

Repair Kit

LED Retrofit Solution for Ships

Repair Kit 20W → FL-2×18W fluorescent replacement

Repair Kit 40W → FL-2×36W fluorescent replacement

No extensive rewiring · Drop-in retrofit · Ready for operation

Cumulative Deliveries (as of Apr. 2026)

21,600 units

Total Repair Kits Delivered

2024	2025	2026
6,976 units	10,602 units	6,056 units

Vessel #113000 | Oil / Chemical Tanker

609

units retrofit

≈1.2year

Estimated Payback

€26,267

Annual Saving

Why Retrofit to LED Now?

Many vessels in service for over five years still use conventional fluorescent and halogen lighting.

CURRENT SITUATION

Vessels in service 5+ years → legacy fluorescent/halogen lighting · frequent failures · high energy use · tightening IMO decarbonization requirements

5–8× Longer Service Life

BEFORE Conventional fluorescent life ≈ 10,000 h

AFTER LED module kit life ≥ 50,000 h

Far fewer replacements → lower maintenance cost and crew workload · replacement possible during operation

44–67% Power Saving

BEFORE Conventional fluorescent 36W / 72W (incl. ballast)

AFTER LED Repair Kit 20W / 40W

Lower annual kWh demand → direct generator-fuel saving · potential emissions-cost reduction

Up to 135% Higher Luminous Efficacy

BEFORE Conventional fluorescent ≈ 85 lm/W

AFTER LED Repair Kit up to 120 lm/W

Brighter, clearer illumination → improved onboard working conditions · equivalent light with less power

*Figures shown apply to Repair Kit 20W/40W fluorescent replacements only; additional savings may arise from other lighting retrofits.

Repair Kit vs LED Tube vs Fluorescent — Direct Comparison

Heat dissipation · service life · vibration resistance · luminous efficacy · maintenance cost

Comparison	Repair Kit ✓	LED Tube	Fluorescent
Service Life	≥ 50,000h	≈ 15,000h	8,000~10,000h
Replacement Cycle	6+ years without replacement	1.5–2 years	1–1.5 years
Power	20W / 40W	18W / 36W (ballast separate)	36W / 72W (안정기 incl.)
Luminous Efficacy	up to 120 lm/W	approx. 85 lm/W	approx. 60~80 lm/W
Vibration Resistance	Screw-fixed → Optimized for marine use	Socket type → Risk of loosening	Ballast failure → Flicker / failure
Maintenance Cost	Virtually Zero	≈ \$5/ units-year	\$5~15/ units-year (parts + labor)

Repair Kit delivers 5–6× longer life, 44% lower power and near-zero routine maintenance versus fluorescent lighting, with superior life, heat management and efficacy versus LED tubes.

Durability & Installation

Designed for long-term low-maintenance operation — materials, structure and mounting optimized for marine environments

Long Service Life Long Service Life	Corrosion Resistant Corrosion Resistant	Shock & Vibration Resistant Shock Resistant
Premium-brand LED light source Efficient heat dissipation · high-quality materials Service life ≥ 50,000 hours 5–8× longer life than fluorescent lamps	Marine-grade aluminium alloy Polycarbonate (PC) diffuser Durable in corrosive marine environments Designed to resist deformation and degradation	Screw-fixed design → reduced vibration loosening PC material supports vibration resistance and rigidity Bracket mounting helps absorb shock Suitable for engine-room and deck vibration environments

≤ 15 min Typical Installation

Product specification

Model: LED-KITS-20W / LED-KITS-40W — Marine Use, IEC Compliant

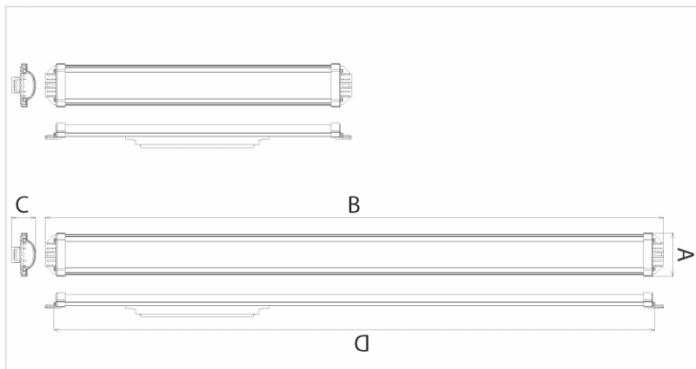
Items	LED-KITS-20W	LED-KITS-40W
Application	For indoor and outdoor ceiling for marine use	For indoor and outdoor ceiling for marine use
Design	According to maritime requirement, additional IEC	According to maritime requirement, additional IEC
Material — Body	Aluminium Alloy (LM6)	Aluminium Alloy (LM6)
Diffuser	Polycarbonate / Side Cover: Polycarbonate	Polycarbonate / Side Cover: Polycarbonate
Light Source	LED Module 20W, AC100~240V 50/60Hz	LED Module 40W, AC100~240V 50/60Hz
Luminous efficiency	120 lm/W	115 lm/W
Dimension (A×B×C)	84.5 × 595 × 47.5 mm	84.5 × 1,202 × 47.5 mm
Mounting Pitch	573 mm (5×10 Slot Holes)	1,180 mm (5×10 Slot Holes)
Service Life	≥ 50,000 hours	≥ 50,000 hours
Feature	Easy Installation · Good Durability · Marine Grade	Easy Installation · Good Durability · Marine Grade

Mounting Bracket W.T Type (For waterproof lights and ceiling lights) / N.W.T Type (For general lights and ceiling lights)

Product Specification

Model: LED-KITS-20W / LED-KITS-40W — Marine Use, IEC Compliant

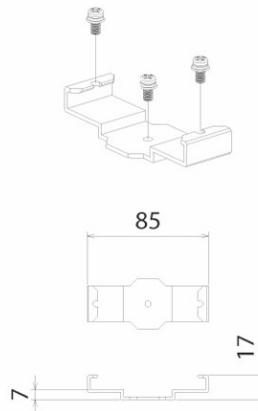
Technical Drawing / Specification



Capacity	A (mm)	B (mm)	C (mm)	D (Mounting Pitch)
20W (Above output with FL. Lamp 18WX2)	84.5	595	47.5	573
40W (Above output with FL. Lamp 36WX2)	84.5	1202	47.5	1180

OPTION

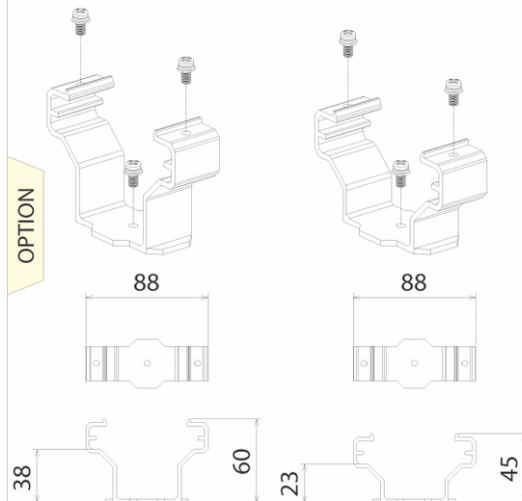
- * FOR USE
- WATERTIGHT LIGHT
- WATERTIGHT CEILING LIGHT
- ONLY FOR "LED-KITS-40W" Mid



Mounting Bracket

- * FOR USE
- NON WATERTIGHT LIGHT
- NON WATERTIGHT CEILING LIGHT

OPTION



Mounting Bracket W.T Type (for waterproof / ceiling lights) / N.W.T Type (for general / ceiling lights) — Select according to mounting condition

Vessel Application Case

Repair Kit — Vessel #113000 Estimated Retrofit Quantity | Oil / Chemical Tanker

Repair Kit 20W 268 units	Repair Kit 40W 341 units
BEFORE FL-2×18W 시스템 36W (안정기 incl.) Life 8,000–10,000 h · replacement every 1–1.5 years	BEFORE FL-2×36W 시스템 72W (안정기 incl.) Life 8,000–10,000 h · replacement every 1–1.5 years
AFTER Repair Kit 20W Service life ≥ 50,000 h Crew-installable during operation · no extensive rewiring · ballast removed	AFTER Repair Kit 40W Service life ≥ 50,000 h Crew-installable during operation · no extensive rewiring · ballast removed
Save 16W / unit 44% saving 34,304 kWh/year saved 34,304 kWh = IP20·44·67 141 units×2,920h + IP56 127 units×8,760h	Save 32W / unit 44% saving 87,296 kWh/year saved 87,296 kWh = 341 units × 32W × 8,760h (IP56 basis)

[Operating-hour assumptions by IP rating]

Annual Saving Potential

Per vessel · IP20-44: 2,920 h/year · IP56: 8,760 h/year · IP67: 2,920 h/year · MGO \$950/ton (2026.04 reference assumption)

Fuel Cost Saving	Potential EU ETS Saving	Maintenance Saving
€ 19,222 / year	€ 4,462 / year (2026~ 100%)	€ 2,582 / year (No external labor assumed)
99,420 kWh × MGO 0.20 kg/kWh = 19.88 t MGO saved × \$950/ton = \$13,560 ≈ €19,222	CO₂ 63.7 t reduction × €70/ton (EU ETS 100% basis) 2024: €1,785 · 2025: €3,124	Crew replacement possible onboard Maintenance Cost \$5/ units·year Ballast removed → one failure source eliminated

Total Annual Saving

€ 26,267 / year

= Fuel cost €19,222 + Carbon penalty €4,462 + OPEX €2,582

Reference-case values only. Actual savings depend on operating hours, generator efficiency, fuel/EUA prices and applicable EU ETS scope.

Potential EU ETS Cost Reduction

Lower onboard power demand can reduce fuel use and associated EU ETS exposure where emissions fall within the applicable scope.

CO₂ Reduction

63.7

Ton CO₂ / year

Calculation Basis

Electricity saved: 99,420 kWh
× MGO equivalent: 0.20 kg/kWh
= MGO saved: 19,884 kg
× CO₂ factor: 3.206 kg/kg (MGO)
= CO₂ saving: 63.7ton

Illustrative EU ETS Saving by Year (€70 / ton basis (2026.04))

Year	Phase-in	Estimated Saving	Cumulative Saving
2024	40%	€ 1,785	€ 1,785
2025	70%	€ 3,124	€ 4,909
2026	100%	€ 4,462	€ 9,371
2027	100%	€ 4,462	€ 13,833
2028	100%	€ 4,462	€ 18,296
5-Year Cumulative Illustrative Saving			€ 18,296

* EU ETS 's EUA Price ~€70/tCO₂ 적용 (2026.04 reference price; market price varies)

From 2026 the EU ETS phase-in reaches 100%; actual benefit depends on the vessel's applicable EU ETS scope.

A Practical Time to Retrofit

EU ETS full phase-in (2026) · rising energy costs · stronger decarbonization requirements

Annual Fuel Saving

€ 19,222

MGO 19.88 t reduction / year

Potential Annual EU ETS Saving

€ 4,144

CO₂ 63.7톤 · EU ETS 100%

Annual Maintenance Saving

€ 2,582

\$5/ units-year (EPS 실적 basis)

Estimated Payback

≈ 1.2year

Based on €26,267 annual
reference saving

5-Year Cumulative Net Benefit

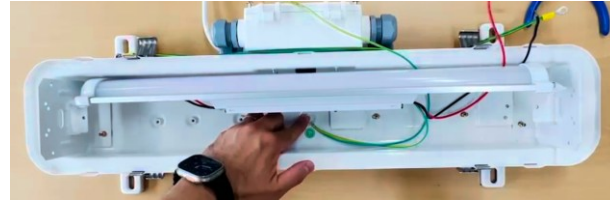
€ 100,154

Repair Kit 20W / 40W — Crew-installable during operation · no
dedicated port stay required

Reference-case values only. Actual savings depend on operating hours, generator efficiency, fuel/EUA prices and applicable EU ETS scope.

Simple Onboard Retrofit

Existing fixture → ballast removal → LED module installation → immediate operation



≤ 15 MIN
Typical installation