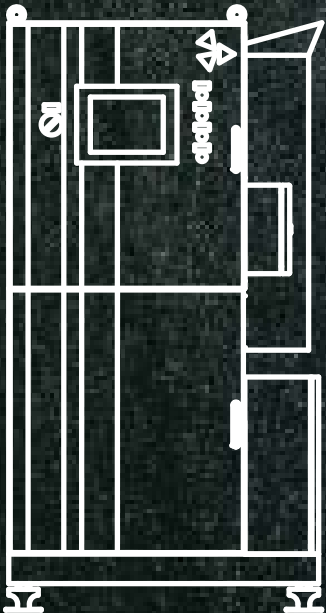




S-Keeper 7™

MARINE APPROVED CEMS

**GREEN
EFFICIENCY
ON BOARD**

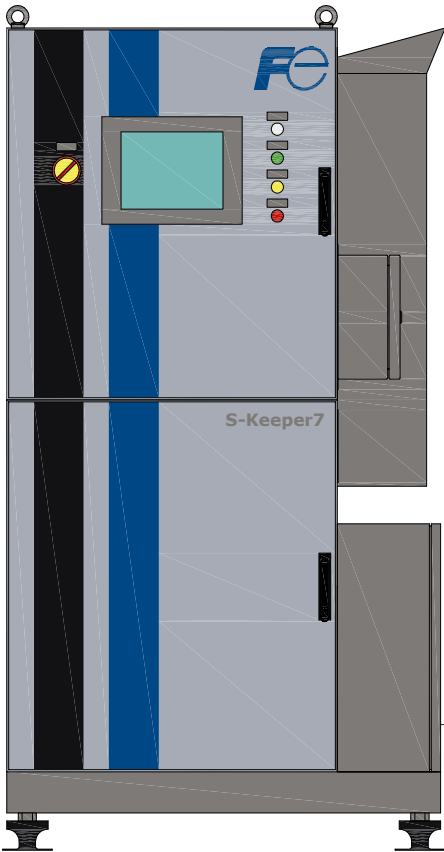


FE Fuji Electric
Innovating Energy Technology



S-Keeper 7™

ARE YOU A SHIPOWNER OPERATING IN EMISSIONS CONTROL AREAS "ECAs"? IS INCREASING SHIP EFFICIENCY YOUR TARGET? ARE FUEL SAVINGS STILL AN ISSUE? THIS IS YOUR LIFERAFT.



S-K7™ is a modular analysis system suitable for on-board continuous emissions monitoring as per:

- **MARPOL Annex VI Reg. 13 & 14**
- **MEPC Circ. 471, 177(58), 184(59)**
- **IEC 60092-504**

and certified as per:

- **RINA Rules, Pt C, Ch 3, Sec 6**
- **LLOYD Register Test Spec 1**
- **DNV Standard for Certification 2.4**



- > S-K7™ is simply the "State of the Art" of integrated analysis systems, fully compliant with applicable marine directives.
- > S-K7™ is fully tailored to the Shipowner's requests with particular focus on CaPex & OpEx balance.
- > S-K7™ is integrated with a modern PEM Propulsion Efficiency Monitor, thus encompassing metered Fuel Consumption, Fuel Oil Viscosity, Thrust and Torque measuring Systems.
- > Thanks to the specific engineering of this modular system, the S-K7™ installation is able to withstand the toughest marine environment.
- > On-board maintenance is easy even for an unskilled operator, while the SPMP Spare Parts Management Program ensures the traceability of every single component and its availability on the ship's course.

TECHNICAL DATA

S-K7™ OVERVIEW OF AVAILABLE FEATURES

- According to **MARPOL Annex VI Reg.13 & MEPC 177(58), 184(59)**
 - > calculation of NOx g/kWh vs Tier I, Tier II, Tier III limits
 - > monthly NOx compliance test report
- According to **MARPOL Annex VI Reg.14 & MEPC 177(58), 184(59)**
 - > calculation SO2/CO2 ratio
 - > calculation of Fuel Oil Sulphur content (% wt/wt) vs Reg.14 limits
- According to **MEPC 177(58), 184(59)** HC total Hydrocarbons load (ppm or g/kWh) is measured
- Reports according to **ISO 14001** of totalized mass NOx / SOx / CO2 emissions (kg/tonne)
- Reports according to **MEPC Circ. 471** of CO2 Emission Index (gCO2 / tonne n.m.)

- **Combustion Efficiency** monitoring by CO2/(CO2+CO) ratio
- Types EASY-N, LITE-N, LITE designed for **LNG powered units**
- O2 (%) & Particulate (mg/m3 or g/kWh) analysis as additional options
- Multiple stack management

S-K7™ MAIN SUPPLY

- Qty#1 Integrated Cabinet
- Qty#1 Sample probe & tube
- Qty#1 Sample line
- Qty#1 Bottles set (according to analyzed components)

S-K7™ ANALYTICAL OPTIONS

- Qty#1 Oxygen Analyser
- Qty#1 Particulate Analyzer

S-K7™ TECHNICAL SPECIFICATIONS

ANALYZED COMPONENTS MEASURING METHOD

- > NO_x, SO₂, CO, CO₂: NDIR (NO with NO₂ to NO converter)
- > HC: H-FID heated flame ionization detector

AUXILIARY INPUTS

Engine speed and Torque, Air inlet flow, Fuel flow, Ambient temperature, Pressure & Humidity sensors as per "NOX Technical Code 2008", Ship GPS Global Positioning System

SOFTWARE

- > Windows®-based Emissions Reporting software
- > Easy self-explaining graphical interface with Process Flow Diagram and real-time parameters
- > Multilevel Password Protection and Data Encryption to ensure safest tamperproof procedure I/O

CONNECTIONS

1 x Ethernet RJ45, 1 x RS-485, 1 x SPDT contact

S-K7™ SAMPLING SYSTEM

SAMPLE CONDITIONING SYSTEM

According to "NOX Technical Code 2008" with system condition monitoring and maintenance indicators

SAMPLE PROBE TECHNICAL SPECIFICATIONS

- > Operative Conditions: max. 200 kPa abs, 180°C
- > Filter element: Bonded Silicon Carbide (CSi)
- > Wetted parts: SS316Ti, CSi, Viton®
- > Flanged Process Connection: DN 65 PN 6 DIN 2573
- > Housing: SS304, IP43 rating

SAMPLE LINE TECHNICAL SPECIFICATIONS

- > Operative Temperature 190°C/Max 210°C/Peak 250°C
- > Maximum Operating Pressure 2.8 barg@200°C
- > Wetted parts PTFE material
- > External diameter 43 mm
- > End Caps diameters 48 mm
- > Minimum Allowable Bending Radius 200 mm
- > External insulation Fiberglass

S-K7™ DIMENSIONS & WEIGHT

MAIN INTEGRATED CABINET

1050 x 1990 x 800 mm (WxHxD), 550 kg

SAMPLE PROBE

Housing 251 x 297 x 168 mm (WxHxD), 9 kg, Length TBD

SAMPLE LINE

Length TBD , 0.9 Kg/m

CALIBRATION BOTTLE

360 (H) x 90 mm (DN), 1.1 kg

OXYGEN ANALYSER (OPTIONAL)

Integrated in main cabinet

PARTICULATE ANALYSER (OPTIONAL)

Flanged housing 342 (L) x 74 mm (DN), 1.7 kg, Insertion length TBD

S-K7™ OXYGEN ANALYSER (OPTION)

MEASUREMENT METHOD

- > Zirconium oxide

MEASUREMENT RANGE

- > 0 ÷ 25 % (dry)

INSTALLATION

- > Integrated in main cabinet

S-K7™ PARTICULATE ANALYSER (OPTION)

MEASUREMENT METHOD

- > Inductive Electrification

MEASURED PARTICLE SIZE

- > 0.3 µm or higher

MEASUREMENT RANGE

- > Lowest value 0.1 mg/m³

INSTALLATION

- > In-Situ, flanged to stack

S-K7™ AMBIENT CONDITIONS LIMITS

MAIN INTEGRATED CABINET

- > Ambient Temperature +5 / +55°C; 95% RH Max

SAMPLE PROBE

- > Ambient Temperature +5 / +55°C; 95% RH Max

PARTICULATE ANALYSER (OPTION)

- > Ambient Temperature +5 / +55°C; 95% RH Max

S-K7™ UTILITIES CONSUMPTION

POWER SUPPLY

230 VAC @50/60 Hz

MAXIMUM POWER CONSUMPTION (FULL MODEL)

4.8 KVA Max

CALIBRATION GAS BOTTLE / EACH PARAMETER

1 bottle 110 L @ 20°C / 1 operative year approx

DEMI WATER (ONLY LITE-S, LITE, FULL MODELS)

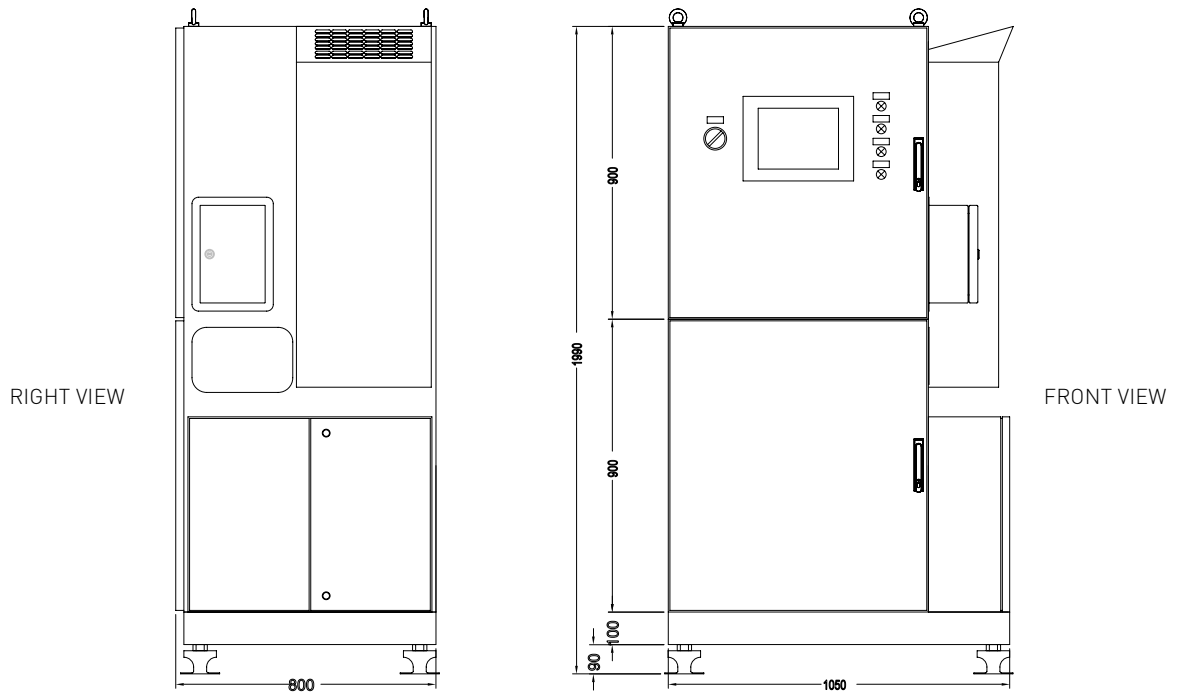
1 canister of 5 Liters / 3 operative months approx

S-K7™ SELECTION TABLE

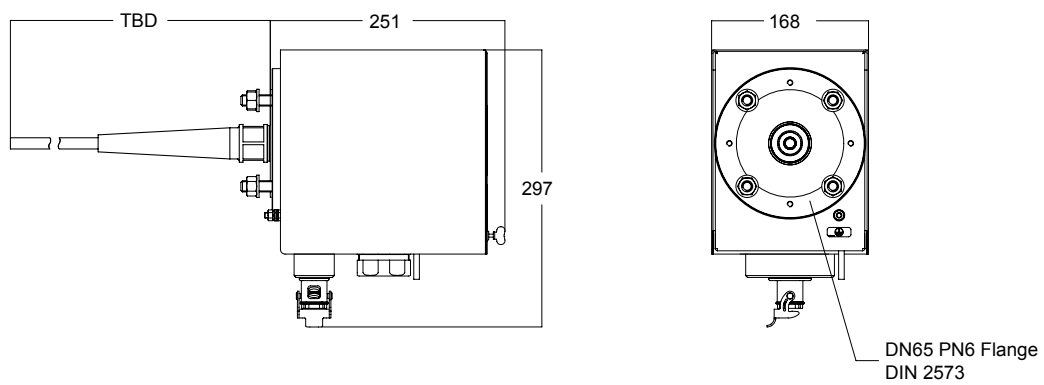
TYPE	MARPOL ANNEX VI		MEPC 177 (58) 184 (59)	ANALYZED COMPONENTS					TIER I/II/III LIMITS	MEPC Circ. 471	ISO 14001	ANALYTICAL OPTIONS
	REG.13	REG.14		NO _x	CO ₂	SO ₂	CO	HC				
EASY-N	✓	✗	✓	✓	✗	✗	✗	✗	✓	✓	✓	O ₂ , Particulate
EASY-S	✗	✓	✓	✗	✓	✓	✗	✗	✗	✓	✓	O ₂ , Particulate
EASY	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓	O ₂ , Particulate
LITE-N	✓	✗	✓	✓	✓	✗	✓	✗	✓	✓	✓	O ₂ , Particulate
LITE-S	✗	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓	O ₂ , Particulate
LITE	✓	✗	✓	✓	✓	✗	✓	✓	✓	✓	✓	O ₂ , Particulate
FULL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	O ₂ , Particulate

LAYOUTS

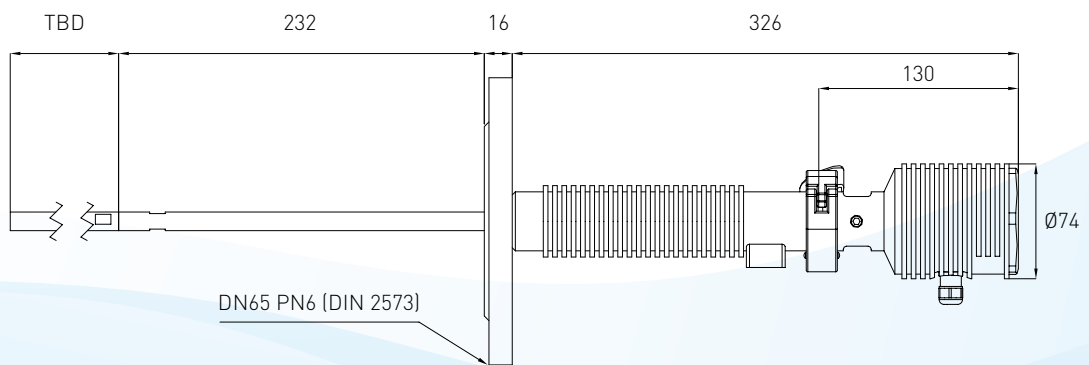
MAIN INTEGRATED CABINET



SAMPLE PROBE



PARTICULATE ANALYSER (OPTION)





S-K7™ companions

SLASHING EMISSIONS, REDUCING FUEL CONSUMPTION, MINIMIZING MAINTENANCE... IN OTHER WORDS, SUSTAINABLE SHIP EFFICIENCY. HOW? HERE'S OUR ANSWER.

POSITIVE DISPLACEMENT METERS

These liquid flow meters take accurate volumetric measurements for a wide range of liquids, from low-density LPG to fuel oil



VISCOSITY IN LINE ANALYSERS

The patented ViscoSense® system is used for continuous in-line measurement and control of fuel oil viscosity & temperature for diesel engines on ships



SHAFT POWER TORQUE & THRUST METER

Using the TT-Sense® for measuring thrust and torque results gives you an insight into your propeller efficiency, vessel pitch optimization and hull resistance



PEM PROPULSION EFFICIENCY MONITOR

The PEM4 is the first maritime solution for measuring propeller thrust, engine power and fuel consumption simultaneously



OIL DISCHARGE MONITORING EQUIPMENT

For the continuous on-line monitoring of discharge water during de-ballasting operations, the Oilcon® Mark 6 is a proven solution known worldwide



PRESSURE TRANSMITTERS

The FCX All V5 family with both aluminum and SS316 housings is simply the-state-of-the-art in pressure sensing for heavy-duty service





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