



DET NORSKE VERITAS

TYPE APPROVAL CERTIFICATE

CERTIFICATE NO. E-10114
This Certificate consists of 5 pages


This is to certify that the
Frequency Converter
with type designation(s)
SV-IP5A

Manufactured by
LS Industrial Systems Co. Ltd Cheonan Factory
CHUNGNAM, 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

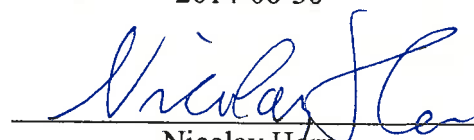

Application
Frequency Converter for Asynchronous Motors SV-IP5A 78 series. Range: 5.5 kW to
450 kW 200 - 480 VAC supply.

Place and date
Høvik, 2010-03-29
for DET NORSKE VERITAS AS


Marit Laumann
Head of Section

Local Office
DNV Reg. Office Maritime,
Seoul

This Certificate is valid until
2014-06-30


Nicolay Horn
Surveyor 

Notice: 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 proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.



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 File No.: 822.21
 Job Id: 262.1-007585

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- | | 8.8 | 12 | 16 | 22/24 | 28/30 | 34/39 | 44/45 | |



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| Model Number (SVxxxIP5A-4) | | 055 | 075 | 110 | 150 | 185 | 220 | 300 |
|-------------------------------|--------------------------------|-------------------------------------|---------|---------|-------------------------------|----------------|----------------|----------------|
| | in DCL Type (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 | | 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) |
| | Bulit-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) | |
| | Bulit-in DCL Type | 39(86) | 40(88.2) | 42(92.6) | 67(147.4) | 68(149.9) | |



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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 (222.7) | 101 (222.7) | 114 (251.3) | 200 (441.9) | 200 (441.9) | 243 (535.7) | 380 (837.7) | 380 (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 \square .

(6) Values applicable for 40 \square C, to be modified for ships application at 45 \square 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 \square C (40 - 70 \square C when derated 2,0%/ \square 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



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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 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).



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Marking of product

SVIP5A – Type designation – Power – Voltage

Certificate retention survey

The scope of the retention/renewal survey 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 survey 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.

Survey to be performed at least every second year.

END OF CERTIFICATE