K-GAUGE HLA 600

KONGSBERG

INDEPENDENT HIGH LEVEL AND OVERFILL ALARM SYSTEM

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The K-Gauge HLA 600 system is designed to monitor level and overfilling in all types of cargo tanks. The system is based on Kongsberg's experience in producing high quality instrumentation to the tanker market and well proven technology of the K-Chief 600 Alarm and Monitoring system. The system meets the overflow control requirements set out in IMO "International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk" (IBC Code), and classification societies rules for chemical, oil products and gas carriers.

Introduction

When the IMO IBC code and classregulations require a cargo to have a closed gauging system, the cargo's containment system must also include a high level and overfill alarm.

High level alarm (HLA) systems are required for preventing overfill during cargo loading. An independent system is applied, with dedicated level sensing devices to monitor the level, and alarm centrals that provide signals for audible and visual alarms to operator in control room and on deck, and to stop cargo flow to the tank to prevent tank overflow.

All tankers shall install an independent HLA system, but the requirements differ depending on type of cargo transported:

- For crude and product oil tankers, a dedicated level switch operating at a level representing typically 98% volume (overfill alarm) are connected to its dedicated controller unit. The high level alarm (typically 95%) may be combined with the level gauge and the level gauging system.
- For chemical tankers, a dedicated level switch operating at both 95% and 98% volume (high level / overfill alarm) shall be connected to dedicated controller units separated from the level gauging system.

The IMO International Code for the Construction and Equipment of Ships Carrying Liquified Gases in Bulk (IGC Code) regulates the requirements for HLA systems onboard gas carriers:

- For gas carriers, a dedicated level switch operating at a level representing typically 98% volume (overfill alarm) are connected to its dedicated controller unit. The high level alarm (typically 95%) may be combined with the level gauge and the level gauging system.

The requirement for dedicated high level and overflow alarm is typically met by dual type sensors giving two independent alarm signals, connected to two independent systems.

The K-Gauge HLA 600 system is type approved by all major clssification societies.

SYSTEM FEATURES

The K-Gauge HLA 600 system comes with independent touch-screen controlpanels, with mimic display for easy operation. Each tank in the mimic is shown with a dedicated indicator for display of sensor and alarm status.

The K-Gauge HLA 600 system is modular and can be configured with up to 48 dual sensors. All level signals have suitable time delays to avoid premature alarms caused by surface motions of the cargo.

The system configuration include two power supply units that are provided for connection to main and emergency power sources. In addition IS-barriers for connection to sensors in hazardous area and input modules are ready installed in a suitable sized cabinet. The controlpanels are typically installed in cabinet door, but may be distributed to a console or similar.

The system also provides potential-free contacts for audible and visible alarms.

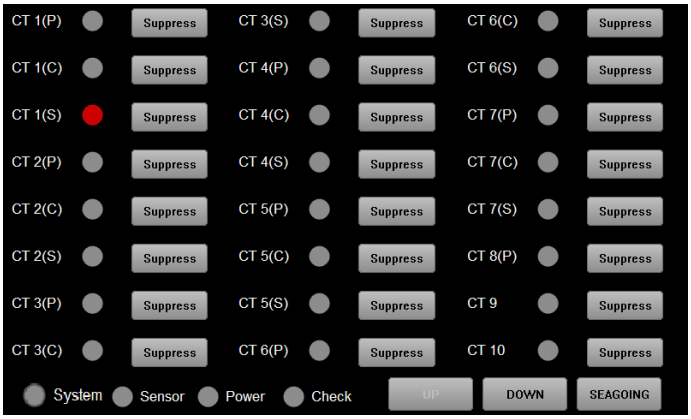


Figure 1. HLA / OFA mimic

Optional features

The system can interface K-Gauge Cargo Level System and K-Chief Automation System on processing network, and be operated from the PC-based operator station. Alternatively potential free or relay contacts for individual high level and overfill alarms can be available for other systems, e.g. for ESD trip.

The equipment can be delivered mounted in standard KM cabinet or for mounting in console.

Alarm devices

A tank overflow alarm must be audible and visible in that part of the deck where the containment systems are located and at the point where cargo loading is controlled on the tankship. The K-Gauge HLA 600 usually comes with flash lights and horn for installation in deck area.

Signal blocking

To avoid unnecessary alarms caused by the cargo motions during seagoing, it is possible to disable ('suppress') the alarm signal from level sensor. The mimic display offers a common 'Seagoing' pushbutton that blocks all level switches. In addition, each level switch can be blocked by using dedicated 'Supress' button. When activated, the tank status indicator will turn blue to indicate status as blocked to eliminate the risk that operator forget to unblock the signals before next transfer operation begins.

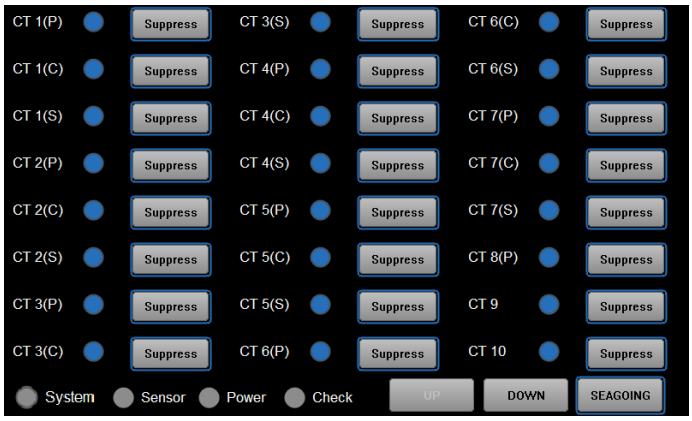


Figure 2. Mimic with seagoing enabled

SENSOR

Level sensors, which trigger at a specific level, provide one output signal per sensor. Depending on ship type and configuration, the system has one or two sensors per tank.

The preferred sensor used in the system is the Kongsberg GL-7B level switch. This sensor uses a capacitive measuring principle for detecting level. This measuring principle has been used by Kongsberg on this application since 1979 and is a well proved and often preferred method for level detection on-board ships.

As the sensors have no moving parts it is robust and can withstand all types of washing machines in cargo tanks. It is tailor made to suit any tank heights and can be used on most type of cargos, including LPG and ethylene, without any need for adjustment.

GL-7B is ATEX and IECEx approved as intrinsically safe equipment, and when installed in explosive area shall be connected to barrier in safe area.

Testing

The K-Chief HLA 600 system with the GL-7B independent level sensors have self-monitoring features and will give alarm notification if any failures in the system or sensor occurs. A dedicated indicator in the mimic panel will display status in case of any faults in the power supply, system or sensors.

The GL-7B level sensors alarm trip can also be manually tested by means of a small permanent magnet applied to the outside of the connection box.

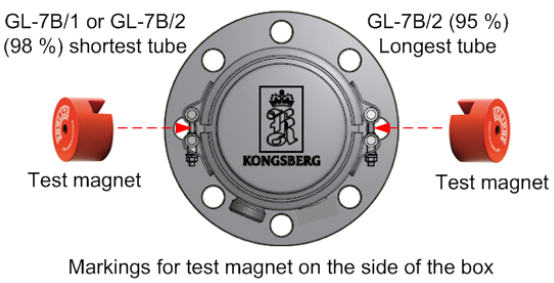
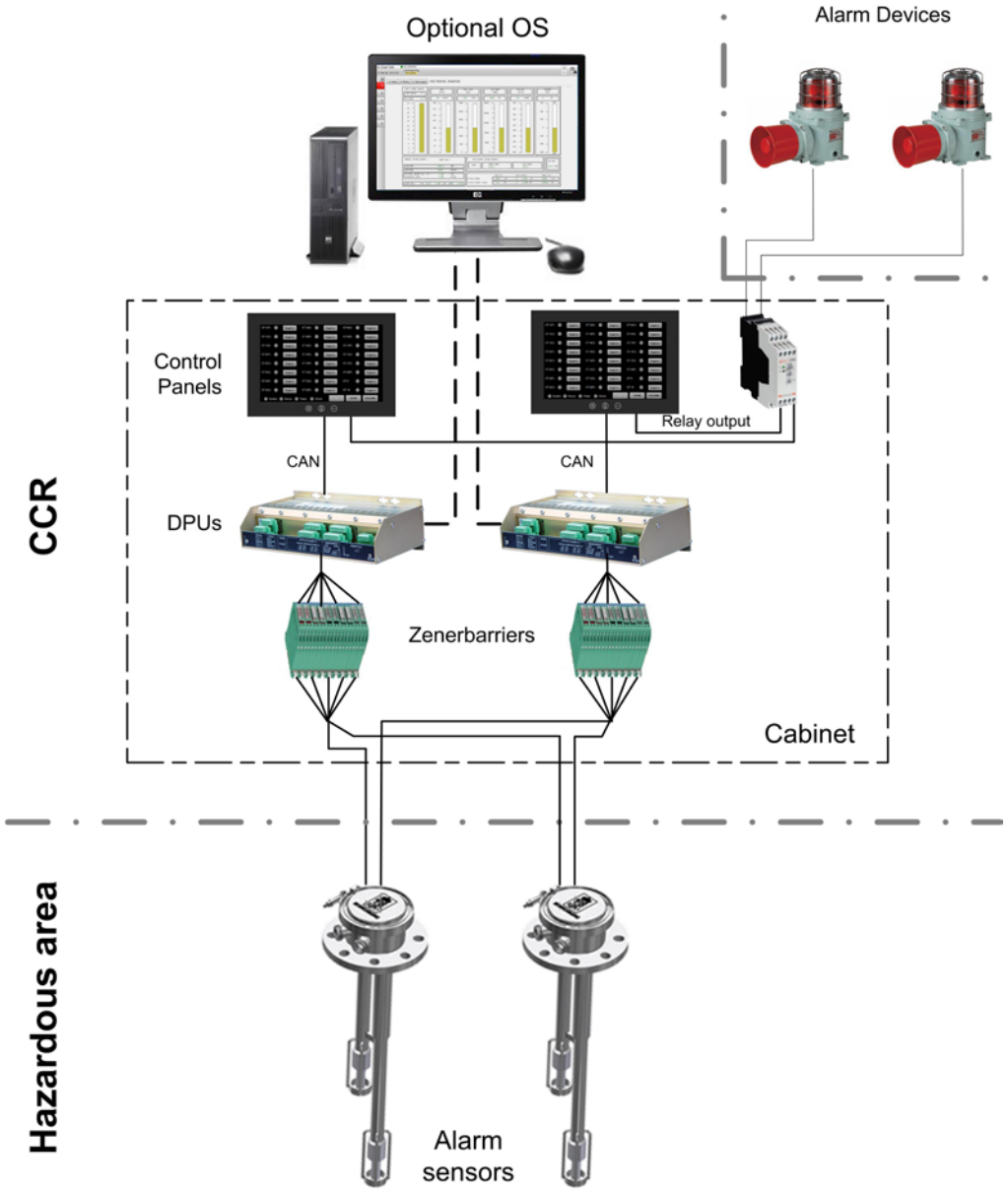


Figure 3. Test of sensor with magnet

SYSTEM CONFIGURATION



RULES AND REGULATIONS

Extract from DNV Rules for Ships, January 2011

For oil tankers Part 5, Ch. 3, Sec. 9:
D. Cargo tank overflow protection
D 100 General

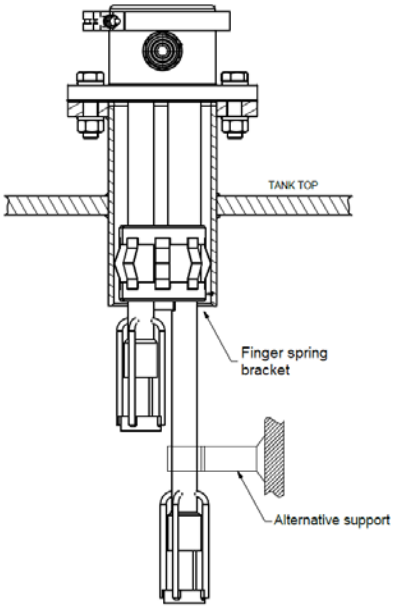
- 101 Provision shall be made to guard against liquid rising in the venting system to a height which will exceed the design head of cargo tanks. This shall be accomplished by high level alarms or overflow control systems or other equivalent means, together with gauging devices and cargo tank filling procedures. High level alarms shall be independent of the closed level measuring system. *Combined level measuring system and high level alarm systems may be accepted as equivalent to independent systems provided extensive self-monitoring is incorporated in the system covering all credible faults.*

For chemical vessels Part 5, Ch. 4, Sec. 13:
B 200 Overflow control

- 201 Arrangements as described below shall be provided according to the IBC Code Ch.17 column o (references to 15.19.6 corresponds to f1, references to 15.19 corresponds to f2).
- 202 Type f1. The cargo tank shall be fitted with a visual and audible high level alarm. This shall be able to be function tested from the outside of the tank and is also to be independent of the level *gauging device required in 102 and the high-high level alarm required in 203.*
- 203 Type f2. In addition to the high level alarm as described in 202, a high-high level alarm shall be fitted. The high-high level alarm shall be independent of the high level alarm and the level gauging device.

FEATURES

- Consist of well-known units from K-Chief 600 Alarm and monitoring system
- Individual suppress or common seagoing mode providing suppression of alarm during voyage
- Kongsberg intrinsically safe capacitive high level switch GL-7B
- The GL-7B is a replacement of the well proven GL-7A delivered since 1979
- Individual testing of sensor by the means of a small permanent magnet placed on the outside of the connection box



TECHNICAL SPECIFICATIONS

GL-7B Level Switch

Supply voltage:	10 to 28 VDC
Output signal:	4 to 20 mA Normal = 8mA / Alarm > 12mA
Weight:	Depend on sensor length (i.e. 10 kg for double 1 m sensor)
Material:	Acid resistant steel AISI316 PTFE or PEEK sensor element
Accuracy:	+/- 1.0 cm
Operating ambient temp.:	-45 to 85 °C (T4) / 70 °C (T5)
Protection grade:	IP67 (housing) / IP68 (sensor)
Shock and vibration:	IACS E10
Type approvals:	DNV, ABS, BV, LR
ATEX certificate:	TÜV 13 ATEX 124272X
IECEx certificate:	IECEx TUN 13.0030X
EX classification	II 1 G Ex ia IIC T5...T4 Ga
Safety data:	U_i = 28 V, I_i = 150 mA, P_i = 0.85 W, C_i = 21.2 nF, L_i = negligile

DZ-110 Transmitter Barrier

Supply voltage:	18 to 35 VDC
Current consumption:	Max. 55 mA
Accuracy:	< 0.0.5 % of FRO
Operation ambient temp.:	-20 °C to + 70 °C
Connection:	Terminal 2.5 mm^2
Protection grade:	IP 40
Weight:	0.1 kg
Dimensions:	79 x 25 x 73.5 mm
Mounting:	Snap-on (DIN rail)
Safety data:	U_o = 25.5 V, I_o = 122 mA, P_o = 0.78 W, C_o = 104 nF, L_o = 2.2 mH, L_o/R = 45.9 mH/ohm, U_m = 250 VAC

Operator Panel 8" AIPC

Supply voltage:	18 to 32 VDC
Power consumption:	Max. 25 W
Operation ambient temp.:	-15 °C to + 70 °C
Storage temp.:	-15 °C to + 70 °C
Maximum humidity:	96 % non-condensation
Weight:	1.8 kg
Dimensions:	Outline: 251 x 168 x 51 mm Cut-out: 321 x 152 mm
Mounting:	Flush mounted
Shock and vibration:	DNV Class B
EMC properties:	IACS E10, IEC 60945

I/O Module

Supply voltage:	18 to 32 VDC
Power consumption:	7.5 to 10 W
Operation ambient temp.:	-15 °C to + 70 °C
Storage temp.:	-15 °C to + 70 °C
Maximum humidity:	96 % non-condensation
Amount of I/O each unit:	Rai-16xe: 16 AI channels
Weight of unit:	2.0 kg
Dimensions:	391 x 150 x 90 mm
Mounting:	Screws, 4 pcs M5
Shock and vibration:	DNV Class B
EMC properties:	IACS E10, IEC 60945

Specifications subject to change without any further notice.

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