

2023/1



COMPANY PROFILE & PRODUCT GUIDE

OIL QUALITY MANAGEMENT

ON-SITE CONDITION MONITORING OF FUEL, LUBE & HYDRAULIC OIL



ABOUT MARTECHNIC®

More Than 25 Years of Tradition and Innovation

Fuel, lube and hydraulic oils are crucial fluids in operating nearly all types of engine. Regular oil analysis is a key proactive maintenance method to promptly detect any off-specification issues (degradation of oil quality or abnormal wear) or changes in the oil condition (oil contamination) before an actual problem occurs.

Since its founding in 1997, Martechnic®'s dedication is to provide engineers and users with equipment and management solutions to conduct continuous preventive and condition-based maintenance. As a small family-owned business, Martechnic® has an excellent expertise in oil quality management. For over 25 years the company has been designing and developing innovative technical solutions to assist engineers in effective and safe running of various engine types, thereby reducing cost, protecting the environment, saving precious resources and supporting sustainable development.

Martechnic®'s oil analysis equipment enables users to routinely measure, monitor and analyse crucial oil parameters of fuel, lube and hydraulic fluids promptly and directly on site. The tests are easy to perform and provide operators with independency and re-assurance not achievable by external laboratory analysis alone. Quick and accurate test results and their direct assessment allows adequate preventive maintenance actions to fix minor problems and to avoid costly machinery damages and unplanned downtimes. Oil trend analysis with Martechnic®'s test kits provides possibility to efficiently plan on necessary maintenance time and to extend the maintenance intervals.

As any results gained either in laboratory or by on-site testing always depend on the oil sample drawn, Martechnic® offers suitable oil sampling equipment to obtain representative samples, so that the efforts invested in maintenance can pay off. The company's products include drip samplers and cubitainers for obtaining representative MARPOL fuel oil samples and various sample bottles for fuel, lube and hydraulic oil. All the equipment is completed with a tamper-evident technology for effective protection from any external contamination.

Oil analysis with intelligent sensor technology of "MT Modular Monitoring System" enables continuous condition monitoring and real-time data on specific oil parameters. Automatic early-warning system of the sensors provides for immediate identification of any occurring changes in the oil condition. So relatively small issues can be efficiently tackled at the pre-alarm level during the uninterrupted operation process of machinery.

Martechnic® offers environmentally friendly ultrasonic cleaning technology to provide gentle and efficient cleaning of heavily fouled machine parts with difficult-to-reach areas.

Applications where Martechnic®'s equipment is in use are manifold, yet especially in places where engineers can rely only on their equipment and expertise alone. Among Martechnic®'s customers are shipping companies, navies, power plants, oil companies, process industries, railways, mining and construction companies, and others.

Martechnic®'s daily commitment is to meet the customer's requirements with fast and individual response, application specific solutions, and efficient order processing. A global network of Martechnic®'s partner companies provides for 24-hour customer service and worldwide delivery.

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PORTABLE OIL TESTING EQUIPMENT

It is important to know the actual condition of mineral oil in order to run engines without waste of these fluids, unnecessary down times or even catastrophic engine failure. Martechnic® brings test equipment to the user on site, allowing immediate assessment of the oil quality, and effective decisions as well as measures taken at the right time.

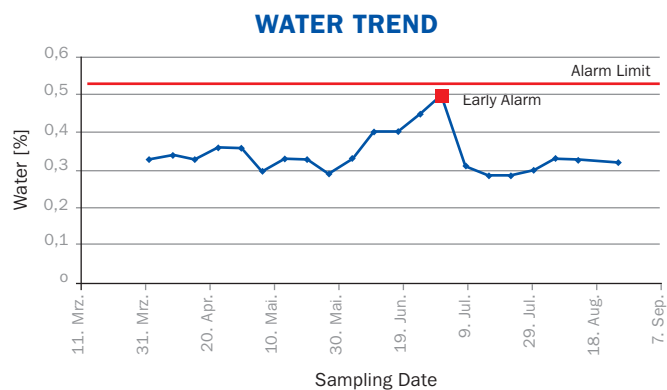
Inferior or degraded quality of a product may get noticed; engine wear may be recognized before severe damage or failure occurs; maintenance intervals can get adjusted right as actually necessary; or in the worst case the reasons for engine problems can get traced. Different applications have different important parameters, and so various combinations of tests could make sense.

TREND ANALYSIS

One of the most valuable benefits of frequent on board testing: TREND ANALYSIS

Example:

Development of Water-in-Oil Content on a generator engine.



TWIN CHECK 4.0

Electronic Water-in-Oil / BN Test



Water in oil is, has been, and will be omnipresent threat to any mineral oil application, and base number (BN) is a crucial parameter for diesel engines. The test device TWIN CHECK has been both developed and designed to achieve immediate indication on the oil condition on site as well as continuous trending of it in daily operation.

The TWIN CHECK 4.0 provides the benefits of digitalization concept in a customer-friendly way including easy-to-use navigation menu, optimized measurement procedures, automatic data recording and storing, USB to serial connection (terminal program) for accurate trend analysis etc.

The modular design of the TWIN CHECK 4.0 enables easy cost-effective replacement of constituent parts (no matter plugged or screwed) directly on site in the case of malfunction or damaged occurred.

▼ The interchangeable parts of the TWIN CHECK 4.0 include a display in conjunction with a mainboard, a cable connection between the mainboard and pressure transmitter (pressure sensor), 9V block battery, a cable connection to the battery, USB cable and a reaction vessel.



TWIN CHECK is delivered as a test kit including the reagents and accessories required for Water-in-Oil and BN tests

FEATURES

PARAMETERS TO MEASURE

Water-in-Oil

- Measuring range: 0 – 1.0 vol. % H₂O
- Processing time: depends on the measured value (min. 2 - max. 20 min.)
- Accuracy: +/- 3 %

Base number

- Measuring range: 0 – 150 BN
- Processing time: depends on the measured value (min. 2 - max. 20 min.)
- Accuracy: +/- 1BN

Also available as single test unit: Water-in-Oil (WIO CHECK E) or BN (ALCA CHECK)

BENEFITS

- Applicable for all mineral oil based fluids
- Improved design with easy-to-follow navigation menu for high accuracy measurements
- Internal memory chip with average data storage capacity of 2.5 years
- Digital read-out of test results
- USB to serial cable connectivity for data transfer and trend analysis
- Water-in-oil measurement: 6 modes for up to 6 various oil grades or different engines
- BN determination: 6 modes for up to 6 various oil grades or different engines
- Maintenance and repair on board is possible

WIO CHECK

Traditional Water-in-Oil Test

Since its introduction as an on-site test in the mid-70ties, the water-in-oil test has become the most portable test kit item for checking oil quality on spot. WIO CHECK keeps on with this tradition and provides a sturdy and time proven measuring unit for reassurance about current water content at any time. It has integrated modern chemical development in order to provide up-to-date reagent solutions.

FEATURES

Measuring range

- Water-in-Oil: 0 – 0.4/1.0 vol. % H₂O
- Measuring time: up to 20 min.
- Accuracy: +/- 3%
- Easy to maintain
- Gauge could get changed by user



WIO CHECK is delivered as a test kit with necessary reagents and accessories

MT TEST KIT VERIFIER

Modern safety requirements demand ever more procedures followed on board, as for example the ISM Code Part A; Paragraph 10.3

“...These measures should include the regular testing of stand-by arrangements and equipment or technical systems that are not in continuous use.”

The MT Test Kit Verifier allows the application of this regulation on Martechnic® pressure test equipment: TWIN CHECK 4.0, WIO CHECK, WIO CHECK E and ALCA CHECK by employing a calibrated pressure check. That way regular calibration requirements could get met, or a device verified against possible malfunction at any time.



COMPA DENS CHECK

Density, Compatibility and Stability Determination – Triple Test Kit

Fuel is paid by weight and delivered in volume. The key to this critical calculation is DENSITY. The precise determination of a fuel's density is essential when calculating its weight from its volume. The COMPA DENS CHECK enables accurate determination of density in light and heavy fuels as well as lubricants and hydraulic fluids from 0.82 up to 1.05g/ml, directly converted to the standard temperature of 15°C.

Almost all heavy fuel oil is blended at some stage. This is an increasing development connected to the lowered sulfur cap and increased demand of low sulfur fuels. During blending or on subsequent storage, reactions can occur that result in sludge formation. The aromaticity or solvent capacity of the fuel oil can be too low and an asphaltene precipitate will occur. Filter blockage, reduced fuel injector performance, poor combustion, and even damage to piston rings and liners may occur.



Test Kit COMPA DENS CHECK
incl. accessories

Fuel blends should get checked for stability upon delivery. Bunkers of different supply should be kept segregated whenever possible and being checked for compatibility before getting mixed in the same tank. The test method applied by COMPA DENS follows ASTM D4740-04(2014).

FEATURES

Density:

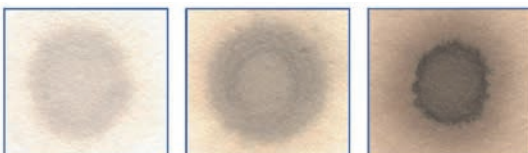
- Measuring range: 0.82 - 1.05 g/ml
- Measuring time: about 2 min.
- Oil sample: 120 ml
- Accuracy: +/- 3 %

Stability/ compatibility:

- Measuring range: all heavy fuels + MGO
- Measuring time: about 20 min. according to ASTM
- Oil sample: stability - 100 ml/ compatibility - 2 x 50 ml
- Accuracy: go/ no go

BENEFITS

- Quick and adjustable heating
- Accurate and reliable analyses
- Four various hydrometers with automatically converted density value from 50 °C to 15 °C
- Directly observable compatibility/ incompatibility test-results
- Easy to handle even for untrained personnel



Degree of soot contamination

light	medium	heavy
Fuel dilution		
no	no	no
Remaining detergent-dispersive power of lube oil		
good	good	good



Degree of soot contamination

moderate	moderate	no
Fuel dilution		
light	moderate	heavy
Remaining detergent-dispersive power of lube oil		
poor	poor	poor

SPOT CHECK

Quick Insolubles Test

The **SPOT CHECK** is a quick and cost-efficient test method to determine contamination of engine lube oil with insolubles and in particular to routinely monitor the soot load. Regular testing enables detection of any occurring changes in the oil condition providing valuable indications on irregularities and impending malfunction of an engine. There by the costs of engine failures, major damages and uncontrolled downtimes can be avoided.

Just drip one drop of engine lube oil on SPOT CHECK paper and let it dry out. The oil flows through the capillary structure of the chromatographic paper and the picture of the resulting spot will indicate:

- Degree of soot contamination
- Fuel dilution
- Remaining detergent-dispersive power of lubricating oils.

TOTAL IRON CHECK

Digital Test for Chemical Determination of Total Iron Content (Patent Number: 2982974)



Cylinder condition monitoring of two-stroke marine diesel engines through regular measurement of total iron content in cylinder drain oil (CDO) samples and remaining base number (BN) are of crucial importance to optimize cylinder oil feed rate and to properly lubricate cylinder components in order to provide safe as well as cost-effective engine operation.

The determination of total iron content in CDOs as per recommendation of major engine manufactures is performed by means of the Cylinder Drain Oil (CDO) analysis also called Scrape Down Analysis (SDA).

The amount of total iron present in the CDO provides direct indication of wear and tear of the cylinder components surrounding the engine combustion chamber (pistons, piston rings and cylinder liners). The CDO analysis with on-board digital test device TOTAL IRON CHECK allows accurate monitoring of the trend of total iron content in the CDO in use. The total iron is the combination of two different wear types of engine cylinders:

1. abrasive iron wear (ferromagnetic iron particles);
2. corrosive iron wear or so-called "cold corrosion" (non-magnetic iron salts).

Therefore, the measurement of total iron enables identification of both types of iron wear. The measurement method of the TOTAL IRON CHECK is based on the chemical determination of the total iron content in mg/kg (ppm). A two-chamber measuring system of the TOTAL IRON CHECK enables simultaneous testing of two CDO samples. The representative CDO sample without any pre-treatment is subjected to chemical reaction occurring between the special reaction liquid and the iron in the CDO sample. The TOTAL IRON CHECK identifies, measures and displays all iron particles in the range up to 1100 mg/kg (ppm), independent of the particle size. The measured values will be automatically saved on the internal memory chip. After the automatic measurement the presence of iron in the CDO samples can also be observed visually. The color of the liquid in the test glass vials can get different shades of blue and is directly related to the amount of iron present. The darker the hue of the liquid, the higher level of iron concentration the CDO samples contain.



Examples of Different Total Iron Concentration Measured in cylinder drain oil (CDO) Samples

> FEATURES

- Measuring range: 15/20-1100 mg/kg (ppm)
- Measuring temperature: 70 °C
- Measuring time: about 20 min. for two cylinder drain oil (CDO) samples
- Measurement method: illuminance meter with LED source
- Accuracy: +/- 20 mg/kg (ppm) (confirmed repeatability of test results)

> BENEFITS

- Precise semi-automatic measurement of total iron content
- Processing of two samples simultaneously (effective time-saving technique)
- Easy-to-read, digital display of test results
- Storage of the measured iron values per cylinder with date and time stamps
- Early warning of abnormal wear processes in case of regular application
- Efficient adjustment of lubrication of crosshead engines

- ▼ The latest improved version of the test device includes the following advanced features:
1. Upgraded navigation menu with the possibility to create individual named data slots for up to 20 different cylinders units.
 2. Large memory capacity: storage of 400 measured values with date and time stamps.
 3. USB to serial connection for transfer of test results into a terminal program and further into Excel or similar software.

MT CAT FINES CHECK

Cat Fines Determination Test Kit for Al and Si based Cat Fines

The abrasive action of catalyst fines can significantly reduce the quality of bunker fuel oil and cause very rapid wear on ship engines.

The test kit MT CAT FINES CHECK is specifically designed by Martechnic® to detect the presence of these hard abrasive particles in heavy fuel oil (VLSFO, HSFO) in a simple and quick test procedure.

The test method is based on the analysis of two samples of heavy fuel oil before and after on-board separation measures in fuel oil treatment unit and prior to the engine inlet. This enables assessing the quality of the treated bunker fuel and the effectiveness of separation system in reduction of cat fines contents to the acceptable levels for the engine system (recommended below 10 mg/kg (ppm)).

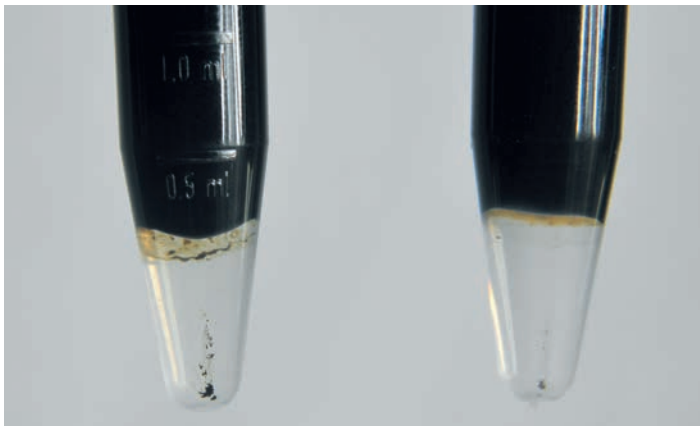


> FEATURES

- Measuring time: approx. 15 min.
- Run up to 8 tests at the same time
- Visually quantifiable

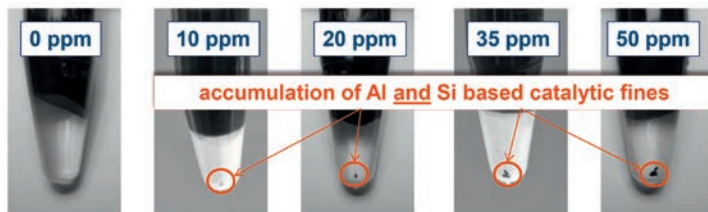
> BENEFITS

- Easy and quick test method
- Applicable for all types of heavy fuel oil
- Demonstrative test results
- Easy to use even for untrained personnel
- Cost effective



BEFORE SEPARATOR

AFTER SEPARATOR



IMAGES BELOW IN ORIGINAL VIAL SIZE – FOR

COMPARING HOLD VIALS ON RED BORDERED AREAS



UP TO 8 SIMULTANEOUS MEASUREMENTS POSSIBLE

Test procedure: prepare the HFO samples for analysis. The prepared samples are placed in the centrifuge in a parallel position for the fixed time. After that the samples are ready to be visually compared. Direct quantitative evaluation of cat fines concentration can be conducted by means of the comparison chart (depicted on the left) after a separator and before the engine.

VISCOSITY COMPARATOR

Go / No Go Viscosity Determination

Viscosity of lubricating and hydraulic oils should be checked frequently in order to avoid engine malfunction. A deviation of 10% from standard viscosity means a considerable risk.



> FEATURES

- Measuring range: max. lube oil
- Measuring time: about 3 min.

> BENEFITS

- No chemicals required
- Quick to apply
- Operationally effective
- Easy to use for untrained personnel

JUNG CHECK

Falling Ball Viscosity Measuring Device

The test device JUNG CHECK is a falling ball viscometer for measuring viscosity of lubricating and hydraulic oil promptly and directly on site. The JUNG CHECK consists of a metal tube with a built-in thermometer to know the oil sample temperature.

The measuring method is rather simple, but precise: viscosity is determined through measuring the elapsed time required for a metal ball to fall under gravity through the oil-filled tube. Thereby, the use of the mirror and an optical trick help to check the position of the metal ball. The test device is then rotated 180 degrees for immediate repeat measurement. After three measurements are taken, the average falling time is calculated and the corresponding temperature is registered, a final viscosity value can be determined with the help of a V-T diagram.

Three different metal balls of various sizes are provided to cover different viscosity measurement ranges.

> FEATURES

- Measuring range: 10 – 999 mm²/s
- Measuring time: about 5 min.
- Accuracy: +/- 3%

> BENEFITS

- Quick determination of oil quality
- No supplementary chemicals required
- Accurate test results



✓ The **VISCOSITY COMPARATOR** is an easy-to-perform test, providing a go/no go answer whether the viscosity is still in OK range or immediate action is recommendable. The viscosity is compared to fresh oil in one single testing device.

VISCO DENS PLUS

Heated Electronic Falling Ball Viscosity Measuring Device



> FEATURES

Measuring range

- For viscosity: 1 – 999 mm²/s
- Measuring temperature: 40 °C, 50 °C, 80 °C
- For density: 0.82 – 1.05 g/ml
- Required sample: approx. 200 ml
- Measuring time: about 15 min.
- Accuracy: +/- 3%

> BENEFITS

- Only one device to measure two important parameters
- No oil sample change for each test
- Three different temperatures applicable
- Four different hydrometers with automatically converted density value to 15 °C

Applying this test device, viscosity and density get measured in the same test tube and of the same sample. Measuring is possible at three different temperatures.

The test equipment includes 4 hydrometers to measure density. By employing the corresponding hydrometer, the density of fuel oils at 15 °C will be determined. With actual density known, it is possible to measure viscosity most accurately. Simply use the same pre-heated sample and employ the falling ball principle.

Both test results provide excellent information on actual quality of bunker taken in and used. Lubrication oil viscosity could be compared directly with ISO Charts because of the exact measuring temperature of 40 °C.

MT AN CHECK

Easy to use AN titration test

High operation temperatures severely stress the oil. This results in oxidation and nitration, viscosity increase, forming of acid sludge and sludge deposits. Acid number or AN is a measure of both organic and inorganic acid contamination within the oil. The handy and easy to use titration test is even possible to use on site like for hosting winches, steering gears, cargo cranes, etc.

With our new AN RMD CHECK we are also able to test RMD fuel.

> FEATURES

Measurable Parameters

- Measuring range: 0–3 AN
- Measuring time: about 3 min.
- Area of application: hydraulic, gear and turbine oil
- Accuracy: +/- 0.1 AN



SALT CHECK

Salt Water Determination Test Kit

It is important to know the nature of water (fresh or salt) found in lubricating or fuel oil as it might give some help in identifying the source of the leakage.

✓ The **SALT / FRESH WATER CHECK** is an easy and quick method to check the salinity in fluids: through the color change of the indicator pad the salt test proves this in a few minutes.

> FEATURES

- Measuring range: go/no go
- Measuring time: about 10 min.

SAMPLING KIT

Quick Sample taking

The Sampling Kit enables to take a sample of fuel, lube and hydraulic oil with a tube which is fixed at a telescope rod. By using the vacuum pump which is coupled with an adapter at a sample bottle, it is possible to suck the oil sample out of the tank from top, middle and bottom.

With the included detection paste it is possible to prove if free water is in the tank. Free water can get detected within 30 seconds, by a colour change of the paste. If the paste doesn't change the color, water in oil test with WIO CHECK from Martechnic® could be done to determine if saturated or emulsified water is in the oil.

> FEATURES

- Provides an indication of free water in the oil tank
- Operating time: about 2 min.
- The sample bottles are suitable for water, emulsions and low viscous mineral oils up to a viscosity of 1200mm²/s at 20°C.
- Adhering iron filings at the magnetic head of the telescope rod could be an indication of friction

> BENEFITS

- Easy to handle also for untrained personnel
- Quick detection of free water in oil tanks



INSOLUBLES CHECK

Visual Particle Determination

It is the purpose of the INSOLUBLES CHECK to provide detailed information about particles regarding their nature, size and relative quantity.



> FEATURES

- Measuring range: Particle > 3 μm
- Measuring time: about 15 min.
- Application: Lube and hydraulic oil

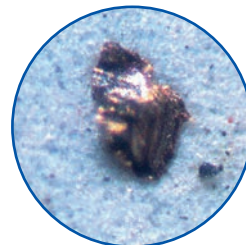
> BENEFITS

- Corresponding to the particles on the filter the result is readable directly
- Problems can get recognized at an early stage
- Easy to handle also for non-trained personnel
- Handy to use and for transport

The test procedure is based on a vacuum filtration system used to filter insoluble particles out of the oil sample. These particles will form a deposit on a molecular filter, allowing their visual inspection by a micro magnifying lense.

It so becomes possible to determine the relative quantity, the size and actually the source of the contamination, e. g. whether their nature might be out of rubber, chrome, brass, steel or rust.

Friction at pistons, pumps, etc. could get recognized even at an early stage – and maintenance measures effectively directed at the root cause of a problem.



FLASH POINT CHECK

Closed Cup Flash Point Test / Pensky-Martens

The identification of possibly hazardous liquids is a safety issue in manifold applications. The test device FLASH POINT CHECK allows this both on site and right on time where and when flash point verification of mineral oils is required.



> FEATURES

- Measuring range: ambient temperature – up to 200 °C
- Measuring time: about 15 min.
- Accuracy: +/- 2% < 100 °C
+/- 6°C > 100 °C

> BENEFITS

- Closed cup method leaning on ISO 2719 DIN EN 22719 and ASTM D-93
- Flash point read-out in °C
- Approved by German Navy for field use

According to strict international requirements of International Convention for the Safety of Life at Sea (SOLAS) and ISO 8217:2017, the flash point of marine fuels has to be minimum 60°C. If the flash point is lower, this can be due to some low flash point components used for fuel oil refining and blending processes of very low sulphur fuel oils (VLSFOs) or indicate fuel dilution in engine oil, thus increasing a risk of spontaneous fire and/or explosion.

Field-tested and approved by the German Navy, the FLASH POINT CHECK is based on Pensky-Martens Closed Cup Flash Point method. The test device enables determination of the flash point in diesel fuel, biodiesel and gas oils in accordance with ISO 2719 DIN EN 22719 and ASTM D-93 test methods.

✓ Precision in measurement is achieved through simulation of real-life conditions of accidental exposure of a closed environment/container to a potential source of ignition. A small amount of oil sample is heated in the closed cup test device to the temperature of about 20°C below the expected flash point and then subjected to small flame with the help of the ignition tool. The sample is checked for inflammability with 1°C temperature increase interval. As soon as the inflammation of gas occurs (i.e., a flash appears), the lowest temperature is registered as the flash point of the sample.





MULTIPARAMETER TEST KITS

- Water-in-oil
- Flash point
- Insolubles
- Viscosity
- Density
- Pour point
- BN (alkalinity reserve)
- Compatibility/Stability
- Salt water determination
- Cat Fines
- Iron
- AN

Water in oil is the omnipresent enemy to every mineral oil application and requires focused attention. Gas oil and lube oil are enemies, too, because a reduced flashpoint of a lubricant gives the risk of a crankcase explosion. Viscosity is a major criteria to assess whether a supplied product matches with the quality stated on the delivery note. Fuel gets delivered by volume and is paid for by weight, and so density is a critical commercial factor. These are only a few reasons to test, and in so many cases it is most beneficial to get assuring results right on the spot, rather than only with delay and detour through an external lab.

All test equipment has been designed to be quick and easy in operation and to be used also by persons unskilled in laboratory procedures. However, the attention paid by the user, cleanliness and maintenance of the equipment as well as its storage conditions may affect the degree of accuracy obtainable. Portable test kits do not have the same accuracy as laboratory analysis devices. They do not fully replace, but complement them.

We offer following standard test kits for nearly all areas of application. Customized test kits are available on special request.

ALWAVIS CHECK

VARIO – Lube Oil Test Kit for 3 Different Parameters

➤ FEATURES

Measurable Parameters

- Water-in-Oil
- Base Number
- Viscosity comparator



LUBE OIL CHECK

VARIO – Lube Oil Test Kit for 4, 5 or 6 Different Parameters



Image refers to the test kit LUBE OIL CHECK 6

➤ FEATURES

LUBE OIL CHECK 4

- Water-in-Oil
- Base Number
- Viscosity comparator
- Insolubles

LUBE OIL CHECK 5

- Water-in-Oil
- Base Number
- Viscosity comparator
- Insolubles
- Salt Water Contamination

LUBE OIL CHECK 6

- Water-in-Oil
- Base Number
- Viscosity comparator
- Insolubles
- Salt Water Contamination
- Viscosity, falling ball

COOLANT & LUBE OIL TEST KIT

COOLANT – Customized Test Kit Example for an Emergency Generator

➤ FEATURES

Measurable Parameters

- Water-in-Oil
- Hardness
- Chlorides
- pH
- Antifreeze
- Corrosion inhibitor
- Viscosity comparator
- Insolubles



COOLANT – Customized Test Kit Example for an Emergency Generator.



MT COOLING WATER CHECK

VARIO – Customized Test Kit for 3 Different Tests

➤ FEATURES

Measurable Parameters

- pH Value
- Chlorides
- Nitrite

FUEL AND LUBE OIL TEST CABINET

Fuel and Lube Oil Test Cabinet: Basic Version and Customized Options

The TEST CABINET is a portable laboratory which provides efficient and exact condition monitoring of fuel, lube and hydraulic oil in engines.

By executing the short and easy-to-handle test procedures, nearly instant confirmation on the essential fuel and lube oil properties gets achieved, enabling the user to take effective decisions right at the time when they are required. It is possible to prolong maintenance intervals or to avoid damage in engines.



FUEL AND LUBE OIL TEST CABINET
Basic Version incl. Reagents and Accessories

Customized versions of the FUEL AND LUBE OIL TEST CABINET can be offered according to individual requirements, a specific field of application and in all possible combinations. New Option: also available with MT Cat Fines and Total Iron Check.



FUEL AND LUBE OIL TEST CABINET Option II: MT CAT FINES CHECK +
TOTAL IRON CHECK incl. Reagents and Accessories

> FEATURES

Basic version allows testing of major oil parameters

- Viscosity (absolute and comparison)
- Density
- Water-in-Oil
- Base Number
- Salt water contamination
- Compatibility/Stability
- Insolubles

Option I: Pour Point, Flash Point

Option II: MT Cat Fines Check, Total Iron Check



OIL SENSOR TECHNOLOGY

Lots of operators desire to be supported in terms of monitoring systems which reliably monitor the sensible components of machinery by day and night. The only way to achieve this aim is to install sensors which permanently control the oil status and quality by measuring certain parameters as they are crucial and individually important for the operation of engines and machines. The Martechnic® Oil Sensors are such devices.

A major breakthrough from Martechnic® in maintenance technology offers operators and manufacturers advanced warning and peace of mind in lube oil management. Water-in-lube-oil is a constant threat to a broad array of machinery. With state-of-the-art infrared technology Martechnic® can now offer a sensor system to provide constant surveillance and quantitative measurement of water contamination – in saturated, emulsified and free states.

Particles measured by laser-light extinction, viscosity, humidity and iron wear are further parameters which are covered by the Martechnic® Oil Sensor range. These sensors could stand alone or can get readily integrated into predictive maintenance or expert management systems.

MT MODULAR MONITORING SYSTEM

The MT MODULAR MONITORING SYSTEM is an assembly of various sensors connected with a data logger. It is possible to monitor water content, viscosity and particles on the same engine, or any other combination of applications.

The components can get selected individually – and specifically for certain applications. Should monitoring for any parameter not being required, the corresponding components get taken out of the scope of supply, and the investment will be amended accordingly.

> FEATURES

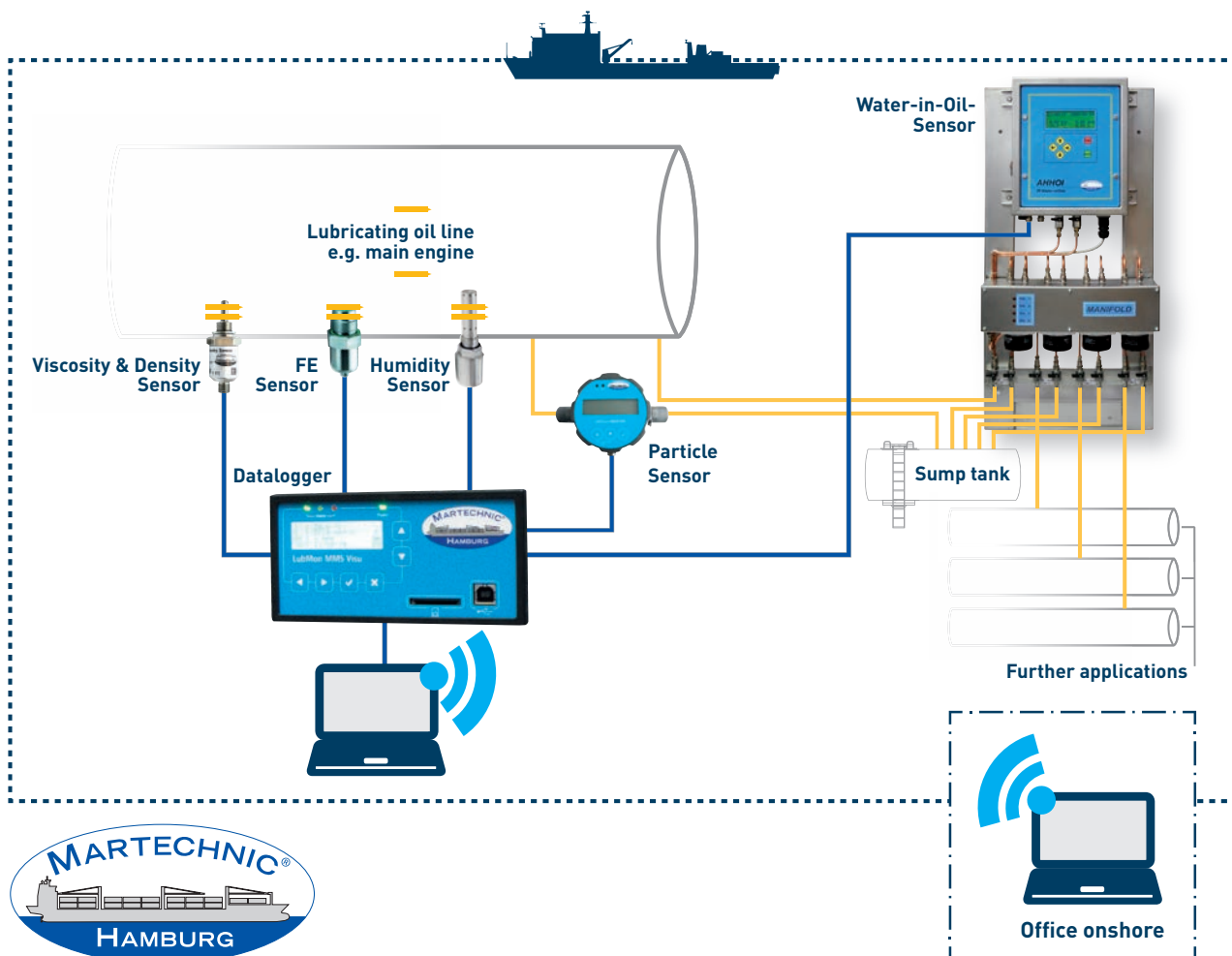
Measurable Parameters

- Water-in-Oil/Humidity
- Viscosity
- Density
- Particles
- Iron

> BENEFITS

- Continuous Monitoring
- Plug & Play
- Customized to any Application

MARTECHNIC „MODULAR MONITORING SYSTEM“



PARTICLE SENSOR

Application area

The Particle Sensor is a compact measuring device for continuous monitoring of the oil contamination in hydraulic fluids and lubricants.

Measuring principle

This sensor is an optical particle counter which applies the so-called laser-light extinction principle. This means that the particles are classified within a measuring cell regarding their size and quantity. The measured values are displayed according to ISO 4406:99 and SAE AS 4059 respectively.

The Particle Sensor monitors and displays precisely any change of contamination in an oil system. In that way it is possible to react quickly when an increase in particle concentration occurs and the appropriate countermeasures can be taken before subsequent damage occurs.

TECHNICAL DATA

- Measuring range: 4, 6, 14, 21 μm
- Cleanliness classes according to: ISO 4406:99 and SAE AS4059
- Voltage: 9 – 33 VDC
- Fluid pressure: up to 420 bar
- Fluid rate: 50 – 400 ml/min
- Temperature: -20 °C to +85 °C
- Protection class: IP 67
- Interface: RS232/CAN; 4 – 20 mA
- Data memory: 3000 data records (internal)
- Fluid compatibility: mineral oils (e.g. HLP), ester oils (e.g. HEES/HETG)



AHHOI IR – WATER IN-LINE

The **AHHOI – Infrared Water-in-Oil Sensor** (patent number: 2009439) is a development by Martechnic® using the IR principle to detect water in lubricants of different nature and application. It measures all three possibilities of water being present (saturated, emulsified and free water) in molecular form up to 10000 ppm/1.0 vol. % and operates on a bypass system. It is applicable with diesel engines, gearboxes and hydraulic systems, and can be readily integrated on-site or remote alarm systems and maintain a permanent condition record for survey compliance purposes. Software for trend analysis is available on the Martechnic® website.

Due to the bypass nature of the installation the system could get fitted with a manifold to connect up to four sampling points, making the IR Sensor useable for up to four engines/applications. The management of the four channels is made by the system, with four different calibrations available, adapted individually for the oil grade(s) in use.



➤ FEATURES

- Measuring range: 0 – 10000 ppm/
0 – 1.0 vol. % water
- Operating voltage: 100 – 240 V AC/50 – 60Hz,
24 VDC is available on request
- Electric power: 100 – 220 V AC/50 – 60Hz
- Pressure oil system: 1 – 10 bar
- Operating pressure: 0.8 – 1.5 bar
- Temperature: 0 – 59°C

➤ BENEFITS

- Low maintenance expenditure
- Continuous measurement of water content
- All states of water
- Easily installed, retrofit or new installation

The system has to be connected to the oil system of the machinery with a pressure range between 1 to 10 bar. The sensor of the system is protected by an inbuilt oil filter and should be operated at a constant pressure of 1 bar which is managed by a constant pressure reducing valve. The AHHOI requires a pressure free outlet (atmospheric drain) and incorporates a flush through system for cleaning.

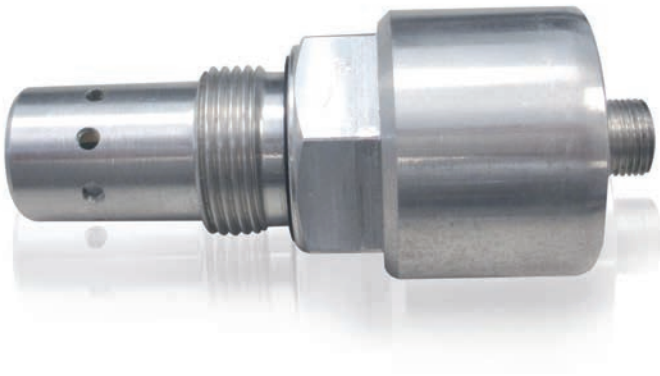
The system is housed in a A3 sized IP 54 steel box and requires 100 – 220 V and has both serial and analogue outlets (0–20/4–20 mA) available.

HUMIDITY SENSOR STANDARD

Application area

High concentration of water can cause severe disturbance in operation and damage the engine and the auxiliary diesel for example. In laboratories, the absolute water content is defined in ppm (parts per million). This has the advantage that it is not necessary to know the saturation limit in order to determine if there is free or dissolved water.

The relative humidity is calculated in% in the range from 0% (no water detected) to 100% (complete saturation/existence of free water). The Humidity Sensor Standard provide all basic functions of humidity measurement in any mineral oil based application but is the ideal tool were the space for installation is limited.



► TECHNICAL DATA

- Measuring range: 0 – 100% (rel. humidity)
- Temperature range: -20°C to +85°C
- Voltage: 9 – 33 VDC
- Max. fluid pressure: 50 bar
- Protection class: IP 67

Example

- Mineral oils (e. g. HLP) have a comparatively low water absorption capacity. 500 ppm may signify that the oil is over-saturated and free water exists.
- Ester oils (e. g. HEES) have a relatively high water capacity. 500 ppm may show that the oil is just saturated by 15%.

Note:

Warm oil can absorb more water than cold oil. Therefore the relative humidity of the oil increases in case of no further water supply. Hot, relatively dry oil may suddenly contain free water if the ambient temperature cools down. The Humidity Sensor Standard points out the current saturation of the oil with water. Additionally, an automatic alarm level could get set.

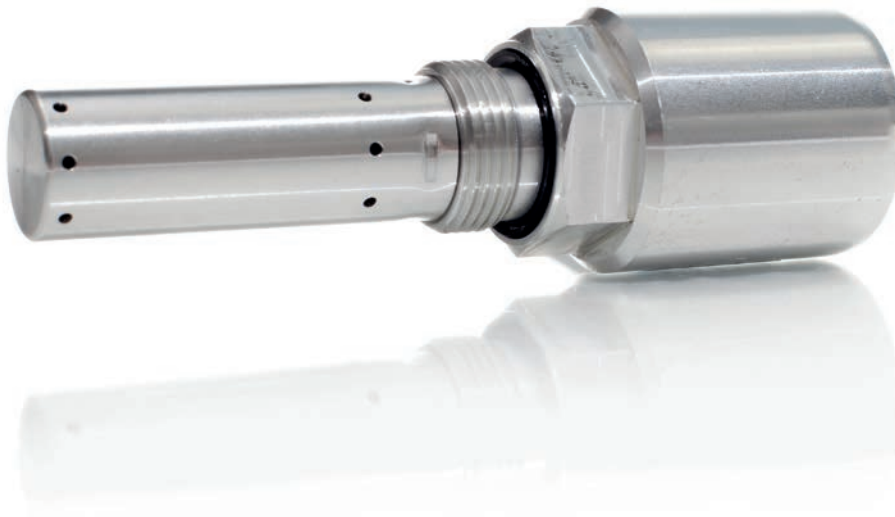
The sensor is ideal to use for small diameter pipes because of its depth of immersion of 29 mm, only. Besides, the Humidity Sensor Standard is essential with regard to unsaturated ester oils which can't be assessed with portable test devices employing reagents.

HUMIDITY SENSOR PLUS

Application area

The Humidity Sensor Plus is a variant of the Standard version and in addition measures the conductivity and relative permittivity of the oil at current temperature during the learning phase when the database has to be created. Upon completion of the learning phase it also processes the measured values at reference temperature of 40°C. The three-field measurements enable further evaluation of the general oil quality and actually turns this sensor into a somewhat new generation of “semi-intelligent” sensors. The increased functionality of our Humidity Sensor + provide a temperature corrected RH measurement which allowed to filter out increasing or decreasing humidity values due to temperature changes.

In connection with the Data Logger these three values could get set into relation for making further calculations, e.g. the remaining useful lifetime of the oil.



Measuring Principle & Performance features

Any changes in lubricant characteristics are evaluated automatically. The ageing effect and ageing rates of the oil will be specified with long-term gradients of the temperature and the acidification.

On the basis of the characteristic values it is possible to distinguish different oil types and to verify whether the right oil grade is in use. Oil refreshments and oil change intervals could be determined/optimized and relative humidity as well as free water could be identified.

➤ TECHNICAL DATA

- Measuring range:
 - Relative Humidity: 0 – 100%
 - Relative Permittivity (dielectric number): 1–7
 - Conductivity: 100 – 800000 pS/m
- Temperature range: -20 °C to +85 °C
- Voltage: 9 – 33 VDC
- Max. fluid pressure: 50 bar
- Protection class: IP 67

VISCOSITY & DENSITY SENSOR

Application area

The Viscosity & Density Sensor is a fluid inline condition monitoring tool based on accurate simultaneous determination of viscosity, mass density and temperature. The Sensor features extended viscosity range, increased accuracy and high sampling rates. The multiple application areas of the Sensor include lube and hydraulic oil condition monitoring, fuel quality control, analysis of process media and monitoring of mixing processes.

The compact and robust design of the Sensor in combination with high-sensitivity and long-term stability make the sensor technology one-of-a-kind predictive condition-based maintenance solution.



Measuring principle & Performance features

The Viscosity & Density Sensor is a screw-in and immersion device with outstanding performance achieved by combining a resonator evaluation technology with a robust and reliable quartz crystal tuning fork resonator. Due to the high measurement rate, excellent data quality can be obtained even in unsteady environmental conditions (pressure, temperature, flow). The device allows both measurement and documentation of any changes in hydraulic liquids and lubricants. Damage can get recognized at an early stage, or even get completely avoided. An early warning provides the opportunity to counter machine malfunction by appropriate preventive actions. Maintenance and oil change intervals might get extended. It is also possible to check on service measures and the use of the prescribed lubricant quality.

► TECHNICAL DATA

- Measuring range:
 - Dynamic viscosity: 1 – 400 mm²/s
 - Mass density: 0.5 – 1.5 g/cm³
 - Temperature: -40 °C to +125 °C
- Accuracy:
 - Dynamic viscosity: +/- 1 mm²/s
 - Mass density: +/- 0.2%
 - Temperature: +/- 0.1 °C
- Voltage: 9 – 24 VDC
- Max. fluid pressure: 50 bar
- Protection class: IP 67
- Interface: Modbus RTU / 4- 20 mA
- Fluid compatibility: mineral and synthetic oils (further approvals on request)

FE SENSOR

Application area

The FE Sensor is a device which is screwed in the oil line directly for monitoring the iron abrasion and the erosion in lube and hydraulic oil systems. Smallest particles affect on slide faces, damage them and thereby produce further particles as a so called metal-metal-contact during the cold starting. The particle contamination causes an intense wear in gear boxes. While accessing on the approved principle of magnetic screw, the FE Sensor is concentrating on ferromagnetic particles. The FE-Sensor provides real time monitoring of magnetic Ferrous wear of any kind of gearboxes, thrusters and hydraulic units such as CP Propeller.



Measuring principle & Performance features

The FE Sensor is immune to disturbances like vibrations and has a high sensitivity. The condition evaluation is done automatically; there is no manual inspection or sample taking necessary. The measuring signal is proportional to the amount of the settled particles.

An automatic purging process makes a low maintenance operating possible. Through the adjustment to the approved magnet screw principle the sensor is small and compact. To avoid breakdowns and to bring down operational costs, the wear monitoring could be an essential tool.

➤ TECHNICAL DATA

- Measuring range: 0 – 100 %
- Accuracy: +/- 1 %
- Voltage: 9 – 33 VDC
- Max. fluid pressure 20 bar
- Temperature: -40 °C up to + 85 °C
- Protection class: IP 67



DATALOGGER

The Datalogger is an all-purpose display unit for the oil condition sensors used in the MT Modular Monitoring System but also for storing the data when using, for example, the Humidity Sensor separately. The Datalogger makes it easy to read and save data from the sensors. It is possible to install alerts when sensor parameters are reaching their critical range. The device has USB/LAN connections as well as a SD card slot.

> TECHNICAL DATA

- Environmental conditions, storage:
 - Temperature: 0 – 60 °C
 - Humidity: 0 – 95 %
- Environmental conditions operation:
 - Temperature: 5 – 50 °C
 - Humidity: 0 – 95 %
- Internal Memory: 1000 records
- LED Display
- Voltage: 9-33 VDC
- Interface: RS-232, analogue 4 – 20 mA
- SD card up to 4 GB



OIL SAMPLING

The results obtained from any tests, either in the laboratory or on-site, will reflect the condition of the sample. Care must be taken to ensure that the sample is representative. So Martechnic® provides sampling equipment and bottles of various sizes and materials for mineral oils and other fluids.



In-line drip sampler for fuel oil with mounted sample container



For fuel oil samples (“MARPOL” samples) to be drawn, stored and transported, Martechnic® offers Drip Samplers, cubitainers (5 or 10 l) and sampling bottles of 500 or 1000 ml. Reliable protection from tampering or external contamination during bunkering is achieved using a sealing strip with unique number. Sampling bottles with retained samples are equipped with a label made of tear resistant and oil proof material and sealing with individual number directly on the seal instead of on a bottle’s cap.

DRIP SAMPLER PRESSURE PLUS

Drip Sampler with optimized back pressure

This new design takes into account the actual situation of flow into a bunker line which is not a laminar stream, but a turbulent one. Also, as fueling hoses usually have a smaller diameter than shipboard bunker pipes and get elevated up to the ship's manifold, a decrease in pressure is caused which might lead to a partial vacuum occurring.

The continuous problems with low or even counter-pressure on the traditional drip sampler led Martechnic® to revise the design and improve the back pressure. This development took place in close cooperation with German Lloyd who has approved the design as to perform according to MARPOL legislation requirements. The improved "PRESSURE PLUS" design provides maximum back pressure and allows continuous fuel sampling, eliminating many problems of the traditional design. The DRIP SAMPLER PRESSURE PLUS design has become integrated part of DIN 86210 in summer 2013.

FEATURES

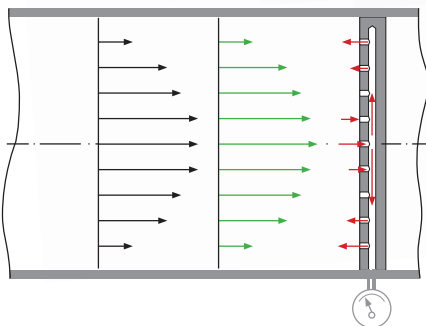
- Material: stainless steel (SUS304/1Cr18Ni9)
- Size: available in three sizes to cover range from DN 80 to DN 300

BENEFITS

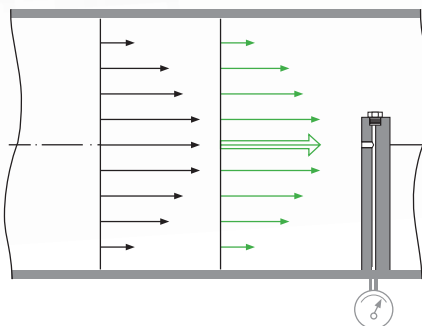
- Representative fuel oil samples
- Optimized back pressure
- Three-hole bore connection on welded flange to secure right sampling direction



TRADITIONAL DESIGN



IMPROVED DESIGN



The DRIP SAMPLER PRESSURE PLUS provides continuous fuel sampling with optimized pressure.

SAMPLING BOTTLES

When taking a sample it is essential to use a clean container which is safe for handling, storage and/or transport to laboratory. For that purpose we offer a wide range of clean sampling bottles and cubitainers, delivered with mounted caps to avoid any contamination prior to sampling. So, for example, small 120 ml bottles for lube and hydraulic oil samples are equipped with sealable screw caps. Owing to the practical screw-thread design, the bottle caps will get automatically sealed through screwing.

Pre-defined sets of bottles, seals and labels are available especially for sampling fuel oil, but we also could provide you with your own customized sampling bottle system for either fuel or lube oil, complete with accessories as required and including logistics service.

OUR STANDARD RANGE OFFERS:

Round bottles	Square bottles	Cubitainer
120 ml	50 ml	5 l
500 ml	100 ml	10 l
1000 ml	250 ml	
	500 ml	
	1000 ml	



MT SAMPLE RETENTION SYSTEM

Equipment to comply with MARPOL 73/78 Annex VI

The IMO legislation demands that ship operators comply with strict regulations concerning emissions while the MEPC.182 (59) guidelines regulate the collection, retention and storage of bunker fuel oil samples in front of this legislation. The MT SAMPLE RETENTION SYSTEM with its manifold equipment enables shipboard staff to follow the rules in a safe and efficient manner.



➤ FEATURES

- Conform to requirements of MARPOL 73/78 Annex VI and MEPC.182 (59)
- Provides a safe (lockable) repository for retained samples and documentation
- Compact and space saving (100 x 56 x 40 cm), weight approx. 37 kg

➤ BENEFITS

- Easy to handle sample bottles
- Seals for all bottles and cubitainer
- Leak protection, tools and cleaning material including

As a feature the MT-SRS cubitainer and sampler are secured with sealing with unique number which is threaded through the fitted holes on drip sampler and on cubitainer. This allows prevention of tampering or external contamination during sampling following the articles 5.2.5 and 5.3 of MEPC.182 (59).

Besides, this method does NOT restrict the manual valve operation as with some designs on the market. This ensures that the valve is operable throughout the bunkering period enabling adjustment to control the flow of the primary sample as required (see 5.2.4 of MEPC.182 (59)). Labels provided actually are not simple paper stickers, but made of tear resistant and oil proof material and fitted with a hole so that a uniquely numbered cable strip create a tamper proof combination of sampling bottle, label and cap.

MT SAMPLE RETENTION SYSTEM

can be supplied with the following components (depending on individual requirements):

1. strong secure lockable storage chest
2. Martechnic® fuel oil drip sampler 6" or 8" plus spanners to mount sampler
3. 1 litre wide neck sample bottles complete with unique numbered sealings and suitable labels
4. cubitainers complete with unique numbered sealings
5. a set of pouring tap and handling box for cubitainer
6. oil resistant gloves plus safety glasses
7. oil absorbing mats

ULTRASONIC CLEANING TANK

Piezoelectric ultrasonic devices create high-frequency sound waves, which release mechanical energy in the cleaning solution, the so-called “push-pull” effect on the surface of the items to be cleaned. This cavitation effect produces vacuum bubbles which implode on the surface of the items. The deposit and dirt get thoroughly removed – also at difficult-to-reach areas, while the implements stay undamaged.



Cleaning Tanks

> FEATURES

- US frequency: 30 kHz
- Voltage: 50/60 Hz – 230 or 440 (380) V
- Material: Stainless Steel ASTM A240/ DIN 1.4571 2mm welded

> BENEFITS

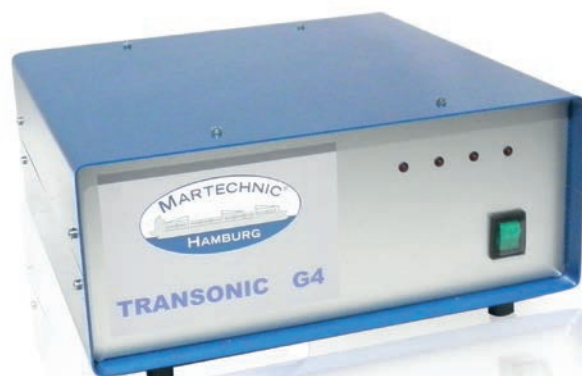
- Easy to handle and the arrangement is possible in many places
- More efficient than traditional cleaning methods
- Low noise development
- Quick cleaning, e. g. the following items: Cylinder cover, cooler, valves, lube- and fuel oil filter, turbocharger impeller, charge air cooler

STANDARD TANK SIZES (EXAMPLES)

TYPE	INNER DIMENSIONS (L x W x H mm)	CONTENT (ltrs)	EFFECTIVE HF POWER (Watt)	HEATING (Watt)
U-Sonic 380	500 x 300 x 300	38	400	1800
U-Sonic 500	550 x 350 x 300	50	500	1800
U-Sonic 800	600 x 400 x 400	80	600	3000
U-Sonic 1700	750 x 500 x 500	170	1000	4500
U-Sonic 2000	750 x 500 x 600	200	1000	5400
U-Sonic 2500	1000 x 500 x 600	250	1200	5400
Octa-Sonic	560 x 560 x 800	370	2400	5400

ULTRASONIC CLEANING

Economic and effective cleaning is of great advantage for onboard applications. The ultrasonic cleaning is gentle for surfaces and ideal for separator discs (avoidance of scratches). Even filter elements and engine parts with complex bores and holes could be cleaned deeply by using ultrasonic technology. In comparison with usual chemical cleaning procedures it is an ecologically friendly method. We offer portable transducers to operate in any existing tank onboard and cleaning tanks for fixed installation.



Generator



Portable Transducer

One generator can operate with max. 4 transducers. Necessary energy for tank application is approx. 5 W/l, depending on tank size.

TRANSDUCERS AND GENERATORS

MODEL	DIMENSIONS (L x W x H mm)	EFFECTIVE HF POWER (Watt)
TRANSDUCERS		
U-Sonic TD 10	155 x 85 x 455	500
U-Sonic TD 12	155 x 85 x 525	600
U-Sonic TD 15	245 x 85 x 460	750
GENERATORS		
U-Sonic G4-2	400 x 380 x 182	max 1500
U-Sonic G4-4	400 x 380 x 182	max 3000

TEST CHEMICALS, CONSUMABLES AND CLEANING AGENT

PRODUCT NAME		ORDER CODE	AREA OF APPLICATION
WA-SOL Set (WA-SOL Basic + Activator)	750 ml	S 300	Water-in-Oil Test
Solution A	250 ml	S 281	MT CAT FINES CHECK
Solution A	500 ml	S 032	Water-in-Oil Test for old test devices
Solution A	1000 ml	S 102	Water-in-Oil Test for old test devices
Solution B	50 ml	S 103	Water-in-Oil Test for old test devices, dangerous goods
ALCA Solution	500 ml	S 205	BN Test
Solution L	250 ml	S 191	AN Test, dangerous goods
Solution M	100 ml	S 192	AN Test, dangerous goods
Solution W	100 ml	S 282	MT CAT FINES CHECK
Solution W	250 ml	S 136	Salt Water Contamination
Saltesmo	100 pcs	S 154	Salt Water contamination
Cooly	300 ml	S 210	Pour point, dangerous goods
Test Kit Cleaner	300 ml	S 105	Cleaning agent for all devices
Flash Clean	250 ml	S 602	Cleaning agent Flash Point Test device, dangerous goods
Liquid Gas Cartridge	1 pc	S 615	Refill for Flash Point Tester, dangerous goods
Spot Test Paper, A4	1 pc	C 172	Spot Test
Spot Test Paper, 57x57 mm	100 pcs	S 170	Spot, Compatibility Test
Replenishment Set		S 143	IRON CHECK
Replenishment Set		S 283	MT CAT FINES CHECK





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