical Data sheet "T1976 Det Norske Veritas : Product Compliance" included with each MV3000 product.

- Approval conditions:
  Assembling of modules is to be according to manufacturer's specifications.
- Product certificate:
  Each delivery of a frequency converter assembly is to be certified according to Pt.4 Ch.8. If GE PC or Avid controls is regarded as a sub supplier only the end user is responsible for product certification.

  The Type Approval covers hardware and software for the basic controller.

- Application Software:
  The Type Approval does not cover application software. For application software, the following applies:
  When the frequency converter is used in an application to be classed by DNV, documentation for the actual application is to be submitted for approval in each case. Reference is made to DNV Rules for Pt.4 Ch.8 Electrical Installations and Pt.4 Ch.9 Control and Monitoring Systems.
- Clause for application software control:
  All changes in software are to be recorded as long as the system is in use on board. The records of all changes are to be forwarded to DNV for evaluation and approval. Major changes in the software are to be approved before being installed in the computer.
- Converters with conducted and radiated emission above the DNV required limits can be installed in "special distribution zone" and "general power distribution zone", in accordance with IEC 60533 provided measures are taken to attenuate these effects on the distribution system, so the safe operation is assured. Planned EMC measures shall be submitted for approval prior to installation onboard. The EMC measures should be derived from an EMC analysis and plan in accordance with IEC 60533 Annex B and /or IEC 61800-3 Annex E.

Type Approval documentation

Tests carried out

Visual Inspection, Performance, Power Supply Variation, Power Supply Failure, Vibration, Dry Heat, Damp Heat, Insulation Resistance, High Voltage.

EMC : Electrical Fast Transient (Burst), Electrical Slow Transient (Surge), Conducted RF, Radiated RF Electromagnetic Field, Electrostatic Discharge (ESD), Radiated and Conducted Emissions.

Marking of product

- Avid Controls
- Type Designation
- Voltage
- Rated current/power (at 40 ºC ambient temperature)

Periodical assessment

The scope of the periodical assessment is to verify that the conditions stipulated for the Type approval are complied with and that no alterations are made to the product design or choice of materials.
The main elements of the assessment are:

- Inspection on factory samples, selected at random from the production line (where practicable)
- Results from Routine tests (RT) checked (if not available tests according to RT to be carried out)
- Review of type approval documentation
- Review of possible change in design, materials and performance
- Ensuring traceability between manufacturer's product type marking and Type Approval Certificate.

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.

END OF CERTIFICATE