S-Keeper 7™

TYPE APPROVED CEMS

TECNOVA HT

WE MEASURE ‹ › YOU CONTROL

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), 259(68)**
- **IEC 60092-504**
- **REG (EU) 2015/757**

and already Type Approved by:

ABS CCS ClassNK
DNV – GL LLOYD Register

> 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™ could be also 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), 259(68)**
  - > 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), 259(68)**
  - > calculation SO2/CO2 ratio
  - > calculation of Fuel Oil Sulphur content (% wt/wt) vs Reg.14 limits
- According to **MEPC 177(58), 259(68)** HC total Hydrocarbons load (ppm or g/kWh) is measured
- CO2 analysis as per **MRV REG (EU) 2015/757**
- 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
- Type LITE designed for LNG powered units with Methane Slip analysis
- O2 (%) & Particulate (mg/m3 or g/kWh) analysis as additional options
- Up to 6 stacks management

S-K7™ MAIN SUPPLY

- Qty#1 Integrated Cabinet
- Qty#1-6 Sample Probe(s)
- Qty#1-6 Sample Line(s)
- Qty#1 Bottles set (according to analyzed components)

S-K7™ ANALYTICAL OPTIONS

- Qty#1 Oxygen Analyser
- Qty#1 Particulate Analyzer
- Qty#1 Multi-Stack Controller
- Qty#1 Redundant Analyser, "Plus" Option

S-K7™ TECHNICAL SPECIFICATIONS

Analyzed components measuring method

> NOx, SO2, CO, CO2, CH4: NDIR (NO with NO2 to NO converter)

> HC: H-FID heated flame ionization detector

Auxiliary inputs

Engine speed and Torque, Fuel flow, Ambient temperature, Pressure & Humidity sensors as per "NOX Technical Code 2008", EGCS Operative Parameters, 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™ 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™ 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™ 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 disposable bottle 1.7 L / 1 operative year approx

Demi water (only lite-s, lite, full models)

1 canister of 5 Liters / 3 operative months approx

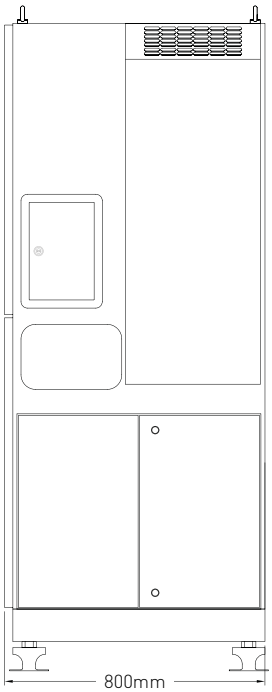
S-K7™ SELECTION TABLE

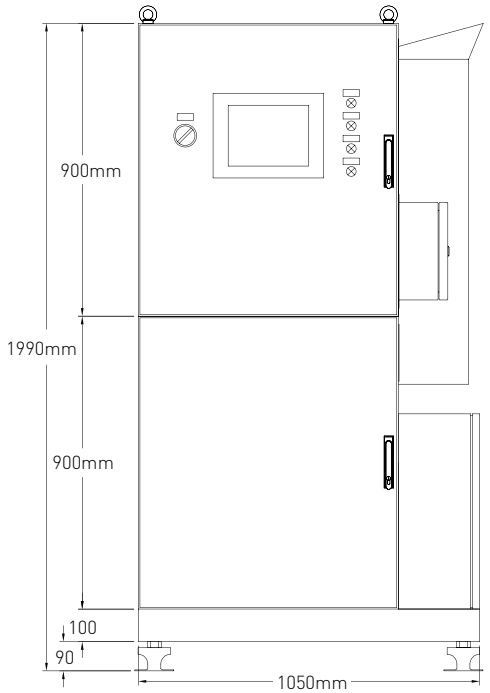
Type	MARPOL Annex VI		MEPC 177 (58) 184 (59)	MRV	Analyzed Components						Tier I/II/III Limits	MEPC Circ. 471	ISO 14001	Analytical Options
	Reg.13	Reg.14			NOx	CO2	SO2	CO	HC	CH4				
EASY-N	✓	✗	✓	✓	✓	✓	✗	✗	✗	✗	✓	✓	✓	O2, Particulate, Plus
EASY-S	✗	✓	✓	✓	✗	✓	✓	✗	✗	✗	✗	✓	✓	O2, Particulate, Plus
EASY	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✓	✓	✓	O2, Particulate, Plus
LITE-N	✓	✗	✓	✓	✓	✓	✗	✓	✗	✗	✓	✓	✓	O2, Particulate
LITE-S	✗	✓	✓	✓	✗	✓	✓	✓	✓	✗	✗	✓	✓	O2, Particulate, Plus
LITE	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓	✓	O2, Particulate
FULL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✓	O2, Particulate

LAYOUTS

MAIN INTEGRATED CABINET

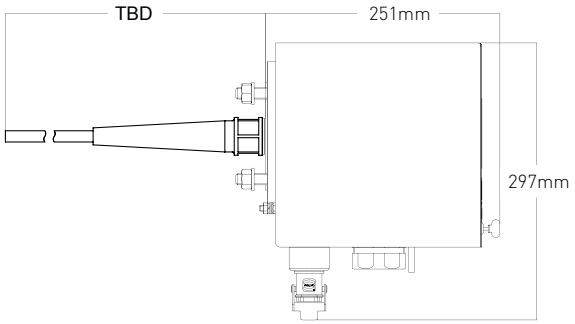
RIGHT VIEW

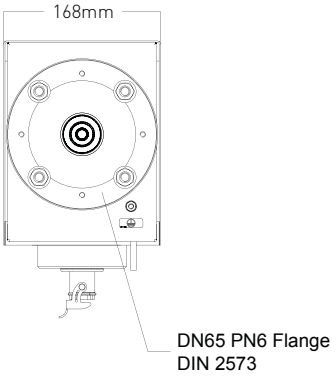


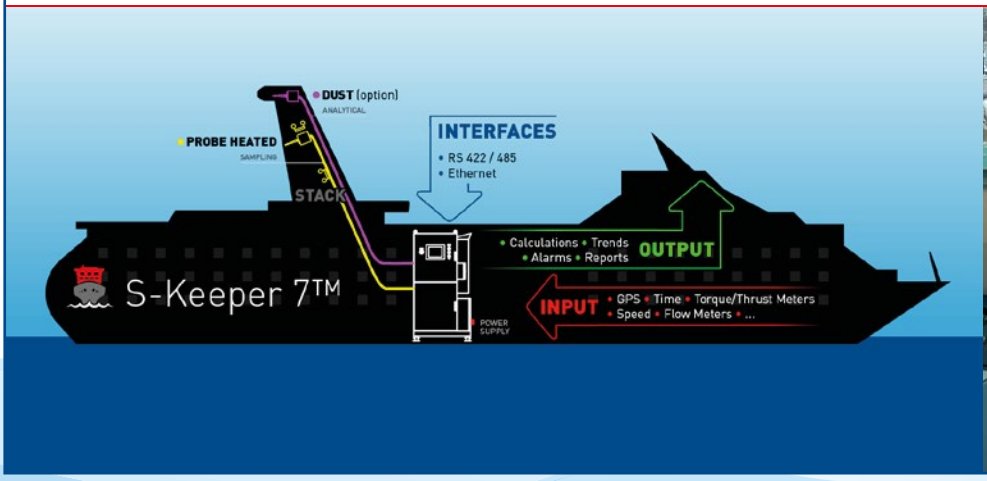


FRONT VIEW

SAMPLE PROBE





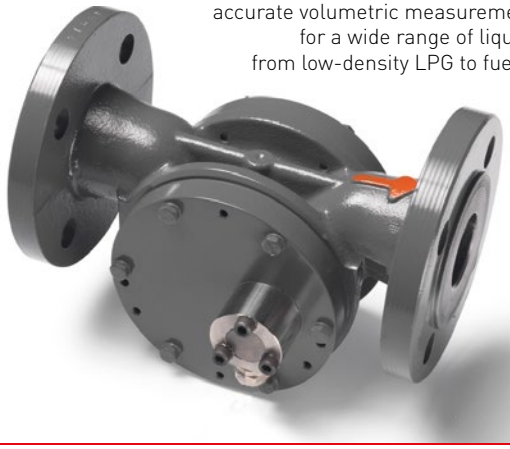


S-K7™ companions

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

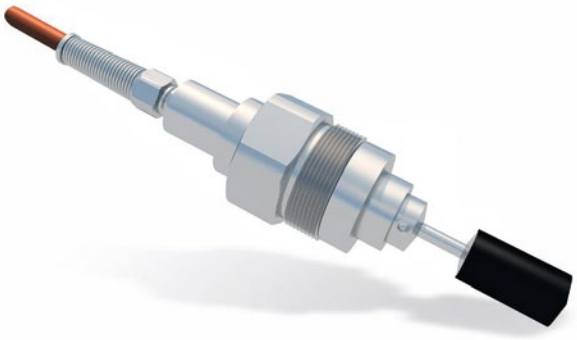
POSITIVE DISPLACEMENT METERS

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



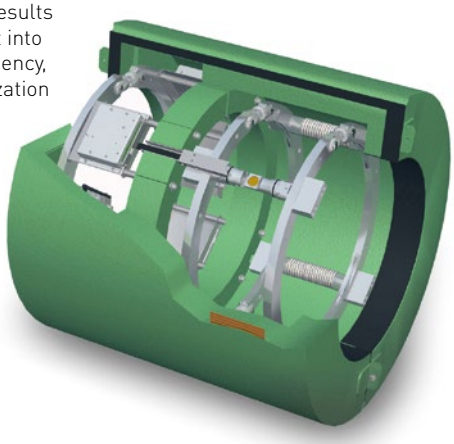
VISCOSITY & DENSITY IN LINE ANALYSERS

ViscoSense®3D is a highly accurate in-line sensor metering density, viscosity and temperature in fuel oil streams. In combination with VAF Instruments PT2 Flowmeters this measurement system is a cost effective solution for mass flow measurement.



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

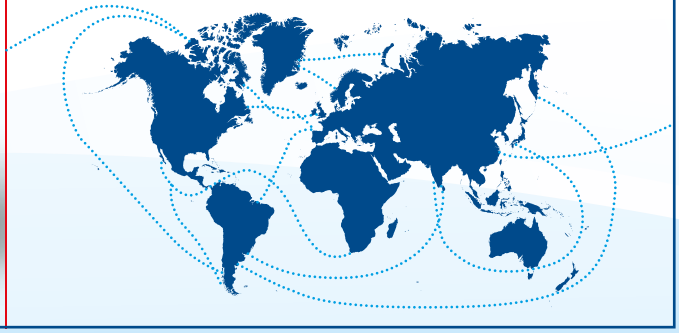
The PEM4 is the first maritime solution for measuring propeller thrust, engine power and fuel consumption simultaneously

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

IVY® PROPULSION PERFORMANCE MANAGEMENT

From ship to shore, IVY® enriches big data for powerful analysis, fleet and ship performance visualization and insight into the relevant data and KPI's via the IVY® dashboard. Already in compliance with MRV and IMO reporting.



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