

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Frequency Converter

with type designation(s)
SV-IP5A;

Issued to

LSIS Co., Ltd. (Cheon-an Plant)
Chungcheongnam-do, Republic of Korea

is found to comply with
Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft and Det Norske Veritas' Offshore Standards

Application :

**Frequency Converter for Asynchronous Motors SV-IP5A 78 series. Range: 5.5 kW to 450 kW
200 - 480 VAC supply.**

This Certificate is valid until **2018-06-30**.

Issued at **Høvik** on **2014-07-04**

DNV GL local station: **DNV Reg. Office Maritime,
Seoul**

Approval Engineer: **Kristine Bruun Ludvigsen**

for **DNV GL**

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Marit Laumann
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. If any person suffers loss or damage which is proven to have been caused by any negligent act or omission of the Society, then the Society shall pay compensation to such person for his proven direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question. The maximum compensation shall never exceed USD 2 million. In this provision the "Society" shall mean DNV GL AS as well as all its direct and indirect owners, affiliates, subsidiaries, directors, officers, employees, agents and any other person or entity acting on behalf of DNV GL AS.

Certificate No: **E-13486**
 File No: **822.21**
 Job Id: **262.1-007585-2**

Product description

Variable speed controller for asynchronous motor. Constant / variable torque applications.
 Air cooled only.

200~230V Class (5.5~30kW / 7.5~40HP)

Model Number (SVxxxiP5A-2)				055	075	110	150	185	220	300	
Capacity [kVA] ⁽¹⁾				9.1	12.2	17.5	22.9	28.2	33.5	43.8	
Output ratings	Fan or pump load	motor rating ⁽²⁾	HP	7.5	10	15	20	25	30	40	
			kW	5.5	7.5	11	15	18.5	22	30	
		Current [A] (110% overload)		24	32	46	60	74	88	115	110% 1Minute (Normal Duty)
	General load	motor rating ⁽²⁾	HP	5.5	7.5	10	15	20	25	30	
			kW	3.7	5.5	7.5	11	15	18.5	22	
		Current [A] (150% overload)		17	23	33	44	54	68	84	150% 1 Minute (Heavy Duty)
	Frequency				0.01 ~ 120 Hz						
	Voltage				200 ~ 230 V ⁽³⁾						
Input ratings	Voltage				3 ϕ 200 ~ 230 V (-15% ~ +10 %)						
	Frequency				50/60 Hz (\pm 5 %)						
Protection degree				IP20 / UL Type1			IP00 / UL Open ⁽³⁾				
Weight [kg (lbs.)]				4.9(10.8)	6(13.2)	6(13.2)	13(28.7)	13.5 (29.8)	20(44.1)	20(44.1)	

380~480V Class (5.5~30kW / 7.5 ~40HP)

Model Number (SVxxxiP5A-4)				055	075	110	150	185	220	300	
Capacity [kVA] ⁽¹⁾				9.6	12.7	19.1	23.9	31.1	35.9	48.6	
Output ratings	Fan or pump load	motor rating ⁽²⁾	HP	7.5	10	15	20	25	30	40	
			kW	5.5	7.5	11	15	18.5	22	30	
		Current [A] (110% overload)		12	16	24	30	39	45	61	110% 1Minute (Normal Duty)
	General load	motor rating ⁽²⁾	HP	5.5	7.5	10	15	20	25	30	
			kW	3.7	5.5	7.5	11	15	18.5	22	
		Current [A]/Built-in DCL Type (150% overload)		8.8	12	16	22/24	28/30	34/39	44/45	150% 1 Minute (Heavy Duty)
	Frequency				0.01 ~ 120 Hz						
	Voltage				380 ~ 480 V ⁽³⁾						

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Model Number (SVxxxIP5A-4)		055	075	110	150	185	220	300
Input ratings	Voltage	3 ϕ 380 ~ 480 V (-15% ~ +10 %)						
	Frequency	50/60 Hz (\pm 5 %)						
Protection degree		IP20 / UL Type1			IP00 / UL Open ⁽³⁾			
Weight [kg (lbs.)]	Standard Type	4.9 (10.8)	6(13.2)	6(13.2)	12.5 (27.6)	13(28.7)	20(44.1)	20(44.1)
	Built-in DCL Type	-	-	-	19.5 (42.9)	19.5 (42.9)	26.5 (58.3)	26.5 (58.3)

380 ~ 480V Class (37~90kW / 50~125HP)

Model Number (SVxxxIP5A-4)		370	450	550	750	900	
Capacity [kVA] ⁽¹⁾		59.8	72.5	87.6	121.1	145.8	
Output ratings	Fan or pump load	motor rating ⁽²⁾ HP	50	60	75	100	125
		kW	37	45	55	75	90
		Current [A] (110% overload)	75	91	110	152	183
	110% 1 Minute (Normal Duty)						
	General load	motor rating ⁽²⁾ HP	40	50	60	75	100
		kW	30	37	45	55	75
		Current [A] (150% overload)	150% 1 Minute (Heavy Duty)				
	Frequency		0.01 ~ 120 Hz				
Voltage		380 ~ 480 V ⁽³⁾					
Input ratings	Voltage	3 ϕ 380 ~ 480 V (-15% ~ +10 %)					
	Frequency	50/60 Hz (\pm 5 %)					
Protection degree		IP00 / UL Open ⁽³⁾					
Weight [kg (lbs.)]	Standard Type	27(59.5)	27(59.5)	29(64)	42(92.6)	43(94.8)	
	Built-in DCL Type	39(86)	40(88.2)	42(92.6)	67(147.4)	68(149.9)	

Certificate No: **E-13486**
 File No: **822.21**
 Job Id: **262.1-007585-2**

380 ~ 480V Class (110~450kW / 150~600HP)

Model Number (SVxxxIP5A-4)				1100	1320	1600	2200	2800	3150	3750	4500	
Capacity [kVA] ⁽¹⁾				178	210	259	344	436	488	582	699	
Output ratings	Fan or pump load	motor rating ⁽²⁾	HP	150	200	250	300	350	400	500	600	
			kW	110	132	160	220	280	315	375	450	
		Current [A] (110% overload)			223	264	325	432	547	613	731	877
	110% 1 Minute (Normal Duty)											
	General load	motor rating ⁽²⁾	HP	125	150	200	250	300	350	400	500	
			kW	90	110	132	160	220	280	315	375	
		Current [A] (150% overload)			183	223	264	325	432	547	613	731
	150% 1 Minute (Heavy Duty)											
	Frequency				0.01 ~ 120 Hz							
	Voltage				380 ~ 480 V ⁽³⁾							
Input ratings	Voltage			3 ϕ 380 ~ 480 V (-15% ~ +10 %)								
	Frequency			50/60 Hz (\pm 5 %)								
Protection degree				IP00 / UL Open ⁽⁴⁾								
DCL (DC Choke)				Built-in				External Option				
Weight [kg (lbs.)]				101	101	114	200	200	243	380	380	
				(222.7)	(222.7)	(251.3)	(441.9)	(441.9)	(535.7)	(837.7)	(837.7)	

- (1) Rated capacity ($\sqrt{3} \times V \times I$) is based on 220V for 200V class and 460V for 400V class.
 (2) Indicates the maximum applicable capacity when using a 4-Pole standard motor.
 (3) IP20 or UL Enclosed Type1 can be provided by the option.
 (4) IP20 or UL Enclosed Type1 is not provided.
 (5) Overload rating 120%, 1 min is based on ambient 25 .
 (6) Values applicable for 40 °C, to be modified for ships application at 45 °C. See under "Application / limitation".

Application/Limitation

Supply voltage range: 200 - 480 V, 50/60 Hz
 Voltage variation: - 15 %, + 10 %
 Frequency variation: \pm 5 %
 Output frequency: 0 - 120 Hz (1000Hz special software)
 Temperature range in operation: 0 - 40 °C (40 - 70 °C when derated 2,0%/°C)
 Temperature class: B
 Vibration class: A
 Humidity class: B
 EMC class*: DNV CN 2,4 / IEC 61800-3
 To be used on EMC class A locations

The SVIP5A must be regarded as a component. The actual installation shall be designed according to Manufacturer Users Manual and according to the applicable DNV Rules for the actual application. A type approval can not replace the requirement for a DNV product certificate for drives > 100 kW. Drawings

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for the actual application are to be submitted for approval in each case. To be installed in an enclosure with an IP degree in accordance with DNV Rules w.r.t. location.

*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.

GN

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.
End of GN.

For marine applications size of drive to be derated with respect to an ambient temperature of 40°C (2,0% per deg. C for ambient above 40°C) Choose rating < 80% load at 50 °C.

Type Approval documentation

Technical info:

"Chapter 1 Basic Information & Chapter 2 Specification", doc. no. P200901 SPEC, part of email dated 2009-03-12.

Test reports:

Appluss test reports nos. 5014883 & 5012017 dated 2005-04-26, and 06/32003457 dated 2006-05-05.
UL test report file E124949 dated 2004-01-31. Petioners test report no. 50008758-M1 dated 2005-02-28.
ENAC test report no. 06/32003071 dated 2006-04-03.
LS test report, undated).

Tests carried out

Visual inspection, Performance/heat run, Power supply failure, Power supply variations, Voltage/frequency variation, Vibration, Dry heat, Damp heat, Insulation resistance, High voltage.

EMC: The following tests are in accordance with the DNV CN2.4/ IEC 61800-3: Electrical fast transient (Burst), electrical slow transient (Surge), RF-common mode Voltage, radiated RF-electromagnetic fields, electric discharge (ESD), radiated and conducted emission. (See under application limitation).

Marking of product

SVIP5A – Type designation – Power – Voltage

Periodical assessment

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

The main elements of the periodical assessment are:

- Inspection on factory samples, selected at random from the production line (where practicable)
- Results from Production Sample Tests (PST) and Routines (RT) checked (if not available tests according to PST and 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 to be performed at least every second year.

END OF CERTIFICATE