



TYPE APPROVAL CERTIFICATE
No. ELE178216XG

This is to certify that the product below is found to be in compliance with the applicable requirement of the RINA type approval system.

| | |
|-----------------------------|---|
| <i>Description</i> | Electronic Ship Automation Equipment |
| <i>Type</i> | Digital Voltage Regulator: IREG |
| <i>Applicant</i> | LST GmbH, Lloyd Systemtechnik HASTEDTER OSTERDEICH 250 28207 BREMEN GERMANY |
| <i>Manufacturer</i> | LST GmbH, Lloyd Systemtechnik |
| <i>Place of manufacture</i> | HASTEDTER OSTERDEICH 250 28207 BREMEN GERMANY |
| <i>Reference standards</i> | Rules for the classification of ships.- Part C - Machinery, systems and fire protection. - Ch.3, Sect. 6, Table 1. |

Issued in **HAMBURG** on **December 5, 2016.** *This Certificate is valid until* **December 4, 2021**

RINA Services S.p.A.
Giuseppe Russo

This certificate consists of this page and 1 enclosure



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Digital Voltage Regulator: IREG

Product description:

The Digital Voltage Regulator IREG is attended for excitation and voltage control of synchronous machines. It also uses alternating and direct current exciters for static systems. The IREG consists of a touch display, 4 configurable IO Slots and is intended for mounting in a 19" rack.

| Functions: | No. | Note |
|--------------------------|-----|----------------------------|
| Voltage Control | 1 | Reg. accuracy $\leq 0.2\%$ |
| Current Control | 1 | |
| Reactive Power Control | 2 | IEEE 421.5 Typ II PI |
| Power Factor Control | 2 | IEEE 421.5 Typ II PI |
| Motor Soft Start | 1 | |
| Synchronizing | 1 | 3 phase, own CPU |
| Synchro Check | 1 | 3 phase, own CPU |
| Breaker Time Measurement | 1 | 10-1000ms |

| Limitations: | No. | Note |
|-----------------|-----|---------------------|
| Underexcitation | 1 | IEEE 421.5 Model II |
| U/f | 1 | |
| Overexcitation | 1 | |
| Stator Current | 1 | |
| Stator Voltage | 1 | |
| PSS | 1 | PSS2A/B PSS4B |

| Inputs and Outputs: | Boards | No. per board | No. max. | Specification | Note |
|------------------------------|--------|---------------|----------|---|---------------------------|
| Digital Inputs | DI_24 | 24 | up to 72 | 24-250V DC | 1kHz, Programmable |
| Digital Outputs | DO_24 | 24 | up to 72 | 250V DC, 8A | constantly Programmable |
| | DO_8R | 8 | up to 24 | 250V AC, 16A | |
| Potential Transformer Inputs | PTCT | 6 | | 100-400V AC, 5-400Hz | 16bit, 10kHz |
| Current Transformer Inputs | | 3 | | 1A or 5A, 5-400Hz | 16bit, 10kHz |
| Analog In-/Outputs | ABRD | 8 | up to 24 | +5V, +-10V, 0-5V, 0-10V, 1-5V, 2-5V, +-20mA, 0-20mA, 4-20mA | 16bit, 1kHz, Programmable |
| CAN-A CAN-B CAN-C | | 3 | | CAN Bus | |
| Sync. Breaker On | | 2 | | 250VDC, 8A constantly | 1x Sync, 1x Check |
| Sync. Digital Inputs | | 8 | | 24VDC | 4x Sync, 4x Check |
| CONFIG | | 1 | | TCP/IP | 100MBit, TMOS Protocol |
| USB | | 1 | | USB 2.0 | |
| FIELDBUS | | 1 | | PROFIBUS, MODBUS TCP | Optional |

Technical data:

Designation: IREG V2.0
Power Supply: 24V DC
Display Size / Resolution: 5", 800x480pixel

Firmware Version: 002.001.xxx
Input Current: 1200mA
Degree of protection: IP20

Documents:

- IREG_Specification dated 21.11.2016; Technical Specification IREG v1.5 EN

Test Reports:

LST Lloyd Systemtechnik: - IREG Functional Test PP_IREG_161104 dated 04.11.2016
TREG Labor für Umweltsimulation: - 201-16 Issue 2 dated 27-Oct-16

Remarks:

- The products fulfill EC-Code: EC31. ^{SN}

HAMBURG December 5, 2016



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