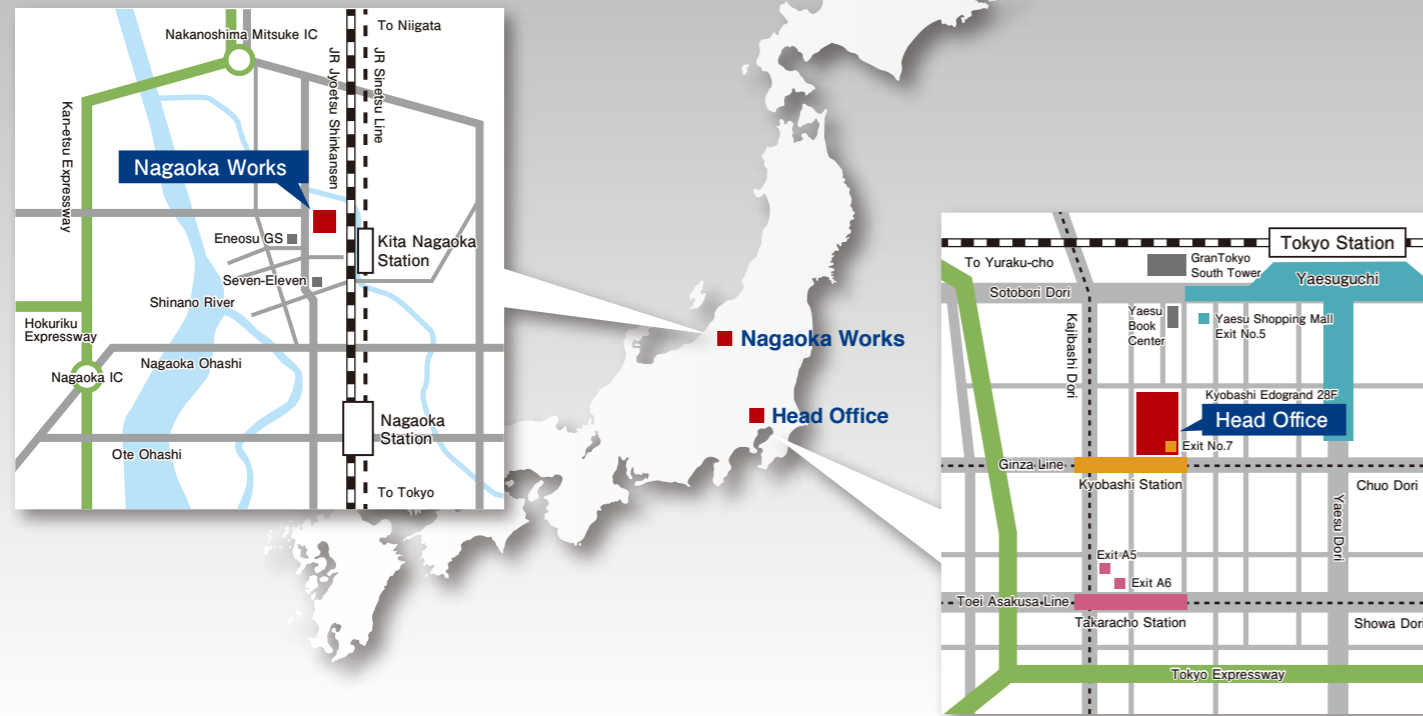
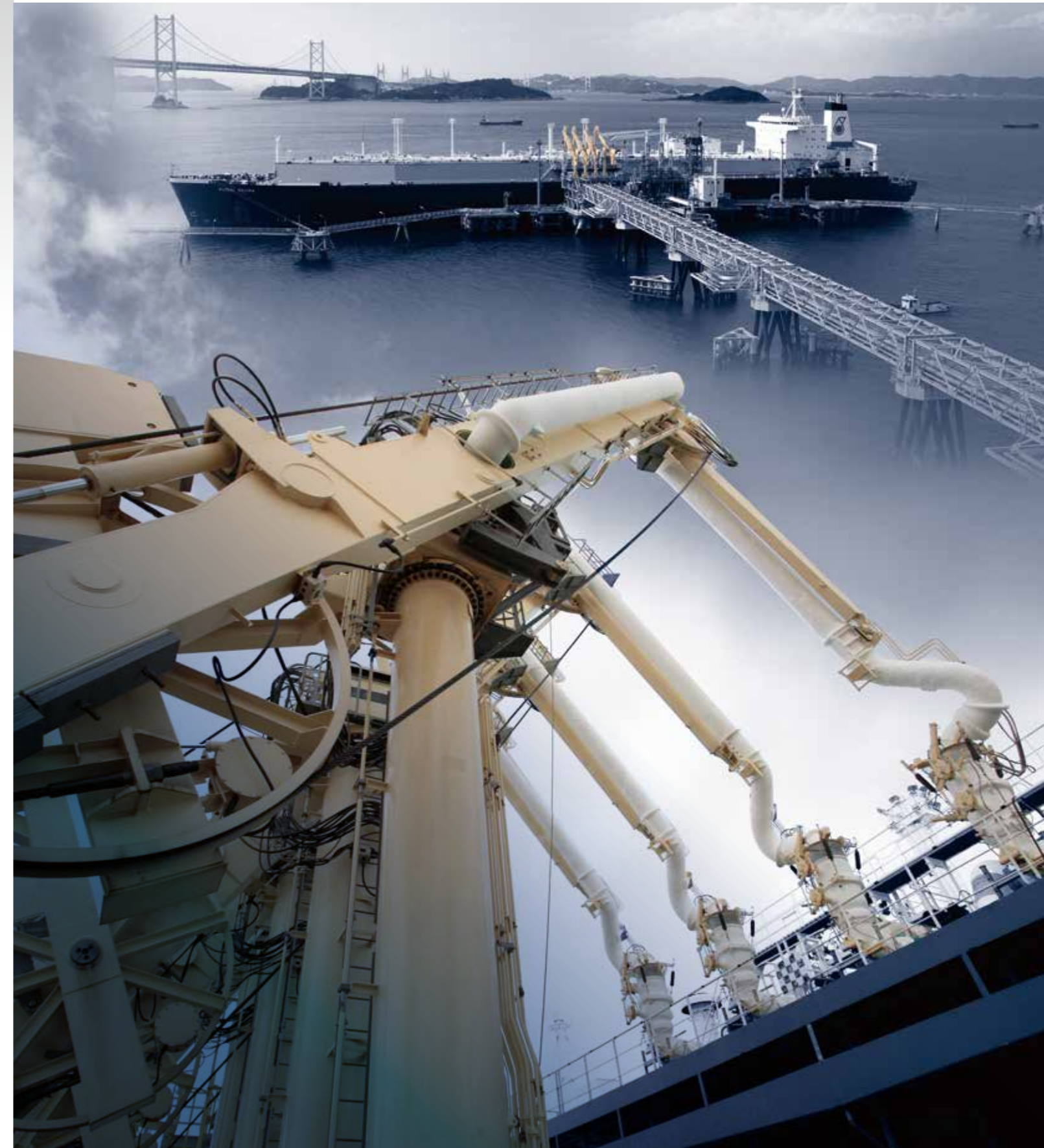


## Access



# NIIGATA

# MARINE LOADING ARMS



## **TB Global Technologies Ltd.**

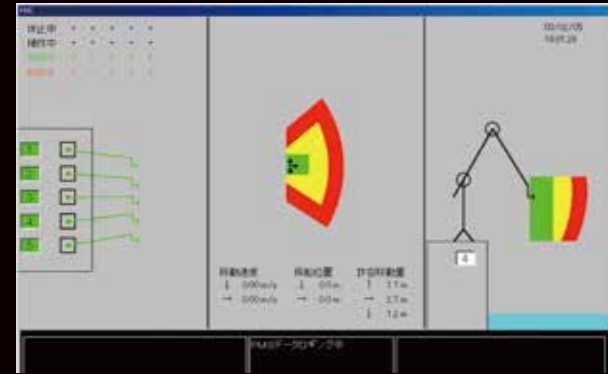
Notice : Tokyo Boeki Machinery Ltd. and Tokyo Boeki Engineering Ltd. merged on April 1, 2021 to become TB Global Technologies Ltd.

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# Niigata Marine Loading Arm will meet all requirements for Oil and Gas handling



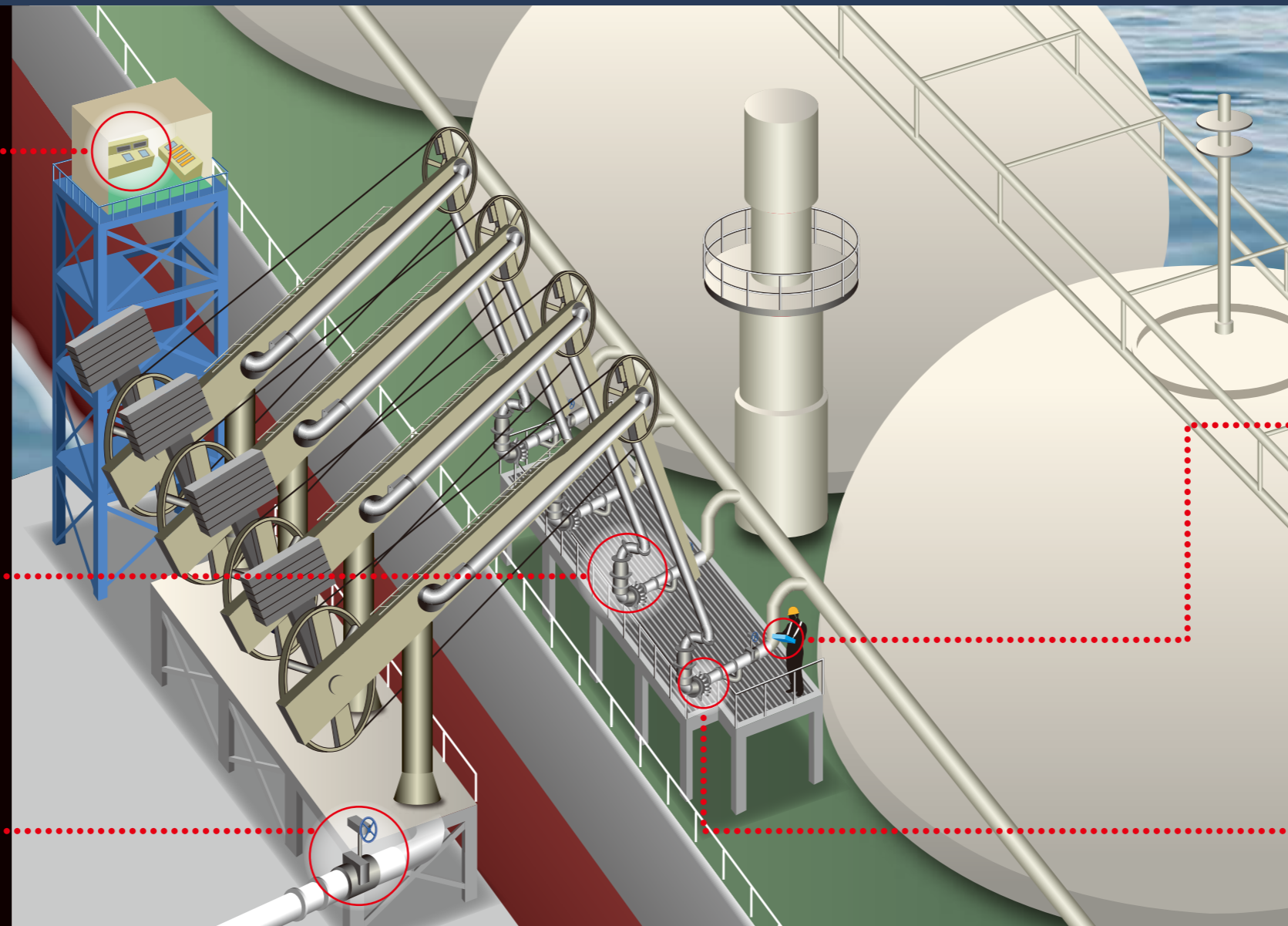
Position Monitoring System (PMS)



Emergency Release System (ERS)



Cryogenic Butterfly Valve



**TOTAL QUALITY...  
WE MAKE ALL OF  
THEM!**



Radio Control System



Hydraulic Quick Coupler (H-QCDC)

## About Us

Tokyo Boeki Engineering(TEN) has the world's No. 1 market share of marine loading arms which are vital to loading/unloading of fluids and gases.

TEN has been manufacturing loading arm systems since 1959 having half a century's experience and always fulfills the demand of our customers for both marine and truck arms of all kinds of products such as crude oil, LNG or chemicals in any environmental condition.

Our long field experience and high technical know-how assure satisfactory design, production, installation and after-sales service through a world wide network.

## Features

Marine loading arms are all metal liquid handling systems that enable safer, faster, more secure and economical loading operations in harsh conditions especially when compared

with rubber hose loading systems.

They are designed for several tanker sizes from barges to the largest crude tankers(100~500,000DWT) and installed successfully at many terminals around the world.

Niigata marine loading arms are equipped with dual ball-race Niigata swivel joints and specialized packing which permits safe loading operation without any product leakage.

Niigata marine loading arms with an appropriate combination of swivel joints (style 50-40-80) allow adequate freedom of movement to compensate for any motion of a vessel with operating range.

Swivel joints and packing can be tailored to the fluid type to give the best product transfer performance of any kind of fluids or gases. Fluid types includes, but not limited to crude oil or petroleum products, cryogenic products refrigerated LPG, ethylene or LNG(-162°C) elevated temperature products such as melted sulphur(120°C) or asphalt(180°C) and any kinds of chemical products.

## History

- |   |  |   |   |
|---|--|---|---|
| <p>1910</p> <p>1961</p> <p>1970</p> <p>1972</p> <p>1973</p> <p>1987</p> <p>1988</p> <p>1989</p> | <p>NIIGATA ENGINEERING CO., LTD. was founded under the name of Niigata Works as a maintenance shop of NOC (Nippon Oil Co., Ltd.) and separated from NOC to start as oil related machinery manufacturer.</p> <p>Started manufacturing Marine Loading Arms and Swivel Joints under the license from Chiksan Corporation (USA) and built Loading Arm factory in Nagaoka city, Niigata prefecture.</p> <p>Started manufacturing Butterfly Valve under the license from Chiksan Corporation (USA).</p> <p>Started manufacturing Drilling Equipment under the license from Armco Steel Corporation (USA).</p> <p>Supplied the world's largest 24" Loading Arm.</p> <p>Supplied the world's largest Loading Arm for LNG service to Woodside Energy (Australia).</p> <p>Successfully completed retrofit work on 16" LNG arms with ERS.</p> <p>NIIGATA original NT-DBV ERS with double ball valves was developed and supplied to Tokyo Gas Co.,Ltd.</p> | <p>2000</p> <p>2002</p> <p>2003</p> <p>2004</p> <p>2005</p> <p>2006</p> <p>2008</p> <p>2015</p> | <p>Cryogenic butterfly valves were developed and was supplied to Shinko Industry Co.,Ltd.</p> <p>Niigata original Hydraulic QCDC (H-QCDC) for cryogenic service was developed and put in the market.</p> <p>Niigata Loading Systems, LTD. was established on February 26.</p> <p>Announced the latest technology of the 5th generation loading arm for LNG service in Society of International Gas Tanker &amp; Terminal Operators Ltd.</p> <p>Delivered 4sets of DCMA type marine loading arm with NIIGATA original ERS(emergency release system) and H-QCDC(quick coupler with hydraulic operation).</p> <p>Acquired the Fire-Safe certificate for Cryogenic Butterfly Valve.</p> <p>Developped 16" ERS(emergency release system) with single cylinder for LNG service.</p> <p>NIIGATA LOADING SYSTEMS, LTD. changed its corporate name to TOKYO BOEKI ENGINEERING LTD.</p> |
|---|--|---|---|



# Basic Models of Loading Arm

## Basic structure of Arm

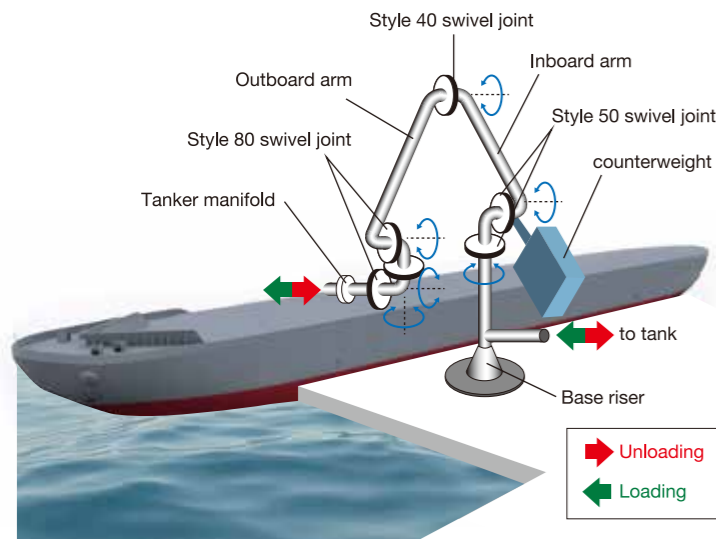
Marine loading arm consists of 3 different types of swivel joints(6 swivels)-Style 50,40 and 80.

The combination of these 3 types of swivel joints allows the arms to follow the movement of vessel in all planes smoothly and enables safe un/loading operation.

**Style 50 swivel joint**, located at the top of the riser, permits horizontal slewing and vertical movement of the arm assembly.

**Style 40 swivel joint**, connects inboard and outboard arms at the apex of the assembly and provides vertical rotation at the point of junction between in/outboard arms.

**Style 80 swivel joint**, the termination of the arm assembly, provides required flexibility in 3 planes where the arm connects to the barge or tanker manifold.



## FBMA

(Fully Balanced Marine Arm)

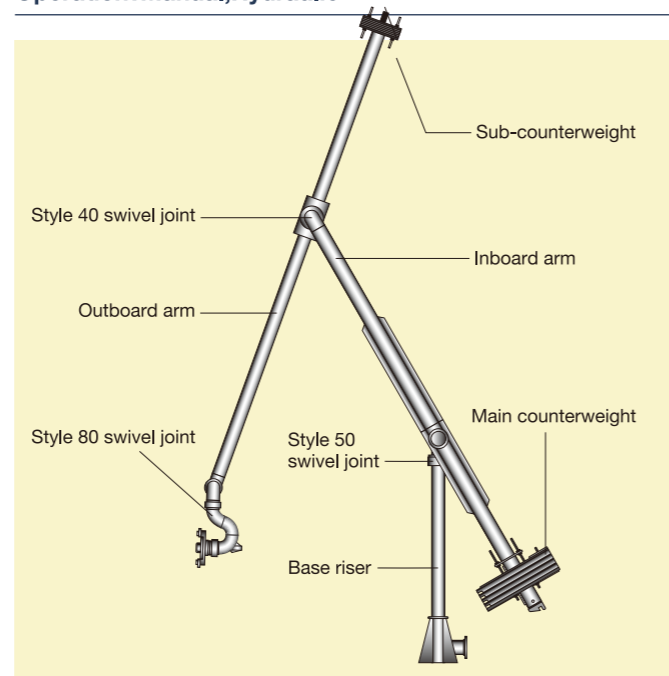
FBMA is the simplest and fully balanced loading arm having main counterweight and sub-counterweight. It can be operated with only a few operators (manual type), and provide easy maintenance as well as overhaul. Design of the FBMA is available in 80A~300A (connection size), up to 14.5m long(sum of the length of in/outboard arms) for different kinds of products. Hydraulic operation is also available.

Size (end connection): 3B(80A)~12B(300A)

Arm length: 8.5m~14.5m, up to 12.5m for 12B(300A)

Tanker size: 100~10,000DWT

Operation: Manual, Hydraulic



## RCMA/RCMA-T/RCMA-S

(Rotary Counterweighted Marine Arm /RCMA-Truss structure/RCMA-Suspended)

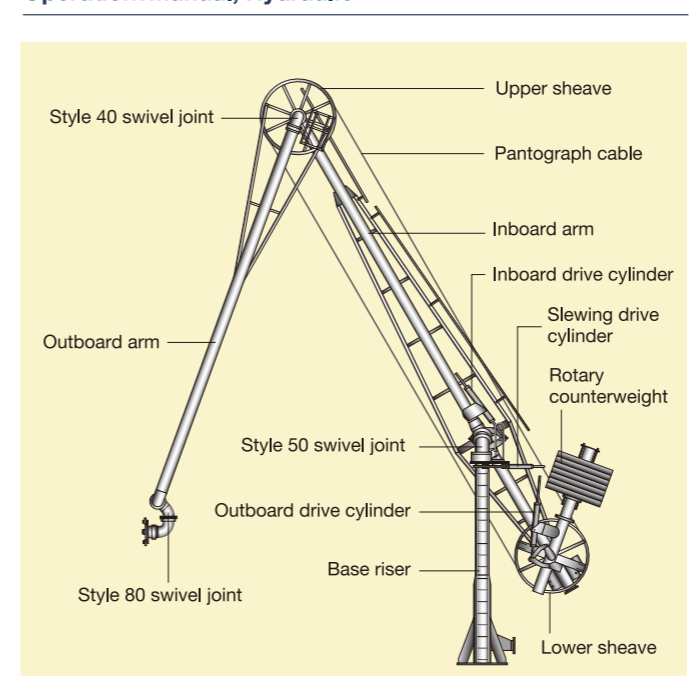
RCMA is fully balanced in all positions with the combination of rotary counterweight and pantograph structure which balances both inboard and outboard arms simultaneously. It is designed for smooth-operability and is used for larger diameter connection and also has wide working range. Both manual and hydraulic operation are available. Connecting size is from 200A~600A(end connection), and the length of arm is set from 12.5m up to 30m.

Size (end connection): 8B(200A)~24B(600A), up to 16B(400A) for RCMA-T

Arm length: 12.5m~30m

Tanker size: 3,000DWT~500,000DWT

Operation: Manual, Hydraulic



## DCMA/DCMA-S

(Double Counterweighted Marine Arm /DCMA-Suspended)

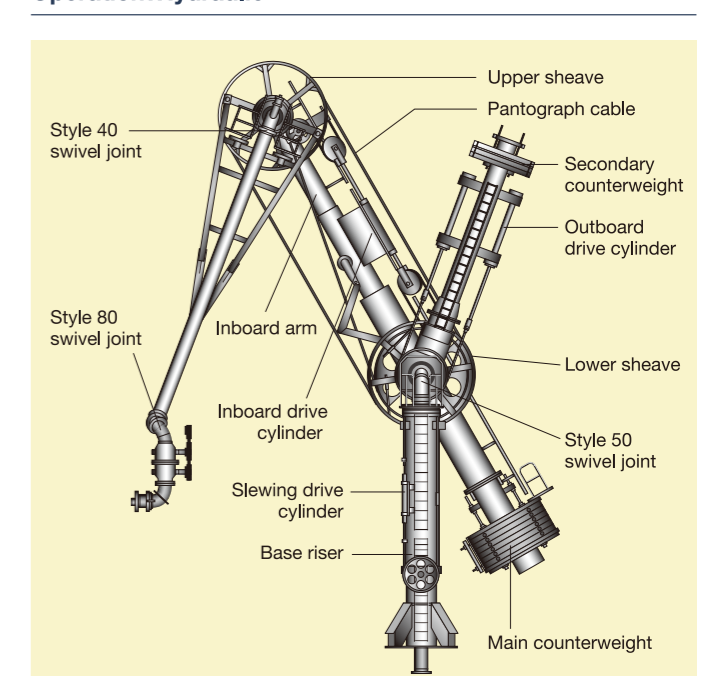
DCMA is fully balanced in all positions with independent counterweights and pantograph structure. Hydraulic operation is standard design and its end connection size is from 200A~600A. The arm length is from 12.5m~30m.

Size (end connection): 8B(200A)~24B(600A)

Arm length: 12.5m~30m

Tanker size: 3,000DWT~500,000DWT

Operation: Hydraulic



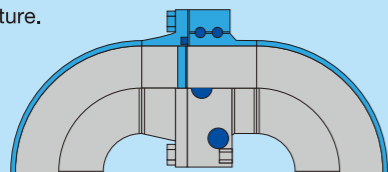
## Swivel joint

The swivel joint, the key part of loading arm, with several machined ball-races allows 360-degree rotation and movement in one, two or three planes and its performance and quality are highly evaluated by our customers since its development in 1920's.

Niigata swivel joint with dual(triple)ball-races allows dispartion of load and its heat-hardened ball race and replaceable stainless steel Snap-in-Race used in joints enable high-resistance of thrust, radial and moment load.

The materials of joint body and packing are appropriately chosen depending on the kinds of fluids handled, design pressure and temperature.

As the prevention of corrosion, the sealing part is stainless-overlaid.





# Marine Loading Arms for Cryogenic Service

Cryogenic loading arms have been using for un/loading of cryogenic products such as refrigerated ethylene(-104°C), LNG(-162°C) or liquid nitrogen(-196°C) since the first successful LNG loading to the Tanker "Metane Pioneer" in 1959.

Niigata cryogenic loading arms are available up to 500A and they include hydraulic operating system as standard equipment.

RCMA-S type loading arm, our main product, has a lot successful delivery and operation records in the world.

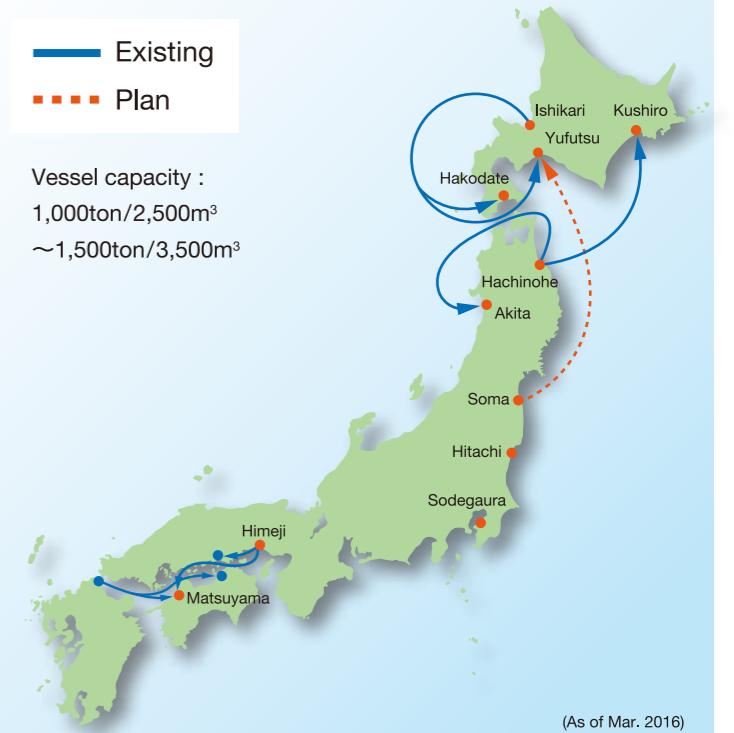
Both hydraulic and manual operation are available and we offer several optional equipment such as Emergency Release System(ERS), hydraulic coupler, radio controller, PMS alarming system and cartridge-type swivel joint to meet all needs of our customers.



## Route of Coastal Tanker Over Japan

— Existing  
- - - Plan

Vessel capacity :  
1,000ton/2,500m<sup>3</sup>  
~1,500ton/3,500m<sup>3</sup>



(As of Mar. 2016)

## Cryogenic swivel joint

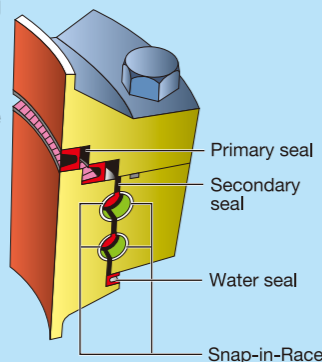
Liquefied gas such as ethylene, natural gas and nitrogen at very low temperature are easily handled through the dual seal Niigata swivel joints.

Dual PTFE seals are tandemly arrayed and this structure ensures high sealing performance.

Water seal which has same structure as packing is also used to prevent ball-bearing

from damaging due to water or dust from outside.

Low-temperature resistance stainless steel is used for the material of joint body.

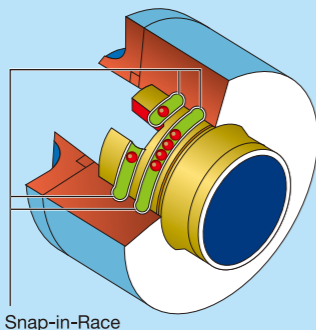


## Snap-in-Race

All swivel joints used in Niigata marine loading arms for cryogenic service employs Snap-in-Race which is replaceable ball-race.

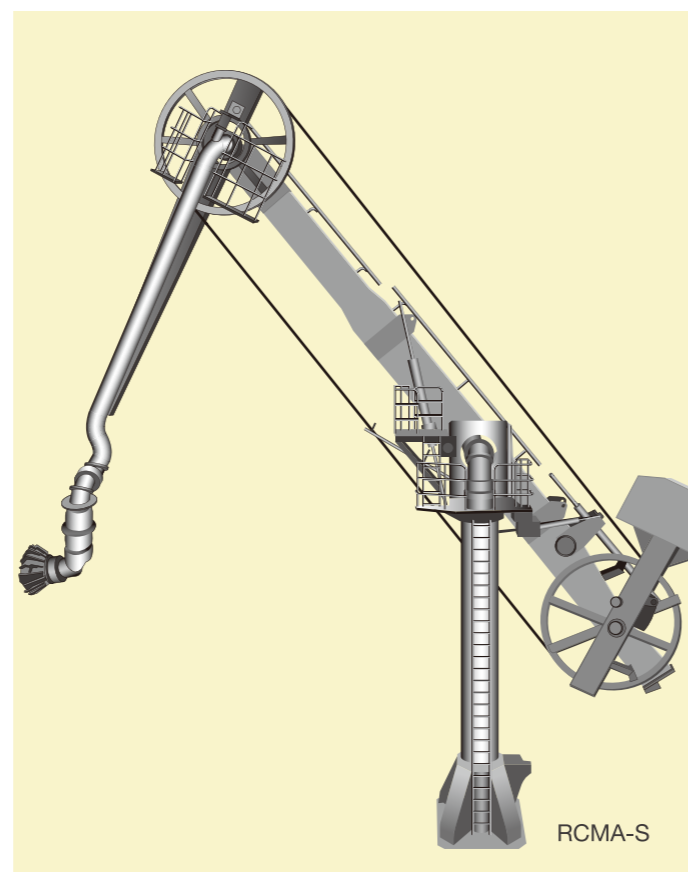
This specially hardened stainless steel ball-races withstand large load and ensure long-term usage.

They are used for not only cryogenic swivel joints but for joints at ambient and elevated temperature.



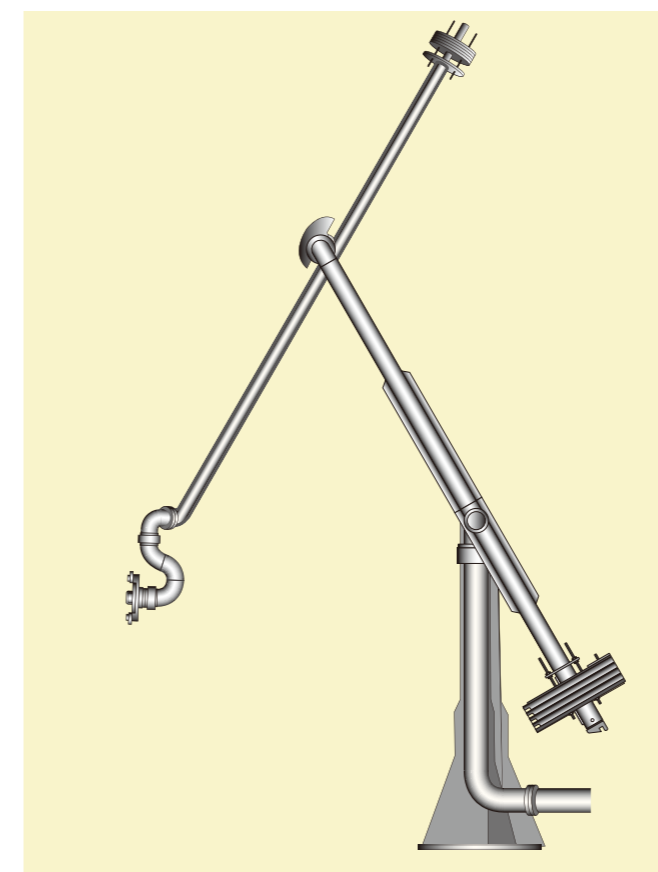
## RCMA-S/DCMA-S

For Export / Import Terminal (size : 16B~20B)



## FBMA

For Coastal Terminal (size : 6B~8B)



## LNG Related Products

Loading Arm for LNG Lorry



Cryogenic Butterfly Valve for LNG Service



Testing at cryogenic temperature at shop



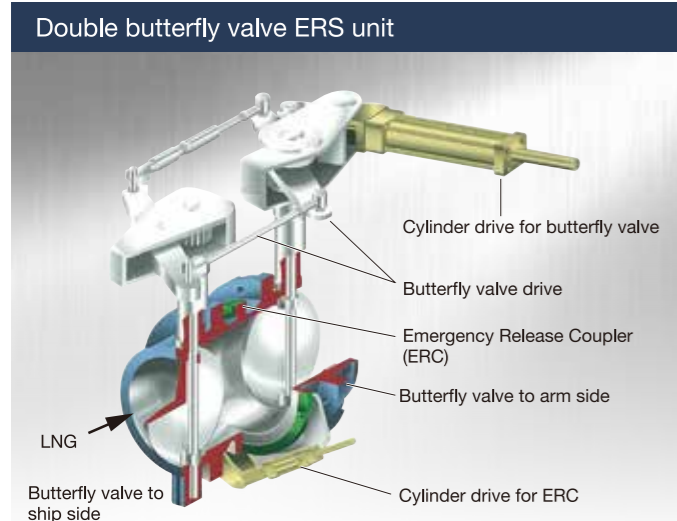
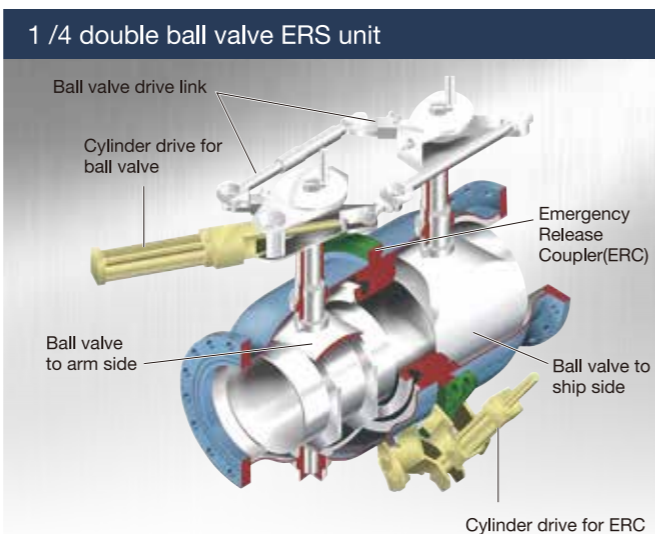
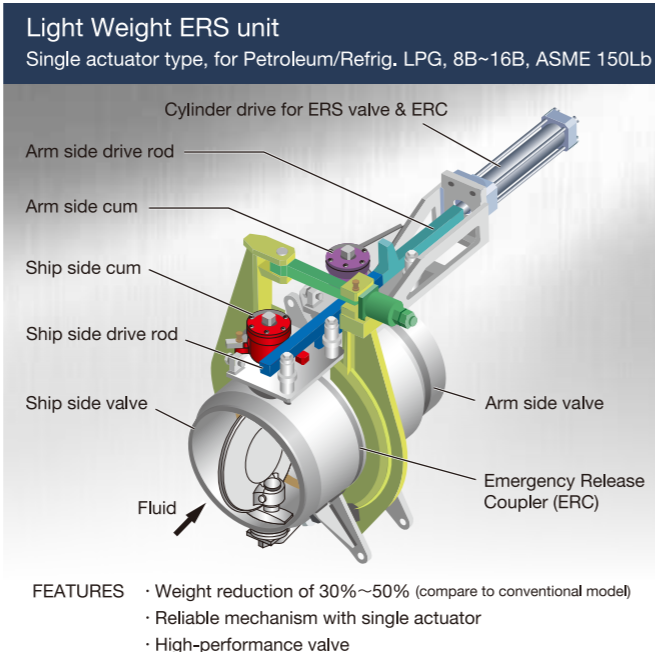
# Safety and Mobility ~ Satisfactory product lineup to meet every needs-1

## Emergency Release System (ERS)

Emergency Release System(ERS) is the system that disconnect the loading arm from the tanker manifold within several seconds with no leakage in any emergency circumstances such as sudden and rapid movement of vessels due to gust, earthquake and seismic surges.

This ERS system consists of the ERS unit installed integrally at style 80 swivel joint and the electrical/hydraulic equipment that control the ERS unit.

Tokyo Boeki Engineering has successful ERS delivery records. for different kinds of fluids and gases and since the first installation in 1982, all of the LNG loading arms supplied for LNG export/import in and outside Japan are equipped with this unit.



1/4 ball valve ERS unit

**1** Start separating



**2** Two valves shut completely



**3** ERC opens and finishing separation



## Position Monitoring System (PMS)

- (1) Position Monitoring System enables you to monitor the mooring location of the tanker connected with loading arms for safe un/loading operation.
- (2) By monitoring the mooring position of tanker or the drifting speed constantly, this system allows you to correct the tanker position instantly.



### 【System outline】

Based on the data from angle sensors installed on the loading arm, PMS main unit calculates the location of the outer flange of the arm, mooring position of the ship, drifting speed, or allowable working range, then in the emergency situation, it alarms for prevention of arm damages.

These data from PMS main unit are sent to the PMS monitor located in the jetty control room or central monitoring room in the safety area, and the arm position and the tanker information (location·speed·distance) are shown on the display.

### 【Installation advantage】

PMS monitor shows you the position of each loading arm (stored·maneuvering·loading) or arm attitude instantaneously. It also monitors the mooring position of the ship and drifting speed constantly and enables you to figure out the safety angles of each arms quantitatively.

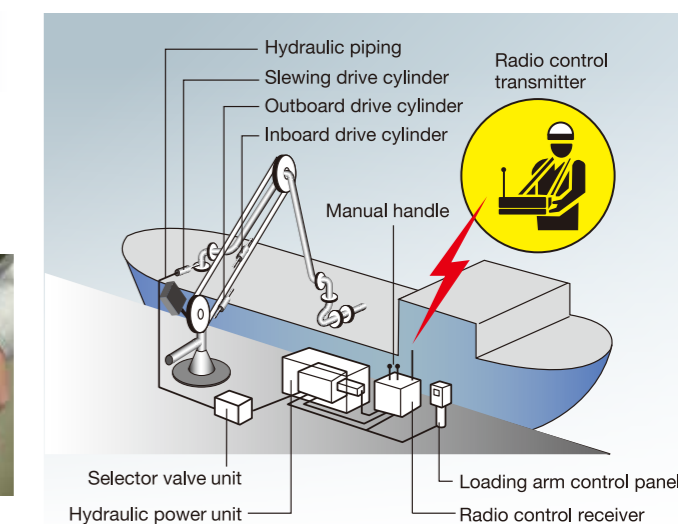
The different kinds of real-time data from the angle sensors and alarming system for emergency allows you to handle any contingencies in appropriate measures instantly.

## Radio Control System

Radio control system is developed for safe, assured and easy loading operation.

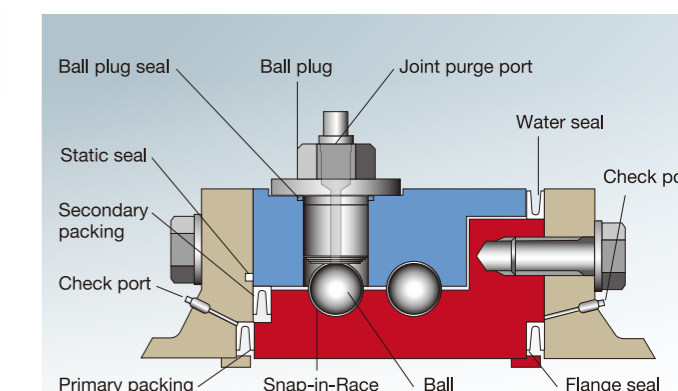
### 【Features】

- (1) This compact and lightweight radio control transmitter allows one person operation.
- (2) This cordless control system also permits safe and easy arm selection and flanging operation in the tanker manifold area.



## Cartridge type swivel joint

The cartridge-type swivel joint can easily removed because of its unique structure, bolted with product carrying pipe, not welded and this structure contributes to reduction of maintenance cost and time.





# Safety and Mobility ~ Satisfactory product lineup to meet every needs-2

## Cryogenic service

(size:16B)

### Hydraulic Quick Coupler (H-QCDC)

- (1) This hydraulic coupler is equipped at the extremity of the loading arm and enables quick, safe and assured connecting and disconnecting operation.
- (2) Combination usage with radio controller, one-man operating is capable.
- (3) A number of H-QCDC have already been installed on the loading arms for large tanker and expedites arm dis/connecting operation.
- (4) Tokyo Boeki Engineering succeeded in manufacturing H-QCDC domestically and improved its reliability and achieved cost reduction.

Despite only a few loading arm makers have the technical knowledge of manufacturing H-QCDC, Tokyo Boeki Engineering provides all range of service-design, manufacture, install and after sales service for H-QCDC.



## Ambient temperature service

(size:10B~20B)

### Hydraulic Quick coupler (H-QCDC)

This is installed at the extremity of the loading arm and allows fast, safe and assured dis/connecting loading arm to the tanker manifold.

By using this quick coupler, it is not necessary any more to insert flange gasket or to bolt the flange to tanker manifold. Quick coupler is activated by hydraulic pressure and its flanging time is only for several tens of seconds supported by flange guide.

After connecting coupler to the tanker manifold, the clamp is tightened mechanically, not hydraulic pressure, therefore it permits safe un/loading operation.



## Manual Quick Coupler

Manual Quick coupler is installed at the extremity of the arm and it enables easy connecting by rotating several clamps with manual handle.

It is unnecessary to insert the gasket and to bolt the flange to manifold.

The available size is from 150A up to 300A and it can be installed to the existing loading arms.



## Niigata Mobile Marine Loading Arms



In the case of impossibility of arm installation due to limited jetty space, Niigata mobile loading arms mounted on the trailers or rail cars are applicable.

## After-Sales Service



Tokyo Boeki Engineering provides quick and reliable after sales service worldwide in case of any troubles and needs of repair.

For safe and long-term usage of loading arms, our highly experienced personnel offer periodical inspection, maintenance and overhaul with Niigata genuine spare parts.

All critical spare parts are stocked at TEN Nagaoka works and ready for timely shipment.