



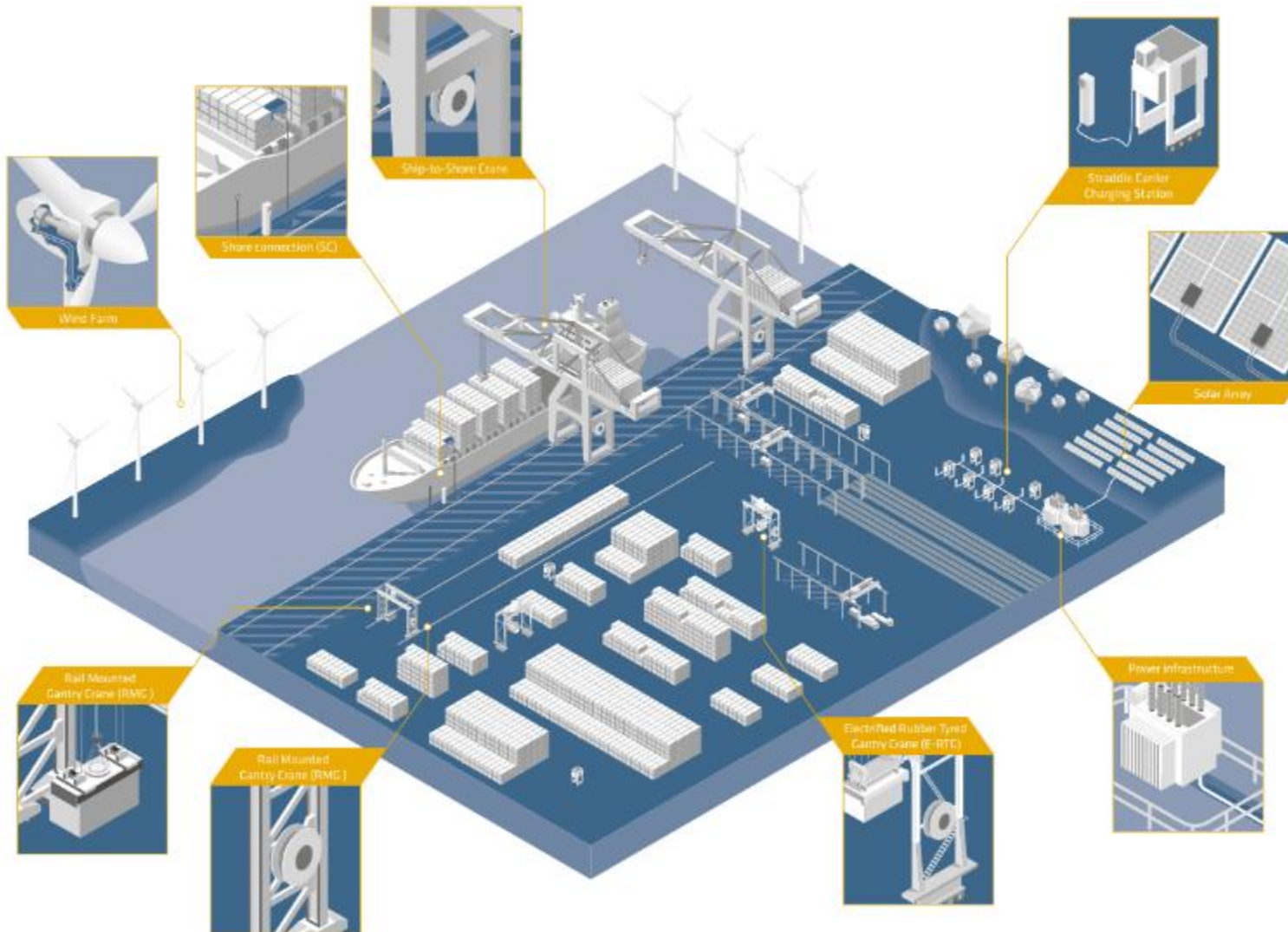
Bellmond Technologies Pte Ltd

Solutions for Green Power Transmission,
Sensing and Safety.



Brian S. Swan
Managing Director

Green Portfolio, Linking Port Operations to Sustainability



Shore Connection

E-RTGC

Green-Labeled for Crane

EV Charging

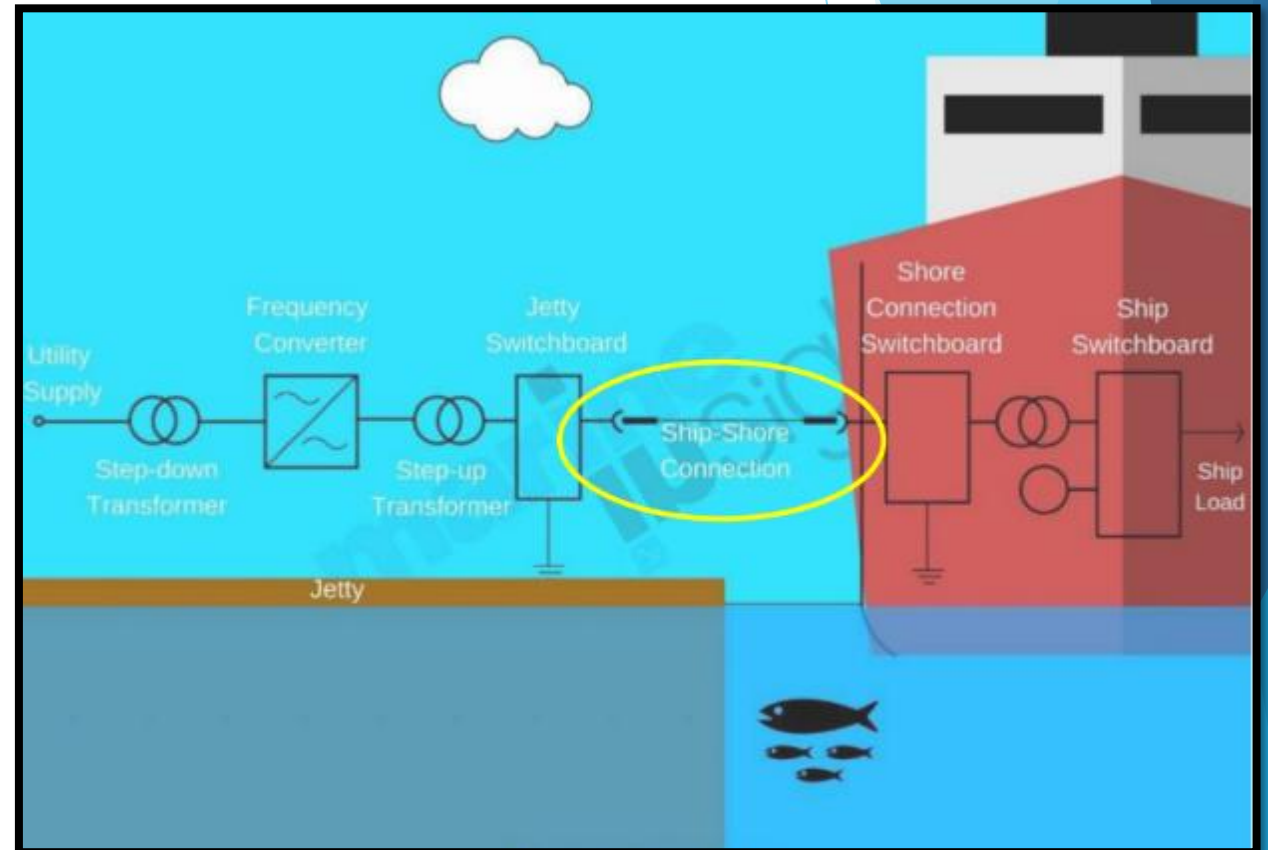
Renewable Energy Generation

Power Distribution

Protolon(SC) Reeling Cables for Shore Connection Systems

Many different names for the same basic technology:

- High-Voltage Shore Connection (HVSC)
- Alternative Maritime Power (AMP)
- Cold Ironing
- Shore-to-Ship Power
-



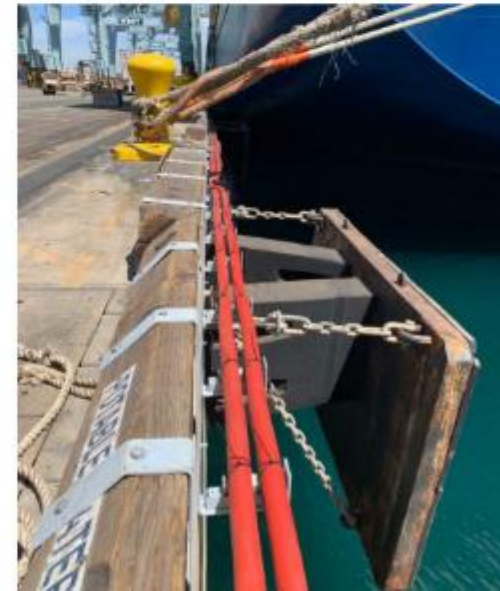
A Cable Connection used to plug ships into the main electrical power grid while berthed. This supplies a ship with enough power and services to let the vessel turn off its engines thus reducing carbon emissions, fuel consumption and noise.



Bellmond Technologies Pte Ltd

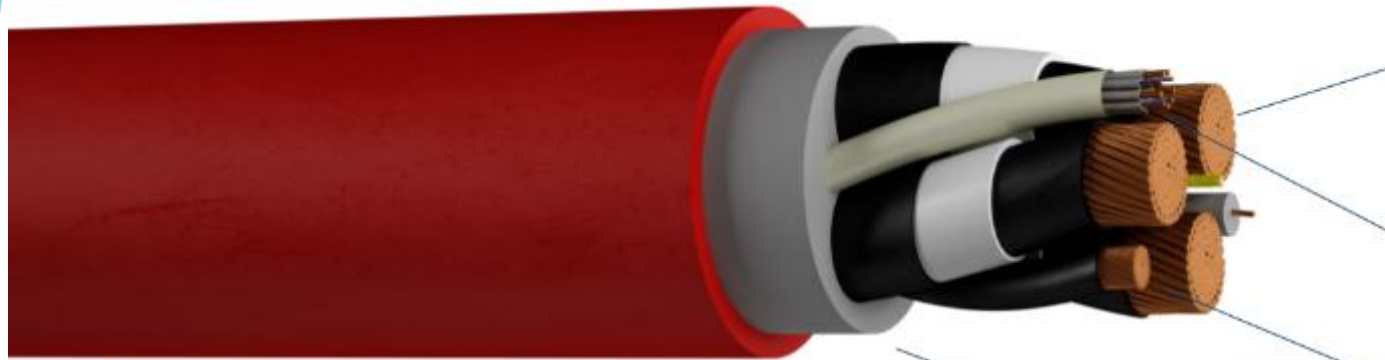


Different Technologies – Just One Cable Type



Protolon(SC)

Medium Voltage 6/10kV – 12/20kV



Power cores, flexible bare CU class 5 with EPR rubber insulation and semi-conductive layers

Composite element with Optical Fibers and Control cores

Ground core, flexible bare CU class 5 with semi-conductive layer

Inner sheath of water-resistant EPR rubber

Outer sheath of water- and abrasion-resistant CPE rubber



Protolon(SC)
Reeling Cables for Shore Connection Systems

Main Features:

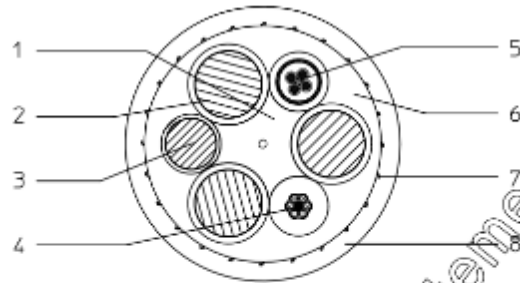
- Compliant to international standard **IEC/ISO/IEEE 80005** and **Bureau-Veritas certified**
- Suitable for all vessels' types (container ships, cruise vessels, RoRo and RoPax vessels, LNG, etc.)
- Designed for **reeling application** but also suitable on **semi-fixed systems**
- Flexible and mechanically robust for **high reliability**
- Resistant to UV, ozone and moisture
- The only cable on the market fit for **permanent immersion in water**
- Delivered with pre-mounted plugs or terminations on request



Power & Control Flexible Cables
For Cranes/Mining/Tunnelling

E-RTGC

Cordaflex(SMK) 0.6/1.0kV, 3x120+1x70+1x(4x2.5)C+1x(6E9/125)



11 rubber grade separator

121 3 power cores 120mm²
- lined copper conductor, extra finely stranded
- foil
- PROTOLONMSI-insulation
- black number printing

131 1 earth conductor 70mm²
- lined copper conductor, extra finely stranded
- foil
- PROTOLON-insulation
- green/yellow

141 1 optical fibre element 6E9/125µm
- central carrier
- 6 optical fibres E9/125µm in single loose buffer tubes
- rubber covering

151 1 KCF-element 4x2.5C
- 4 control cores 2.5mm²
- lined copper conductor, extra finely stranded
- ETPF-insulation (with white number printing)
- rubber covering
- tape spinning
- screen in form of a braid of lined copper wire
- foil-mesh woven spinning
- rubber covering

161 DR - inner sheath

171 reinforcement polyester yarn braid

181 DR - outer sheath

cable diameter: 64.9mm (+/- 2.0mm)
cable weight: approx. 8100kg/km

#5 Fibre Optic Options

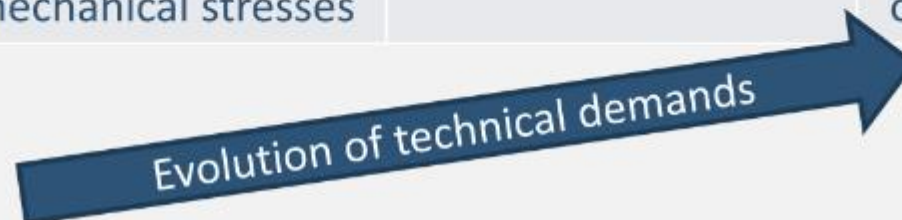
Quantity: 6, 12, 18 or 24 fibres

Type: 50/125, 62.5/125, E9/125

PROTOLON Family – The Real Deal



PROTOLON(SMK-200)	PROTOLON(SMK)	PROTOLON(SMK+HS)	PROTOLON(iQ)
			
Made for reeling operations with moderate mechanical stresses	Made for reeling operations with high to highest mechanical stresses	Made for High speed reeling operations	Made for Permanent Monitoring of reeling operations



PROTOLON(iQ) – Measure – Control – Predict

MV reeling cable with well-known PROTOLON(SMK) design!

Enhanced with IQ function



High grade outer
Sheath – type PCP
(better than 5GM5)

Anti-torsion
braid

High grade inner
Sandwich – type PCP
(better than 5GM5)

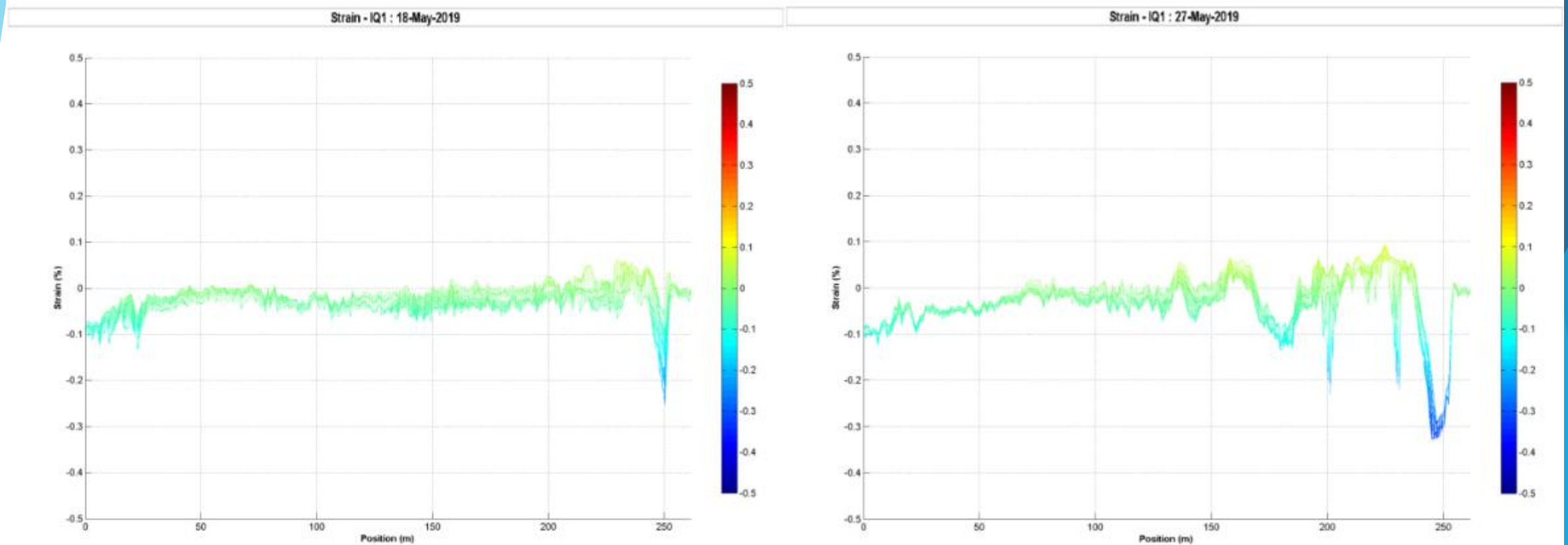
FO element with
commodity and
IQ-ref. fibers

Power cores,
super flexible tinned
CU, with high grade
EPR insulation

Cradle separator
with IQ-Sensor
fiber

Protolon(iQ) 6/10kV, 3x70+2x35/2+1x(16E9+2E9ref) <RED>

- Installation date: 14/05/2019 - 17/05/2019
- Monitoring - phase 1: 18/05/2019 - 29/07/2019
- Monitoring - phase 2: 19/12/2019 - 24/02/2020
- Monitoring - phase 3: 25/02/2020 - 15/11/2020



THE NEW BRAND

is **sp**ecial

HIGH END state of the art product solutions able to cover applications and environmental conditions with **HIGH** to **VERY HIGH** stresses. With **SPECIAL** features like e.g. multiple elements and/or higher tensile strength.

is an **xp**ert

HIGH END state of the art product solutions able to cover applications and environmental conditions with **HIGH** to **VERY HIGH** stresses.

is **sm**art

STATE OF THE ART reduced to the MAX product solutions able to cover applications and environmental conditions with **MODERATE** to **HIGH** stresses.

EXISTING BRAND	NEW BRAND	DESIGNATION	TENSILE LOAD MAX. STAT / DYN N/MM ²	SPEED MAX.	MECH. STRESS MAX.
MV REELING - Round Medium Voltage Reeling Cables					
PROTOLON(SMK) PROTOLON(SMK+HS)	PROTOLON XPRT	(N)TSCGEW0EU	20 / 30 + support element	300 m/min	Extra High
PROTOLON(SMK)-200 TENAX family PANZERFLEX	PROTOLON SMRT	(N)TSCGEW0EU	20 / 25	200 m/min	High
PROTOLON(SMK) and (SMK+HS) with special elements	PROTOLON SPCL	(N)TSCGEW0EU	20 / 30 + support element	240 m/min	Extra High
LV REELING - Low Voltage Reeling Cables					
CORDAFLEX(SMK)	CORDAFLEX XPRT	(N)SHT0EU	30 / 30	240 m/min	Very High
CORDAFLEX(SMK)-200 TROMMELFLEX KSM-S PANZERFLEX	CORDAFLEX SMRT	(N)SHT0EU	20 / 25	200 m/min	High
CORDAFLEX(SMK) with special elements	CORDAFLEX SPCL	(N)SHT0EU	30 / 30 + support element	240 m/min	Very High
TROMMELFLEX PUR HF	TROMMELFLEX PUR HF	D12Y1Y1Y1Y	25 / 25	180 m/min	High
SPREADER - Low Voltage Cables for Vertical Reeling					
CORDAFLEX(SMK)-V CORDAFLEX(SMK)-V-S	SPREADERFLEX REEL XPRT	(N)SHT0EU	20 / 30 + support element	240 m/min	Very High
SPREADER - Low Voltage Cables for Basket Operation					
SPREADERFLEX	SPREADERFLEX BSKT XPRT	3GSLT0E / SYSLT0E / 2XSLT0E	Increased	160 m/min	Very High
SPREADER - Low Voltage Cables for Mobile Harbour Cranes					
CORDAFLEX(SMK)-VS	SPREADERFLEX XTRM	(N)SHT1Y	20 / 30 + support element	160 m/min	Very High
FESTOON - Round Low Voltage Cables for Festoon Operation					
RONDOfLEX	RONDOfLEX XPRT	(N)CRDGOEU	15 / 20	240 m/min	High
RONDOfLEX(C)-FC	RONDOfLEX-C XPRT	(N)CRDCCGOEU	15 / 20	240 m/min	High
FESTOONFLEX PUR HF	FESTOONFLEX PUR HF	D12Y1Y	15 / 20	210 m/min	Moderate
FESTOONFLEX C PUR HF	FESTOONFLEX C PUR HF	D12YC1Y	15 / 20	210 m/min	Moderate
OPTOfLEX	OPTOfLEX	G62.5/125, G50/125, E9/125	500	120 m/min (Reeling) 240 m/min (Festoon)	Very High
FESTOON - Flat Low Voltage Cables for Festoon Operation					
PLANOfLEX	PLANOfLEX	NCFLGOEU	15 / 20	180 m/min	Moderate

Load Cells
Anti-Snag/Overload & Weighing Systems
Ex-Proof Sensors



Why Safety & Weighing Systems?

Safety systems on lifting equipment is a **mandatory** requirement when loads are lifted

Monitoring of Safe Working Limits and Operational Limits at all times

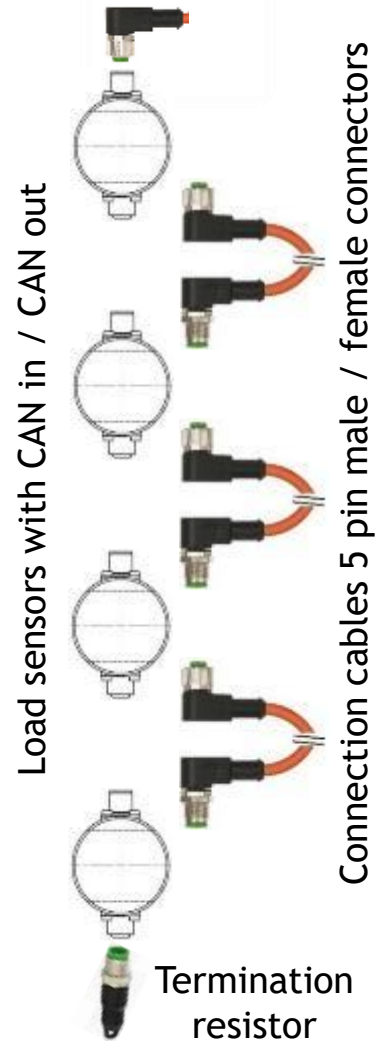
Safety Systems must comply with Safety Standards

Safety issues for extended functions (e.g. SOLAS)

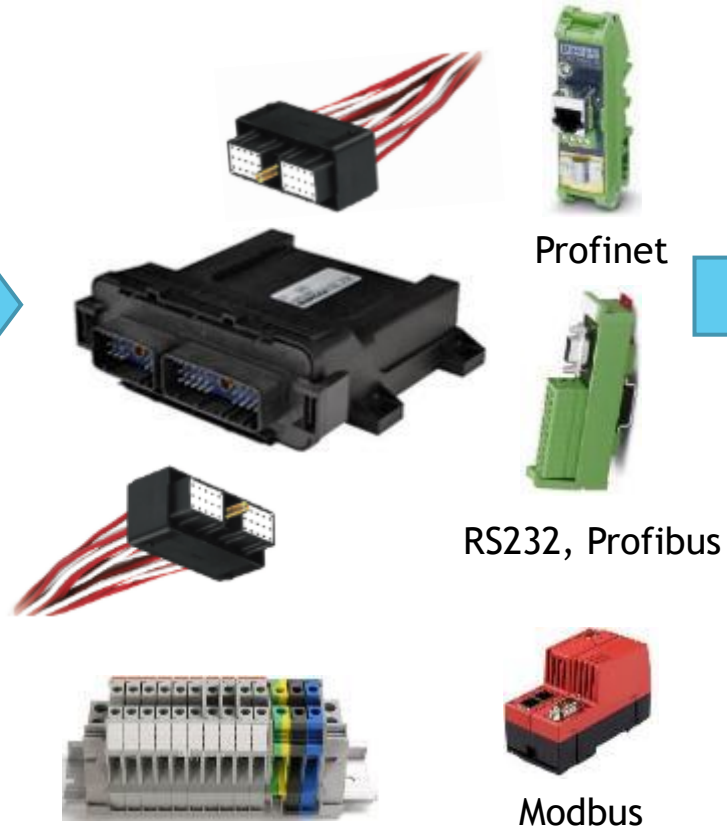
- Detection of wrongly declared Container Weights
- Improvement of Ship Stowage Plans

Obtaining the VGM of a container with a certified weighing system





Electronic system 0656 with connectors and accessories



Operator's display



Crane PLC



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