







LNG Bunkering Solutions

Leading the way in LNG Bunkering

KLAW LNG

Leading the way in LNG bunkering

The KLAW LNG safety system ensures integrity of the system and containment of LNG during an emergency.

This means you maintain control over the event and its potential consequences.

Reducing risk in LNG bunkering management

KLAW LNG bunkering systems are designed to fulfil a range of safety and efficiency requirements depending on the particular operational circumstances and objectives.

Typical variables: frequency of transfers, environmental conditions, transfer rates and risk reduction requirements.

Designed for the demands of commercial operations

Operational footprint is a major consideration when commissioning a system. The space available for the transfer and safety system and the operational time and resources required to both operate, maintain and test are all influencers on the design and manufacture of a commercially efficient system.

Delivering commercial advantage

Innovation based on proven technology

KLAW LNG leads the way in safe LNG bunkering transfer technology. KLAW LNG bunkering systems currently deliver reliable and efficient operations around the world.

Examples include a 3” system operating in Singapore, a 4” Ship-to-Ship bunkering system operated by Gasnor in Norway and a 6” Ship-to-Ship bunkering barge operated by Engie in Belgium.

The Engie Zeebrugge 2017 project is the first of its kind with a 5100m3 LBV capacity. This ambitious and commercially astute project is a joint venture between Engie, NYK, Mitsubishi and Fluxys.

The project presented particular technical challenges which were resolved using both the operational experience and engineering ability available at KLAW.

Image courtesy of Engie

Design and testing

KLAW LNG possesses full cryogenic and pressure test in-house facilities at two UK Technology Centres.

Computer aided design, stress and flow analysis software ensure robust design solutions are delivered on time and within budget.

Third party verification is available and is encouraged by KLAW LNG from all Class Societies.

Bunkering standards

All direct and indirect standards are integrated within KLAW LNG design, manufacture and aftersales services.

These include: ISO 20519 and IGF Code.

SIL1 and SIL2 systems are also available when required.

Truck Bunkering system – TBS

Typical applications

- Small scale infrequent LNG bunkering fuelling.
- Up to 150³/hr.

Function

- Passive safety transfer system – responds to an emergency with instantaneous shut-down and separation of the transfer line in the event of undue strain on the transfer line.

Features

- Bunkering vessel from on-shore Truck or ISO Container.
- Facility requiring mobile solution with zero footprint.
- Small scale and infrequent LNG bunkering fuelling.

Advantages

Cost-effective and convenient solution.

Specification

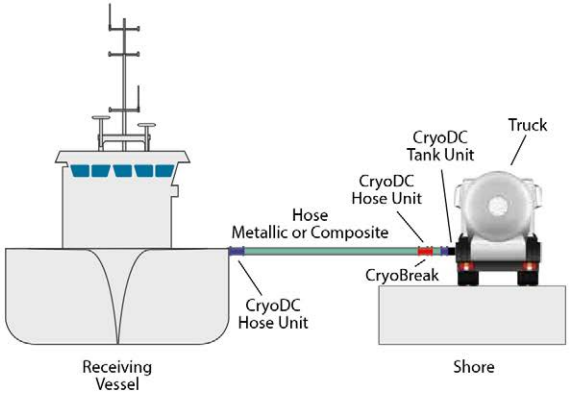
Sizes: 2 to 6”.

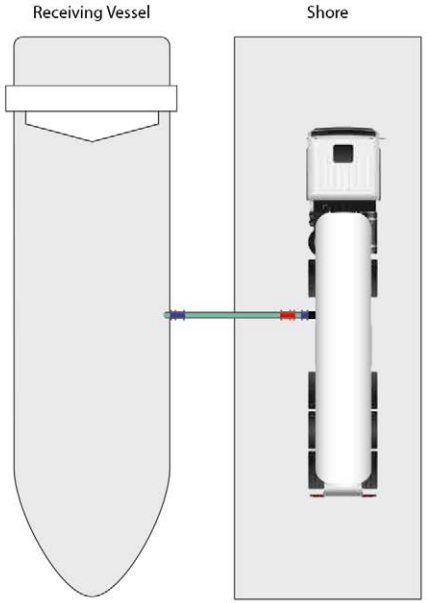
CryoDC - Cryogenic Dry Break Coupling and tank unit – connection at each end of the transfer system.

CryoBreak – Cryogenic Breakaway Coupling.

Hose – Metallic or Composite.

Shore-to-Ship





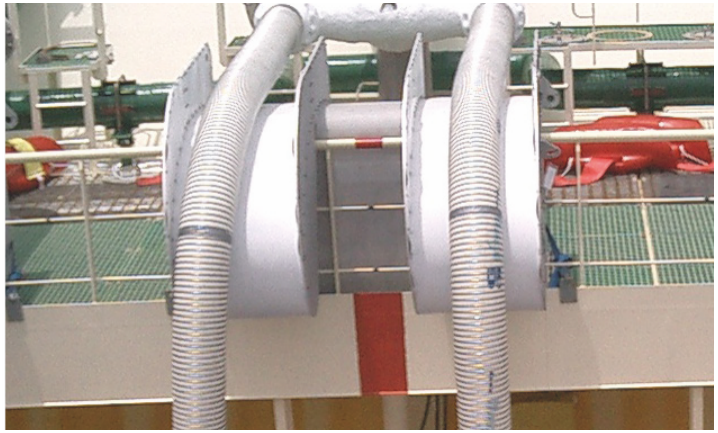
Key:

- CryoBreak Breakaway Coupling
- CryoDC Hose Unit
- CryoDC Dry Break Hose Tank Unit
- Metallic or Composite hose

TBS – Zero footprint systems for infrequent transfers

CryoDC Cryogenic Dry Break Coupling and tank unit – connection at each end of the transfer system.

Metallic hose option.



Composite hose option.(This example is shown with Saddles.)

CryoBreak Cryogenic Breakaway Coupling.

KLAW LNG TBS Bunkering System operating in Singapore.

Bunkering Hydraulic Power Unit Controlled - BHPU

Typical application

- Larger transfers not requiring full systems.
- Over 150³/hr.

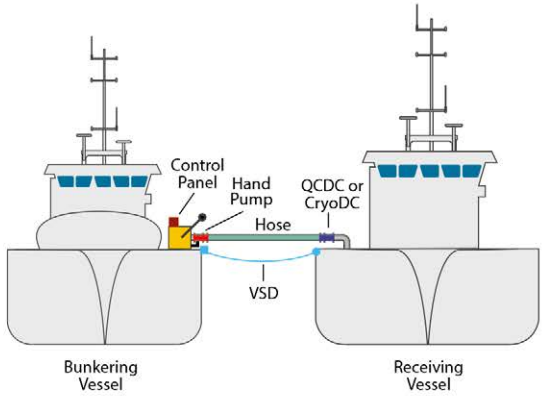
Function

- Automatic activation response without strain being placed on the hose string.

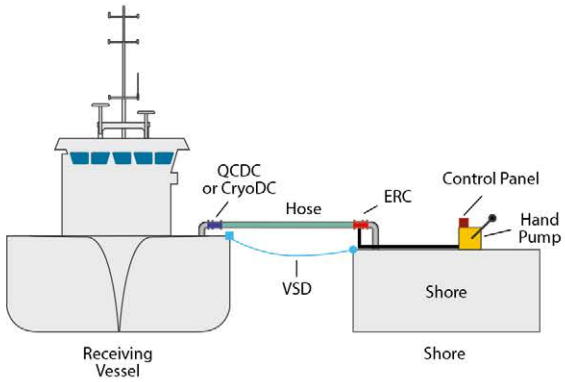
Advantages

- Small and compact system designed to deliver small footprint.
- Simple and efficient solution.
- Lower capital expenditure required compared to alternative systems.
- Portable and lightweight.
- Hand Pump Unit delivers an independent power source over the safety response system.

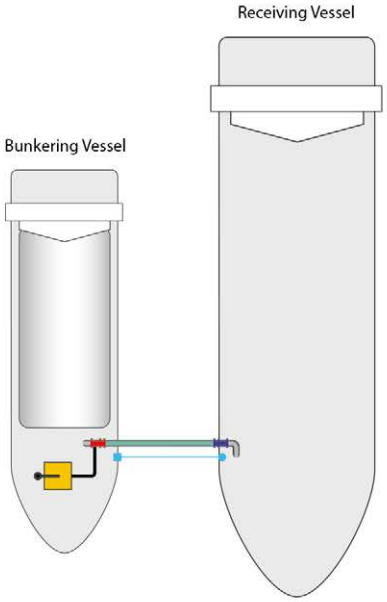
Ship-to-Ship



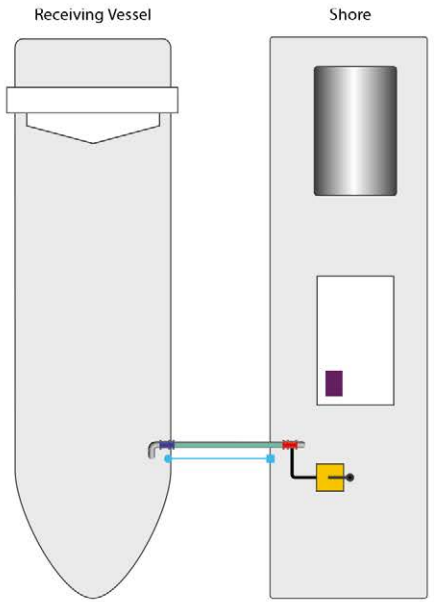
Shore-to-Ship



Ship-to-Ship



Shore-to-Ship



Key:

- Emergency Release Coupling
- CryoDC or QC/DC connection
- Hand Pump with independent power source
- Control Panel Manual Override
- Vessel Separation Detection (VSD)
- Hose

Specification

Sizes: 2 to 6”

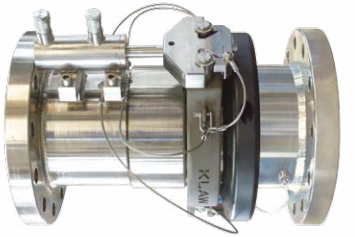
Hydraulic control over the Emergency Release Coupling using a Hand Pump that accumulates hydraulic power.

Vessel Separation Detection enables activation without placing strain on the hose string.

Can upgrade to include manual control over ESD1.

Saddles are also available as an option.

CryoDC

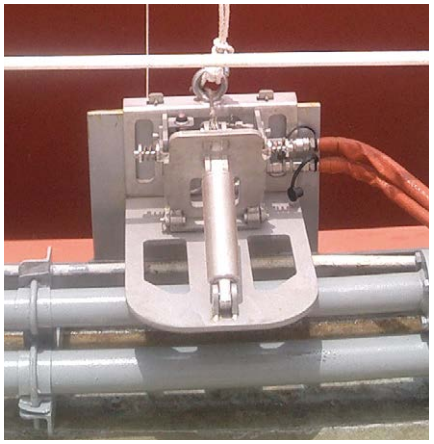


Emergency Release Coupling

Hand Pump

Metallic or Composite hose

Control Panel



Vessel Separation Detection

QC/DC

Saddle option also available

KLAW Houlder Orbital Bunkering System - KHOBRA

Typical application

- LNG Shore-to-Ship and Ship-to-Ship bunkering.
- Varying sizes of receiving vessels.
- Frequent bunkering.

Advantages

- Delivers the advantages of Loading Arms without the capital and maintenance expense of Loading Arms.
- More reliable than traditional Loading Arms – delivering lower downtimes.
- Designed without the need for stressed swivel joints as found on conventional Loading Arms.
- Minimal operating personnel are required.
- Easily aligned to different manifold arrangements.
- Monitors and compensates for vessel motions including limit detection system.
- More flexible than traditional Loading Arms by being able to easily bunker different sized vessels.
- Much smaller footprint than traditional Loading Arms.

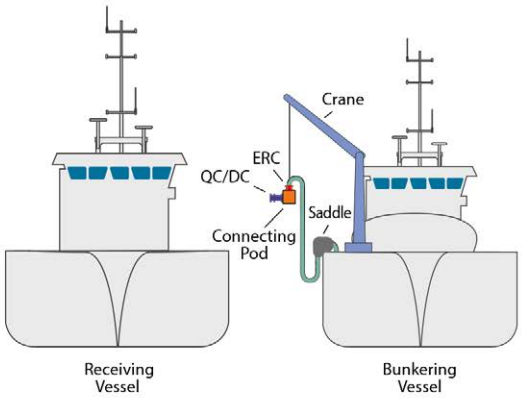
Specification

Sizes: 4” to 10”.

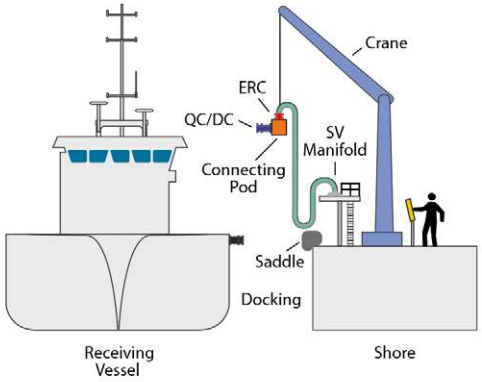
Function

KHOBRA is an integrated crane and hose transfer system which includes an Emergency Release System.

Ship-to-Ship



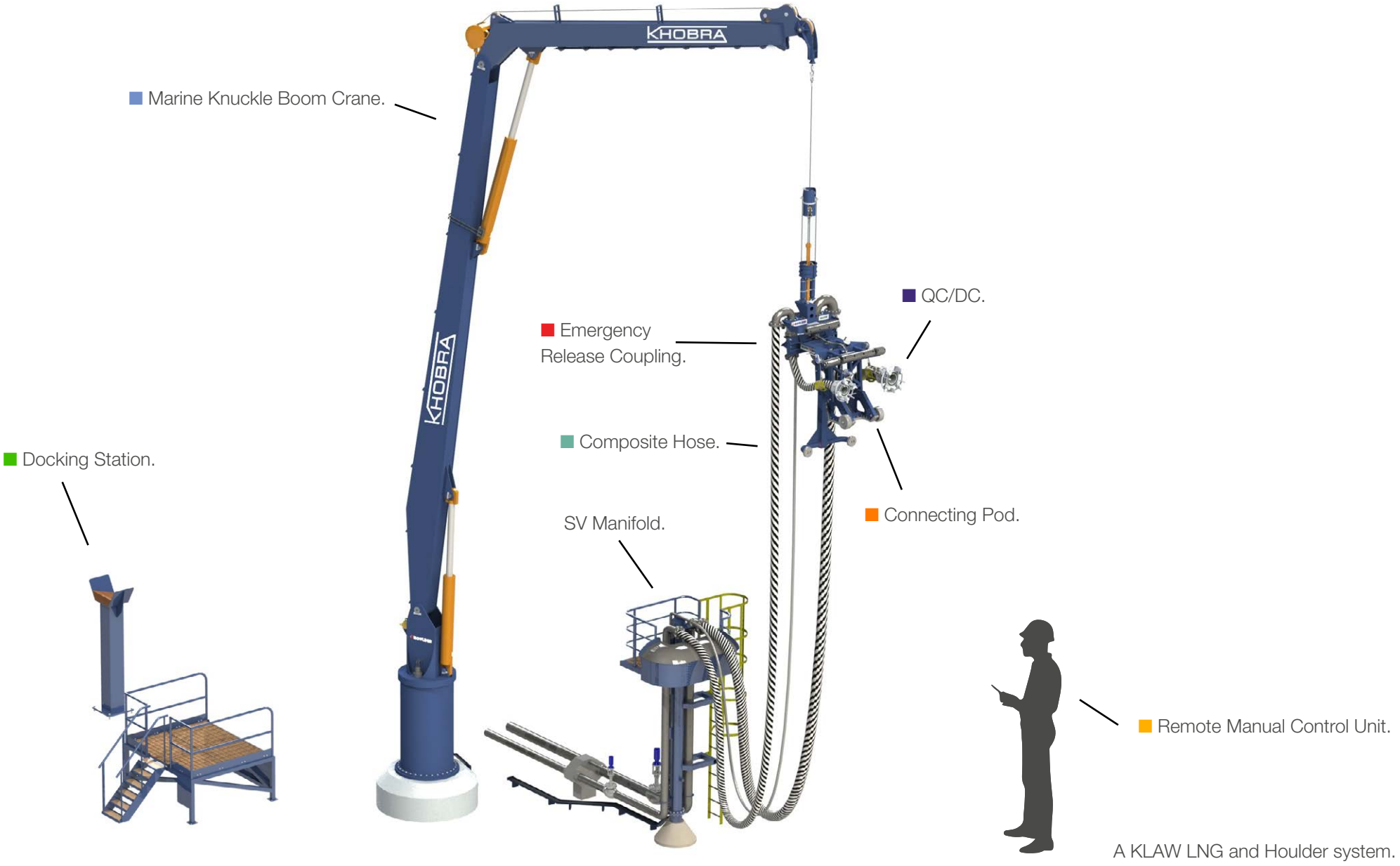
Shore-to-Ship



Key:

- Emergency Release Coupling
- Boom Crane
- Control Panel
- Composite Hose
- Connecting Pod
- QD/DC
- Vessel Connector
- Saddle

KHOBRA is SIL2 compliant



A KLAW LNG and Houlder system.

Frequent and Dynamic State Bunkering - FDSB

Typical applications

Frequent LNG bunkering transfers.

Convenience of a permanent system.

Shore-to-Ship or Ship-to-Ship bunkering.

Function

Delivering frequent transfers.

Advantages

Technology is based on that used for over 1000 Ship-to-Ship LNG transfers around the world (as at September 2016).

Provides complete control over ESD1 and ESD2 procedures and events.

Much lower capital and operational costs compared to Loading Arms.

ESD integrated.

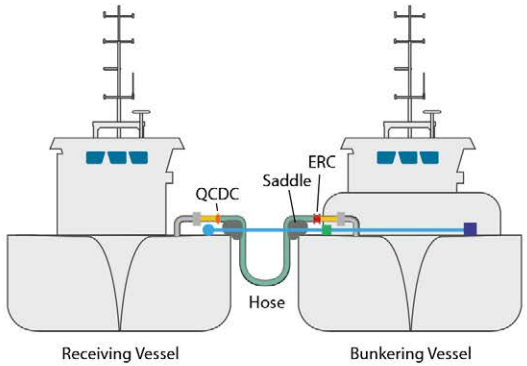
SIL2 compliant SILSIS PLC option.

Specification

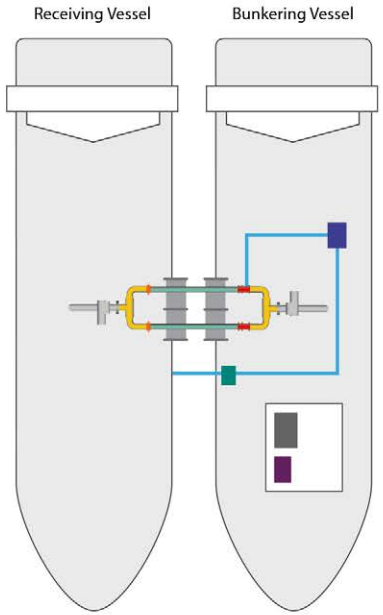
Sizes: 3” to 10”.

Available as SIL1 and SIL2 to IEC 61508 and IEC 61511.

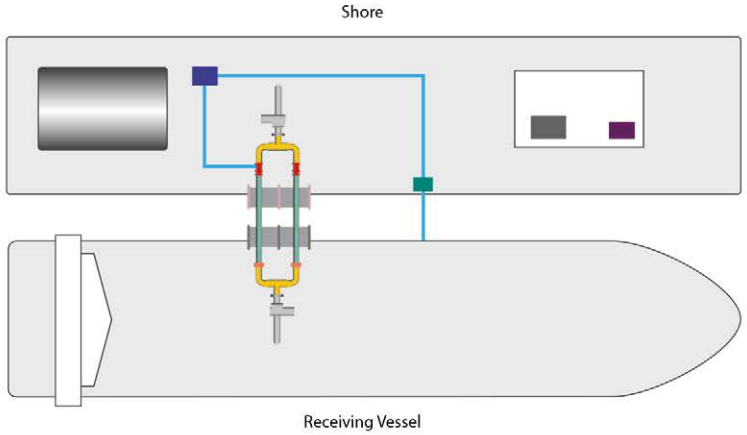
Ship-to-Ship



Ship-to-Ship



Shore-to-Ship

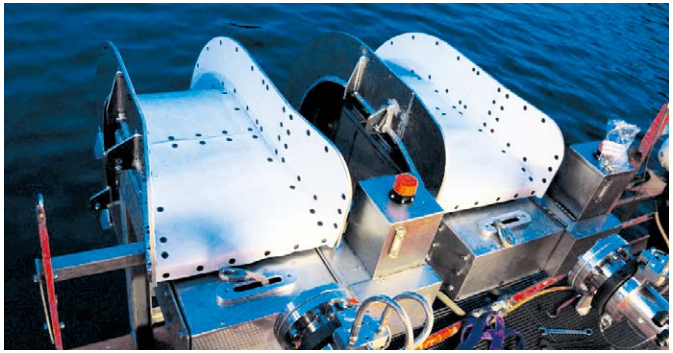


Key:

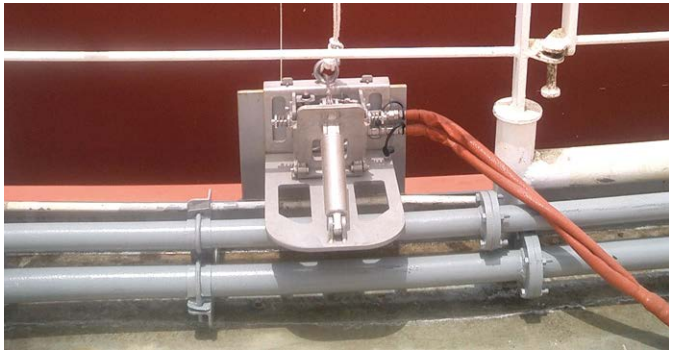
- Emergency Release Coupling
- Vessel Separation Detection (VSD)
- Control Panel
- QC/DC Isolating Flange
- ESD2
- Y-Piece Reducer
- Saddles and Fall Arrest
- HPU/PLC
- Hose

FDSB – Robust for frequent LNG Bunkering transfer

HPU

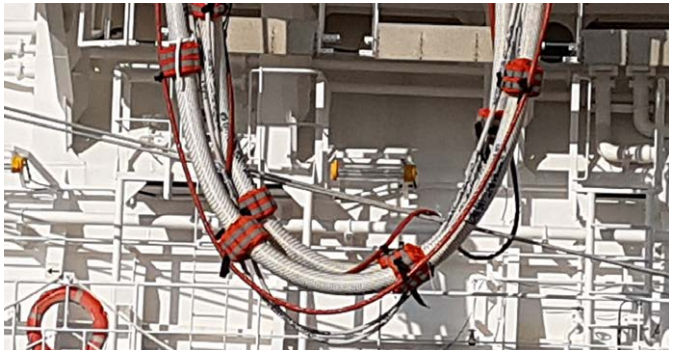


Hose Saddle and Fall Arrest System

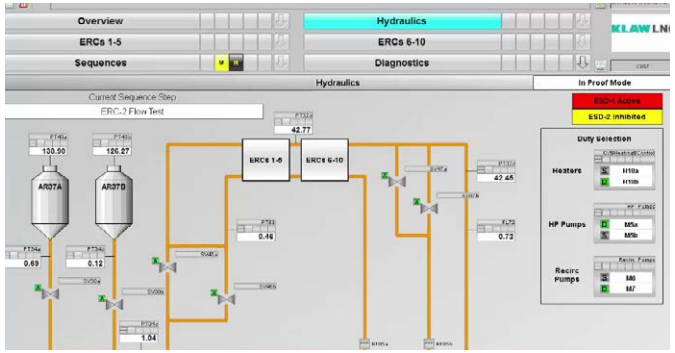


Vessel Separation Detection

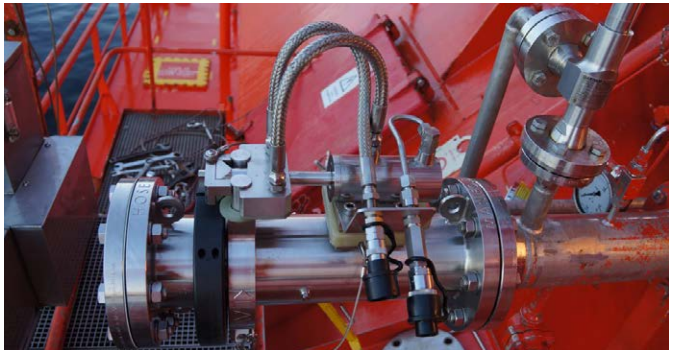
QC/DC Connector



Hose



SIL2 Compliant SILSIS PLC System



Emergency Release Coupling

Remote CCR Control Panel

Classes and Standards

All KLAW LNG Systems are Class Approved to the highest standards as expected for LNG transfer.

Complies with:
EN 1474-3
ISO18683
ISO20519
IGF Code

Conforms to:
OCIMF
ISO
SIGTTO
SGMF

Also available:
LNG Refuelling
LNG Road Tanker Loading
LNG Rail Car Loading
Ship-to-Ship Systems

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KLBE1708D

ISO 9001
BUREAU VERITAS
Certification

UKAS MANAGEMENT SYSTEMS
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