

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Gas Detector**

with type designation(s)

Flexsight™ LS2000 Line-of-Sight Infrared Gas Detector / Model HC800 (Autronica)

Issued to

**Detector Electronics Corp.
Minneapolis MN, United States**

is 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.**

Temperature	D (see page 2)
Humidity	B
Vibration	A/B
EMC	B
Enclosure	C / IP66 / IP67

This Certificate is valid until **2021-09-25**.Issued at **Hamburg** on **2016-09-26**DNV GL local station: **New York**Approval Engineer: **Andrea Grün**for **DNV GL**

Duy Nam Le
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: **262.1-016845-3**
Certificate No: **TAA000002M**
Revision No: **1**

Product description

The Model LS2000 / HC800 is a line of sight infrared gas detection system that provides continuous monitoring of combustible hydrocarbon gas concentrations in the range of 0 to 5 LFL-meters, over a distance of 5 to 120 meters. Standard system output includes an isolated 4-20 mA signal supporting HART communication protocol and an RS-485 output supporting MODBUS protocol and optional LON communication.

The Model LS2000 / HC800 is able to detect Methane, Propane and Butane gases.

The system consists of two stainless steel modules – a transmitter and a receiver, along with mounting and alignment bracket. The receiver provides the measurement signal outputs and is furnished with on board "status indication" LEDs and an internal magnetic calibration switch. The transmitter houses a xenon flash lamp and "status indication" LEDs. Both modules are powered from an external 24 VDC supply and are equipped with microprocessor controlled heated optics to increase resistance to moisture and ice.

Application/Limitation

The Type Approval covers hardware listed under Product description. In each case the hardware is used in application to be classed by DNVGL, documentation for the actual application is to be submitted for approval by the manufacturer of the application system. Reference to this certificate is to be made through the equipment list covering the application system in question.

Ex-certification is not covered by this certificate. Application in hazardous area to be approved in each case according to the Rules and Ex-Certification/ Special Condition for Safe Use listed in valid Ex-certificate issued by a notified/recognized Certification Body.

Rated ambient temperature range (°C):

Operating	-50°C to +75°C (for Ex db eb Version)
	-55°C to +75°C (for Ex db Version)
	-55°C to +75°C (-55°C to +65°C for Relay version)
Storage:	-55°C to +85°C

Type Approval documentation

- Vibration Test for LS2000 by Environ Laboratories: 51255-1 dated 2014-12-15
- EMC Report - LS2000 Line of Sight Gas Detector by Northwest: EMC DETE0014 dated 2015-04-30
- Det-Tronics Official Project Record Model LS2000 and Autronica Model HC800 Gas Performance Certification: CDOC 3607 Revision B dated 2015-02-04
- Dry Heat Test for LS2000 51935-1 dated 2015-05-01
- Damp Heat Test for LS2000: 51935-2 dated 2015-05-01
- Damp Heat Test for LS2000: 54251-1 dated 2016-07-14
- Cold Temperature Test for LS2000: 51935-3 dated 2015-05-05
- Cold Temperature Test for LS2000: 54251-2 dated 2016-07-14
- Salt Mist Test for LS2000: 51935-4 dated 2015-06-02
- IECEx Test Report by UL LLC (including IEC 60079-29-4 Ed. 1): US/UL/ExTR15.0043/00 dated 2015-07-22
- Det-Tronics Official Project Record Model LS2000 and Autronica Model HC800-Maritime Environm. and EMC- DNV Standard No.2.4: DEC 3901-01 (DNV PP097538) Revision B
- Test Report by UL International Demko A/S including LON board, covering EN60079-0,-1,-7,-11 DK/ULD/ExTR09.0002/04: (4786319697) dated 2014-06-10
- Test Report by UL LLC,USA including LON board, covering EN50271:2010: 13CA21793 dated 2014-02-21
- IECEx Test Report: ExTR Reference Number US/UL/ExTR15.0043/03 Reference Number: 4787176868 dated 2016-08-30

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- Model LS2000 Line of Sight Infrared Detector, Autronica Model HC800 (Project scope and test plan): F30057-007 dated 12/10/2013-12-18
- Drawing 012386-001: Revision B
- Det-Tronics Model Matrix: 011252-001 Revision C
- Instructions FlexSight™ LS2000 Line-of-Sight Infrared Hydrocarbon Gas Detector 95-8714 Rev: 6/16

Tests carried out

Applicable tests according to:

- Class Guideline DNVGL-CG-0339, November 2015.
- IEC 60079-0 Ed.6
- IEC 60079-29-4: Ed.1 – Explosive atmospheres- Part 29-4: Gas detectors- Performance requirements of open path detectors for flammable gases.

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 2.5 year and at renewal of this certificate.

END OF CERTIFICATE