

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Monitoring System**with type designation(s)
G6100 Water Monitoring System

Issued to

Green Instruments A/S
Brønderslev, Nordjylland, Denmarkis found to comply with
DNV GL rules for classification – Ships, offshore units, and high speed and light craft**Application :****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.****Location classes:**

Temperature	A
Humidity	B
Vibration	A
EMC	A
Enclosure	IP54

Issued at **Høvik** on **2018-12-20**for **DNV GL**This Certificate is valid until **2020-12-31**.DNV GL local station: **Aalborg**Approval Engineer: **Ingrid Hagen Johansen**

Jan Tore Grimsrud
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.



Job Id: **262.1-017769-3**
 Certificate No: **TAA0000178**
 Revision No: **1**

Product description

The G6100 Water Monitoring System is a continuous in situ water monitoring system. As a standard configuration the system monitors PAH, turbidity, pH and temperature.

A system can consist of or be configured with extra measuring modules for G6110 PAH, G6120 Turbidity and G6130 pH/Temperature. An optional sampling system (not covered by this TA certificate) can be necessary depending on the location of the Water Monitoring System (WM).

The G6100 Water Monitoring System communicates typically with an Exhaust Gas Cleaning System (not covered by this Type Approval Certificate) on a fixed communication protocol (ref. document "Main Cabinet, Installation manual", document no. 02481).

Water Monitoring System (WM)			
Cabinet WM: Eldon, MAS Enclosure: IP66			
Controller and I/O: WAGO/ 750-xxx series. Current DNV TAC TAA0000194 & 11-631-10HH Controller application SW: XXXXX.V.3.0.0			
Display: EXOR UniOP e TOP 500 series. Current DNV TAC TAA00000AS HMI application SW: XXXXX.V.3.0.0			
Power supply: Mean Well/ SDR-120-24.			
Sensor module	G6110 PAH	G6120 Turbidity	G6130 pH and temperature
Brand/Type	TriOS/ enviroFlu-HC	- ABB/ 4690 series - ABB/ ATS430 series	MJK/ pHix Compact
Measuring technique	UV Fluorescence	Nephelometry	Glass electrode
Range	0-800 µg/l PAH _{phe} Configurable	0-400 NTU/FNU Configurable	0 – 14 pH units
Accuracy	+/- 5 % of range	+/- 3 % of FS	+/- 2 % of FS Fully temperature compensated

Table 1: G6100 Water Monitoring System (WM).

Place of manufacture

Green Instruments A/S
 Erhvervsparken 29
 9700 Brønderslev
 Denmark

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Application/Limitation

The G6100 Water Monitoring System is generally in compliance with the requirements of Resolution MEPC.259(68) - 2015 Guidelines for exhaust gas cleaning adopted on 15. May 2015, Chapter 10 "Washwater".

The G6100 Water Monitoring System meets the following requirements:

- Principle of detection for PAHphseq. (MEPC.259(68), 10.1.3.3)
- Turbidity influences on PAHphseq. (MEPC.259(68), 10.2.3)
- Principle of detection for pH (MEPC.259(68), 10.2.2)
- Resolution for pH (MEPC.259(68), 10.2.2)
- Temperature compensation for pH (MEPC.259(68), 10.2.2)
- Principle of detection for Turbidity (MEPC.259(68), 10.2.5)

In order to completely fulfil the requirements of MEPC.259(68) for "washwater monitoring" additional equipment (e.g. data recording) will have to be installed.

DNV-GL shall be notified in writing whenever the G6100 Water Monitoring System is installed in a DNV GL classed vessel. A reference to this Type Approval Certificate shall be included.

This Type Approval Certificate covers hardware and software as listed under Product Description.

Correct configuration and set up for each delivery to be tested during commissioning after installation.

The system cabinets shall be mounted on vibration dampers according to the manufacturers instruction.

Installation to be made in accordance with maker's specifications. The maximum allowable sample line distance to be observed (ref. document "Main Cabinet, Installation manual", document no. 02481).

Type Approval documentation

No	Document Name	Doc. no	Rev. no	Date
1	Environmental test report	4P06867	-	2014-12-03
2	Environmental Specifications - G61 TA application	C2	v.1.1	
3	Binder, G61 Electrical Drawings <ul style="list-style-type: none"> • PLC & power, 8 pages • Cabinet, arrangement layout, 1 page • Terminal matrix, 7 pages 	ED	v.2.1	Oct. 2014
4	Test Plan – G6100 Water Monitoring System	TP	v.2.2	Dec. 2014
5	Environmental Tests & Standards for G61 TA	ETS	v.1.0	
6	Wash Water Monitoring manual G6100		v.2.1	Nov. 2014
7	Type approval test of Wash Water Monitoring System	4P06867		2014-12-03
8	Overview of changes for G6100 Water Monitoring System		V.1.0	21 Feb. 2017
9	Overview of changes for G6100 Water Monitoring System		V.2.0	Oct. 2018
10	Water monitoring, Operation manual	02480	V.3.2	July 2018
11	Water monitoring, Installation manual	02481	V.2.7	Sep. 2018
12	Main Cabinet, Installation layout	06735	C	
13	Main Cabinet, Component overview	06763	B	
14	Main Cabinet, Detailed P&ID	06925	A	
15	Electrical Documentation for Water Monitoring System	02313_02475_03548_ED	H	
16	WMXXSoftwareVersionerLog			
17	Environmental test report	P17-0003		2017-12-15
18	Environmental test report	P18-0071		2018-11-06
19	Additional Performance Test Plan – G6100 Water Monitoring System	TP	V.1.2	Nov. 2018

Document no. 9-19 included during renewal 2018.

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Tests carried out

Applicable tests according to Standard for Certification No. 2.4, April 2006.

Performance tests according to "Test Plan, G6100 Water Monitoring System, performance tests", Version 2.2 – December 2014.

Performance tests according to "Additional Performance Test Plan, G6100 Water Monitoring System", Version 1.2 - November 2018.

Marking of product

G6100 Water Monitoring System

Periodical assessment

The scope of the periodical assessment is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software versions, components and/or materials.

The main elements of the assessment are:

- Ensure that type approved documentation is available
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications
- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do not affect the type approval given
- Ensuring traceability between manufacturer's product type marking and the type approval certificate

Periodical assessment is to be performed at least every second year and at renewal of this certificate.

END OF CERTIFICATE