



**BLACK SEA Ports and Logistics 2026**  
**9.-11.6.2026 Istanbul**

**More Safety. Less Downtime. Intelligent Load Monitoring  
and Force Sensor Technology for Container Operations**

# Safe Lifting of Loads



## Why Safety Systems

- Safety systems on lifting equipment are a mandatory requirement when loads are lifted
- Nearly 25% of accidents in container ports are load dependant, but not in all cases containers are overloaded.
- Monitoring of Safe Working Limits and Operational Limits at all times
- Safety Systems must comply with Safety Standards
  - European and International Safety Standards
    - Performance Level d (DIN 13849)
    - Safety Integrity Level 2, SIL2 (IEC 61508)



# Facts & Figures



## About BROSA

- Family owned company
- Headquarter in Tettnang – South Germany
- Founded 1935 – over 90 years of innovation
- 100 employees
- ISO 9001 and ISO 14001 certified
- Annual production of 16000 sensors
- Measurement range up to 12 MN and 5.000 bar




# Facts & Figures



## Global Footprint

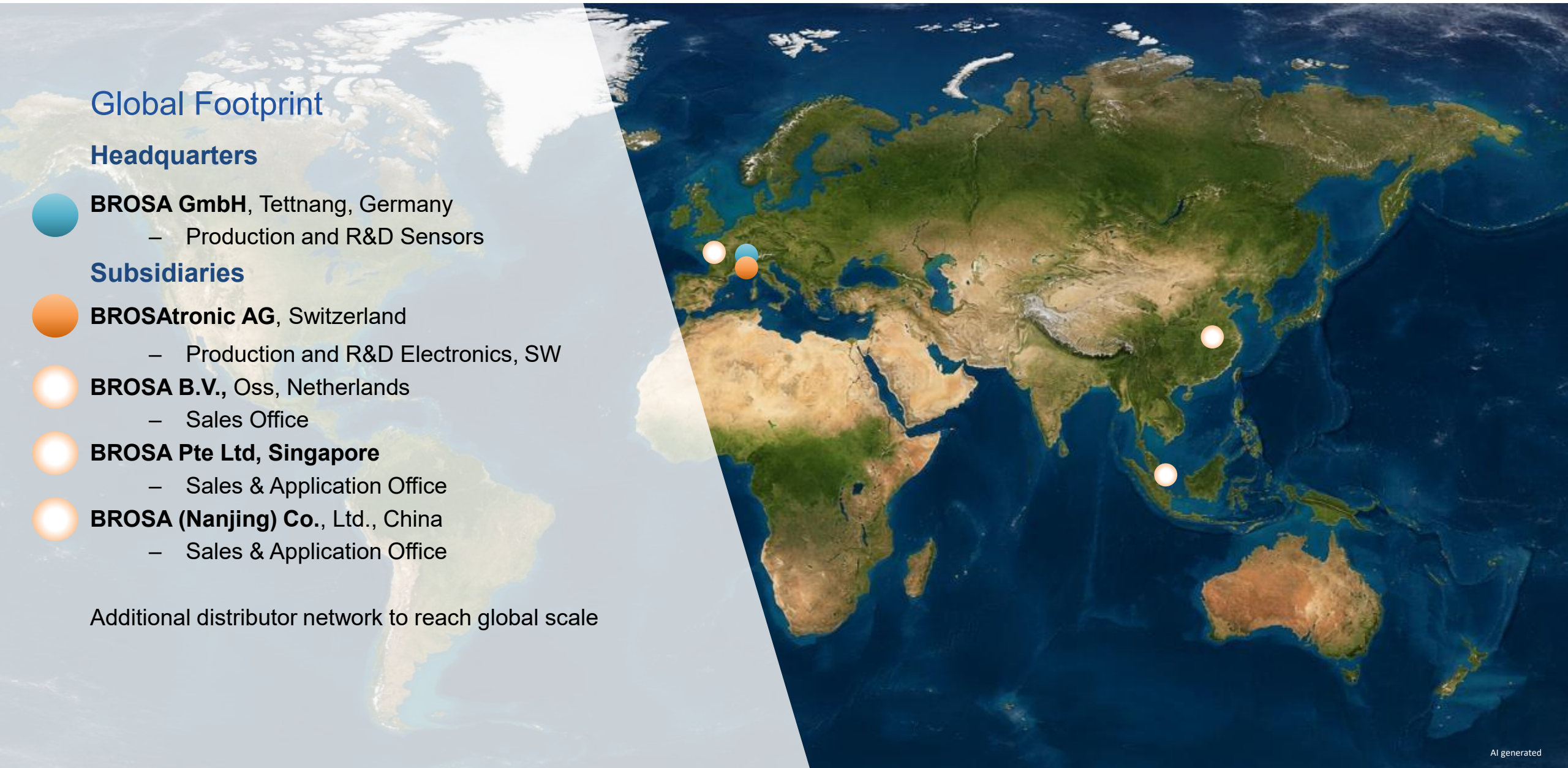
### Headquarters

-  **BROSA GmbH**, Tettwang, Germany
  - Production and R&D Sensors

### Subsidiaries

-  **BROSAtronic AG**, Switzerland
  - Production and R&D Electronics, SW
-  **BROSA B.V.**, Oss, Netherlands
  - Sales Office
-  **BROSA Pte Ltd**, Singapore
  - Sales & Application Office
-  **BROSA (Nanjing) Co., Ltd.**, China
  - Sales & Application Office

Additional distributor network to reach global scale



## Capabilities

- Tailormade: Products are developed in close collaboration with our customers
- Understanding the Trends & Industries
- Compliance with worldwide safety standards
- “Made in Germany” The logo for 'Made in Germany', featuring the German flag's colors (black, red, and gold) and the text 'Made in Germany'.
- More than 90% in house manufacturing
- Full scope of product engineering and manufacturing
  - Specification
  - Technical proposals
  - Production: mechanical, electrical, assembly
  - Calibration
  - Certification, Type Approvals,
  - Customer Acceptance Tests





Special applications

Mechanical engineering

Port Technology

Offshore and Maritime

Construction industry



# Product Portfolio



Force measuring pin



Tension load cell



Force sensor washer



Tubular load cell



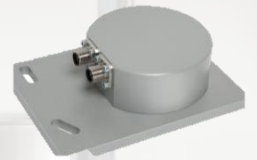
Compression load cell



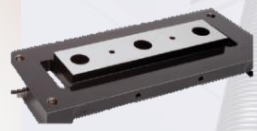
Weighing and Overload Systems



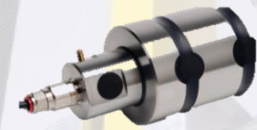
Support jack load cell



Angle sensor MEMS



Normal force sensor



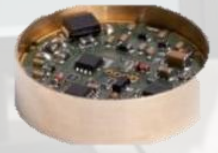
Sensor for Ex area



Pressure transducer

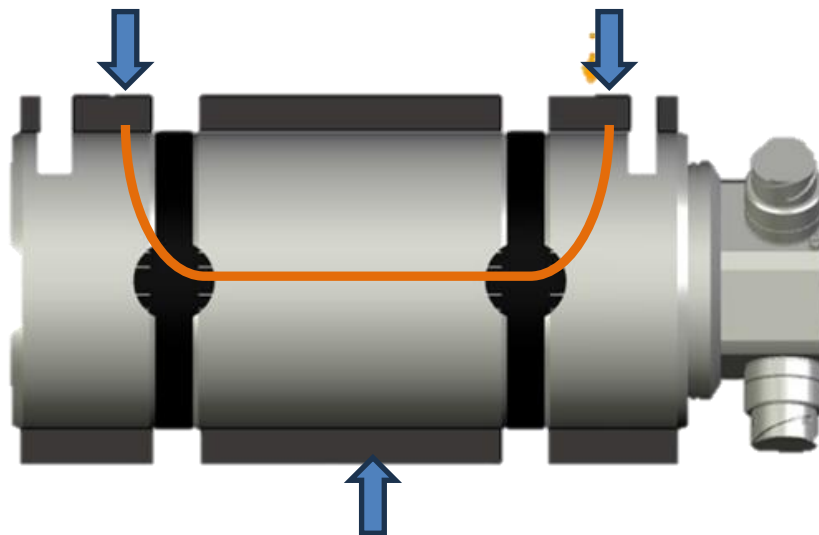


Pressure transducers



BROSA electronics

# BROSA Load pins



Single output		Redundant (double output)	
PL c / SIL 1	PL d / SIL 2	2x PL c / SIL 1 *	2x PL d / SIL 2 *
1 measuring system 1 amplifier 1 output	2 measuring systems 1 amplifier 1 output	2 measuring systems 2 amplifiers 2 outputs	4 measuring systems 2 amplifier 2 output
4-20 mA CANopen PROFINET	4-20 mA CANopen CANopen safety PROFINET PROFINET PROIsafe	4-20 mA CANopen PROFINET	4-20 mA CANopen CANopen safety PROFINET PROFINET PROIsafe

# Typical installations



## Installations

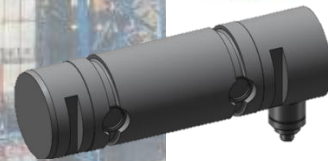
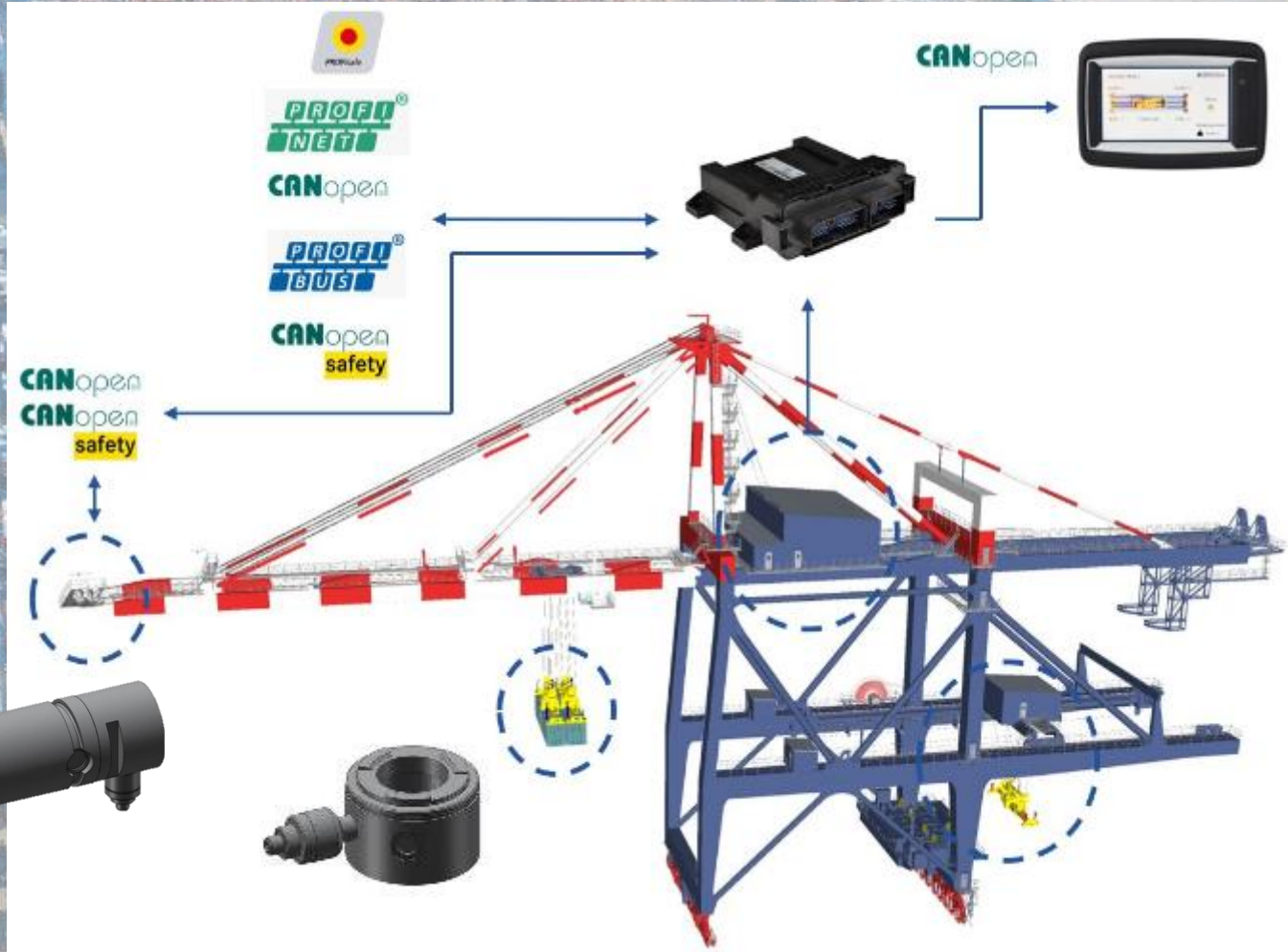
Anchor points on dead end of hoist rope  
Sheave at rope system  
Brakes

## Designs

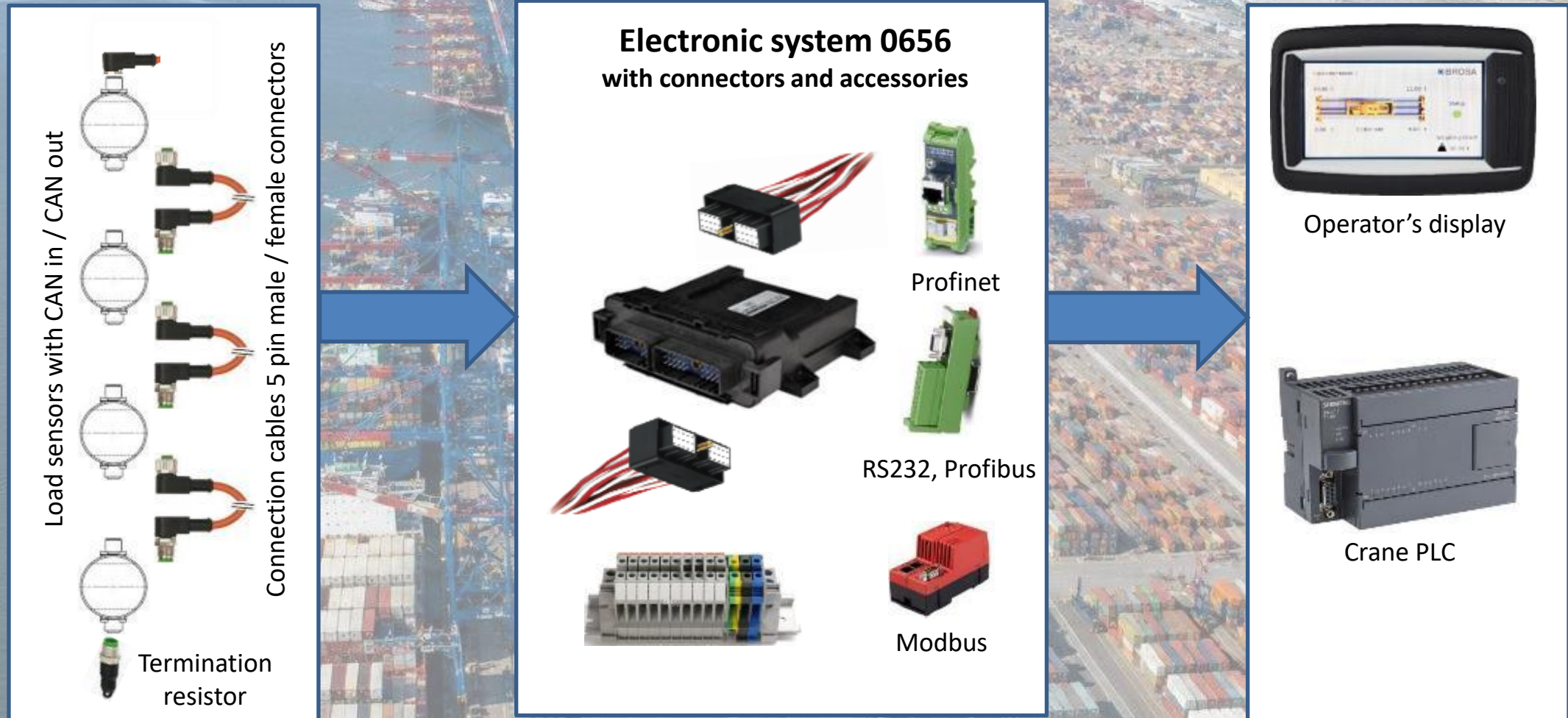
Standard Design, 1 measuring direction  
X-Y Measurement, 2 measuring directions with a 90° offset  
MOP Design, with Mechanical Overload Protection



# Safety System



# Safety System Concept



## Safety System for SIL2 requirements

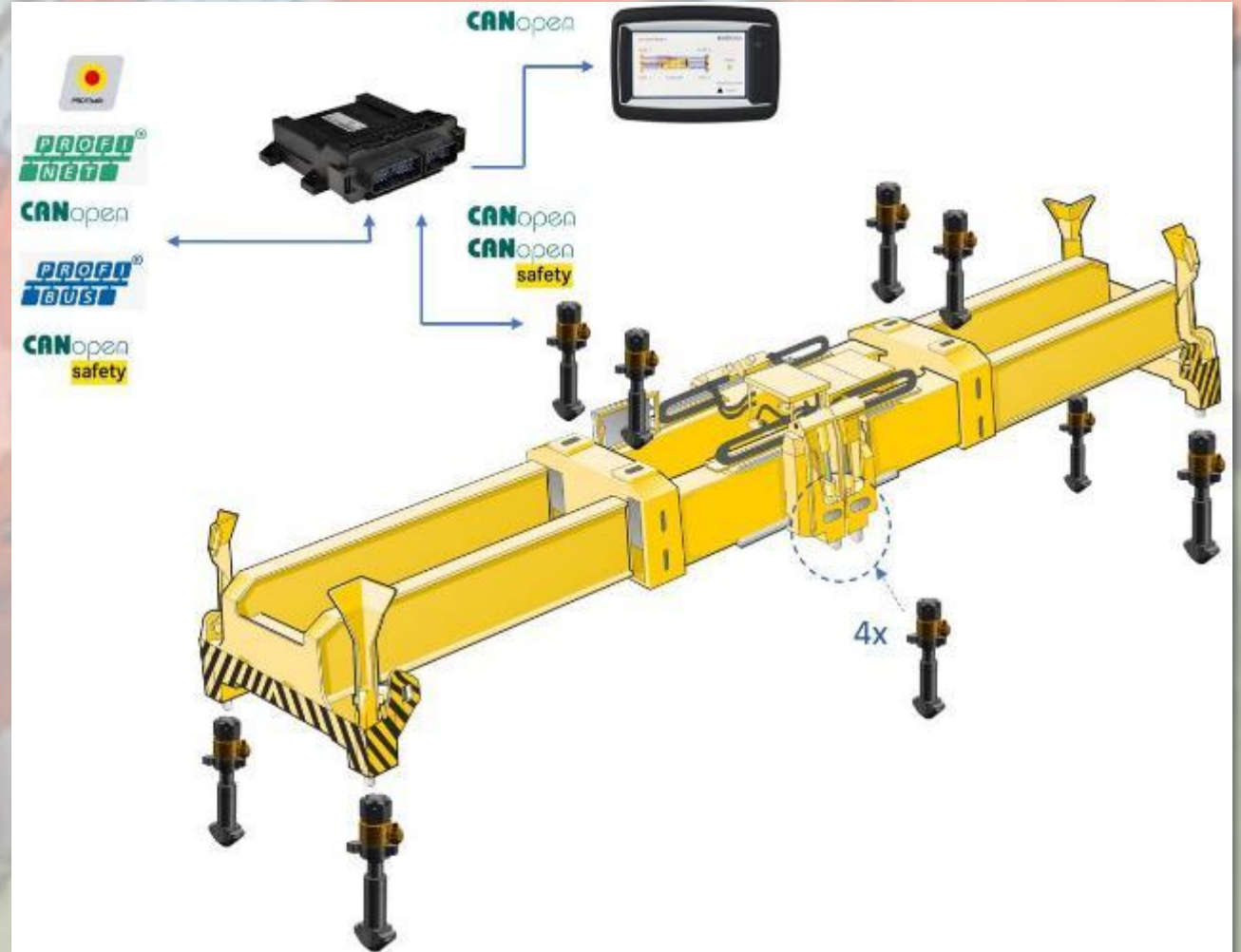
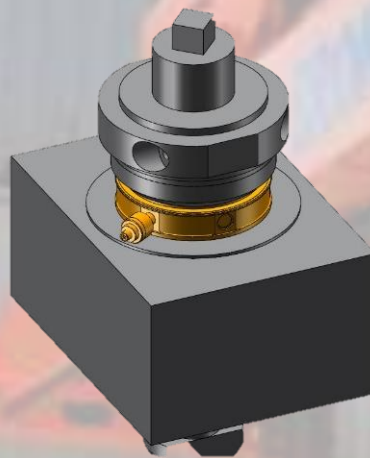
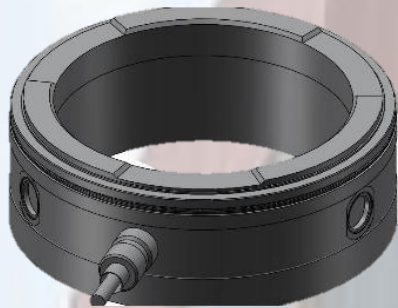
- Processor TMS570 Texas Instruments
- 8 digital inputs,
- 8 digital outputs
- 3 CAN lines (sensors, display & communication)
- Safety cut-off, Power MOSFET
- Communication controller for interfacing with the main PLC
  - Profinet (ProfiSafe)
  - CANopen (Safety)
  - Profibus DP
  - RS-485 (compatible to BROSA display)
  - RS-232 (for service purposes)
- Firmware FlexLim Safety
- Suitable for headblock installation, shock & vibration proofed
- Area of Use
  - Safety System
  - Weighing System
  - Gateway



# BROSA 3P sensor washer



Integration of the sensor in a twistlock

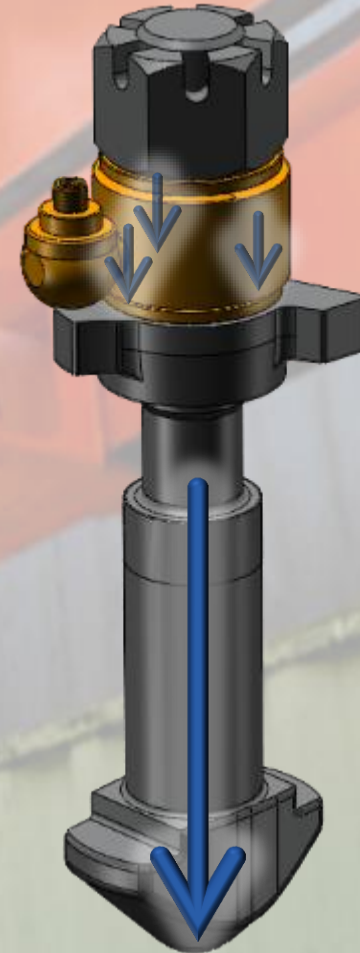


# BROSA 3P sensor washer



## Integration of the sensor in a twistlock

- No effect on twistlock cross-section
- Direct force measurement by integrating the sensor into the twistlock assembly
- Tension of the twistlock is transformed into a compression force
- Detachable mechanical assembly
- Can be re-used during twistlock inspection
- Can be re-used after twistlock exchange
- Designed and tested for > 2 Mio. load cycles



# SOLAS Container Weighing

- Safety issues for extended functions (e.g. SOLAS)
  - Mandatory to verify the VGM of the container before its lifted to a vessel since 01.07.2016.
  - Different methods to verify the VGM (Method 1 & Method 2)
  - Detection of wrongly declared Container Weights
  - Improvement of Ship Stowage Plans
  - All VGM must be taken by a verified system



Organisation Internationale de  
**Métrieologie Légale**  
International Organization of  
**Legal Metrology**



## **BROSA GmbH**

- A competent partner for load sensing and monitoring
- A leading supplier to the container handling industry
- An innovation driven development partner for future oriented products
- Supplier to all major crane and port equipment manufactures
- Products are used in all major ports around the world.

**THANK YOU VERY MUCH FOR YOUR ATTENTION**