

PRODUCT CATALOGUE



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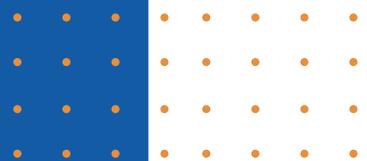
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Merel Instruments workflow



Merel dissoDG[®] is an automated media degassing system designed for pharmaceutical dissolution testing. Operating in compliance with the stringent USP degassing procedure, dissoDG ensures the precise removal of dissolved gases from the test solution or medium.

dissoDG[®]
Automated
media
degassing
system

Key features

Advanced degassing:

using the USP degassing procedure, dissoDG adeptly eliminates dissolved oxygen and air components, guaranteeing a level below the industry limit of 6.72 ppm at 37°C.

Efficient operation: With a basic setup of 1x9L media container, dissoDG can handle 6L or 8L media preparation, allowing for versatile usability in various testing scenarios.

Rapid deggasing:

Capable of degassing 8L of media within a swift 20 minute cycle, dissoDG ensures a quick turnover for uninterrupted testing workflows.

User-friendly controls: The system is operated through easy-to-use push buttons, eliminating the need for external controls and simplifying the degassing process significantly.



Application in pharmaceutical dissolution testing

Dissolution media degassing is indispensable in pharmaceutical dissolution testing, **ensuring the accuracy and reproducibility of results**. Merel dissoDG not only meets but exceeds industry standards, enabling pharmaceutical professionals to **conduct dissolution tests with utmost precision and reliability**.

It can be used as a standalone desktop unit or integrated seamlessly into the Merel dissoBOT® automated dissolution testing system as well as into any compatible advanced automated media preparation system.



Specifications

Functions:	Automated Media Degassing System, using USP degassing procedure
Basic Setup:	1x9L media container, suitable for 6L or 8L media preparation (selectable)
Capacity:	8L of media is degassed in 20min
Controls:	push buttons operated, none external controls necessary
Dimensions:	300x450x420mm (WxDxH)
Weight:	approx. 20kg
Required supply:	100 V - 240 V AC (+/-10 %), 50/60 Hz, 16A
Max. Power Consumption:	2kW



Merel dissoCART® stands out as a solution for seamless equipment transportation within laboratories. Its design focuses on durability, and ergonomics features, ensuring a superior experience in laboratory logistics.

dissoCART®
Efficient
laboratory
equipment
transport solution



Optimal dimensions: dissoCART® is specifically crafted to navigate standard laboratory doorways effortlessly while providing sufficient storage space for various instruments.

Lightweight build: Weighing just 17kg, dissoCART® maintains a perfect balance between sturdiness and portability. Its lightweight construction facilitates effortless movement, significantly reducing the physical strain on laboratory staff during operation.

Easy mobility: Engineered with high-quality wheels and an ergonomic handle, dissoCART® guarantees easy mobility across diverse flooring surfaces. Its precise handling ensures swift and accurate maneuvering, even in confined laboratory spaces.

Versatility in instrument accommodation: dissoCART® is designed to accommodate a wide spectrum of laboratory instruments, accommodating both delicate analytical devices and bulkier equipment. Its adaptability caters to the diverse needs of modern laboratory setups.

Robust construction: Crafted from durable materials, dissoCART® ensures longevity and resilience. Its robust frame guarantees stability, ensuring the secure transportation of fragile laboratory instruments.

User-centric design: dissoCART®'s design emphasizes user convenience. It simplifies the process of securing equipment, promoting quick and secure fastening. The cart's ergonomic structure minimizes physical strain, fostering a safer and more comfortable working environment.



Merel dissoCART® and its blend of reliability, lightweight design, and versatility makes it an indispensable asset in laboratories, enhancing overall operational efficiency and ensuring the safety of valuable equipment during transit.

Specifications

Dimensions:
Weight:

630x630x940mm (WxDxH)
17kg

dissoCART®
Efficient
laboratory
equipment
transport solution



Volumetric medium dispensing with accuracy better than 0.5% for 900ml

Battery-powered, handy portable unit

Intuitive user interface

Three different dispensing speeds

Appropriate for foaming medium

Easy dispensing history review

Easy cleaning procedure

dissoDOSE®
System for
Volumetric
Media Dispensing

How do you handle your medium?

Handy, portable, battery-powered, easy-to-use and compact unit is designed to dispense the medium as easily as possible. The dissoDOSE®'s unique concept allows for accurate volumetric dispensing of the dissolution medium where you need it - directly into the installed dissolution vessels. Based on a special design, the dissoDOSE® offers maximum portability for easy servicing of many dissolution apparatuses, regardless of type and producer.

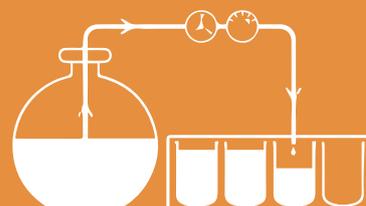
The dissoDOSE® is the perfect medium dispensing system for busy dissolution laboratories demanding both speed and accuracy.



Plan a suitable place in laboratory to prepare sufficient quantities of medium. Heat the medium and perform a validated deaeration technique.



Find appropriate way to transport the medium from medium preparation place to your dissolution apparatuses.



Accurately dispense the medium directly into dissolution vessels using the dissoDOSE®.

In the dissolution laboratory medium preparation is typically a time-consuming and labor-intensive task. Maintaining prepared dissolution medium heated and degassed and precise volumetric media dispensing require diligence, patience and care. Automated methods can streamline these tasks while freeing the chemist for more productive analytical work. The automation carries the added benefit of eliminating human errors.

Specifications

Functions
Pharmacopeia conformance
Control
Time needed to dispense 500ml
Time needed to dispense 900ml
Dosing volume, accuracy
Dimensions (H x W x D)
Weight
Power supply
Power consumption

Portable volumetric media dosing
USP, EP, JP
4.3" RGB TFT LCD Capacitive touch Screen
8 seconds
12 seconds
< 1%
215 x 225 x 225 mm
3.5 kg
115 V - 230 V, 1.3 A
Max. 90 W

dissoDOSE®
System for
Volumetric
Media Dispensing



MEREL
instruments



One of a kind, semi-automated and easy to use dissolution tester washing system with media dispensing capability. Battery powered for superb mobility and fully equipped for exceptional performance.

dissoWASH&DOSE[®]
Semi-automated
washing and media
handling system

Overview

dissoWASH&DOSE® is addressing foremost the resource-consuming waste removal and cleaning of the vessels in your dissolution testers. In addition, it keeps the prepared dissolution medium heated and ready for dispensing and saves you a lot of time with its function of precise volumetric dispensing. This frees up your limited resources and makes this time available for more productive laboratory work.

dissoWASH&DOSE® simplifies and optimizes those monotonous tasks while adding an additional benefit of reducing possibilities for human error, thereby saving time, reducing cost and increasing output of your dissolution laboratory.

Working principle

The unit is prepared at a filling station – media and hot rinse containers are filled, and waste container is emptied – all this via pre-installed hoses with quick connect fittings. Then the easily portable unit is ready to be pushed into a position next to the dissolution tester. The operator uses an easy to operate LCD touchscreen to select the desired program - i.e. mode of operation.

Depending on the program selected, the dissolution vessels are emptied, hot water rinsed and filled with fresh media. All three steps are performed subsequently on each vessel, using only one tool and with no adjustments or additional steps necessary.

The unit can then be moved to the next tester and the procedure repeated. Up to 5 testers with 6 vessels (900 ml) or an equivalent of 9 testers with 6 vessels (500 ml) can be attended to before another stop at the refill station is necessary.

In addition, the upper tester parts (shafts, evaporation covers, cannulas and probes) can be washed using a second handheld tool (delivered as an option).

User can switch between methods, selecting from:

- **waste emptying and vessel washing**
- **media dispensing only**
- **emptying, washing and media dispensing**



We have designed an apparatus which suits your needs. A clean, minimalistic design enables simplicity of use, has a modern design with a minimal number of different components and looks great!

System components

1. Easily maneuverable cart (wheels with locking brake)
2. Hand-held tool for vessel washing and media dispensing (nozzle for full 360° rinse)
3. Hand-held tool for shafts washing (optional)
4. Separate circuitry for waste removal, vessel rinsing and fresh media dispensing
5. Top panel mounted touch display for easy and intuitive operation
6. Side panel with quick connect fittings for waste emptying / hot rinse re-fill
7. Large capacity internal battery
8. Internal rinse, media and waste containers



Highlights

Mobile (set on robust wheels), **battery powered**, great autonomy

Compatible with all dissolution testers using 1 and 2 Liters USP conforming vessels

Vessel removal is not necessary, self-adjusting drain compensates for differences in vessel height

Sequential waste removal, vessel rinsing and precise volumetric media dispensing

Washing (rinsing) with hot, purified water

Low cycle times, repeatable procedures (<1% dispensing accuracy)

Heated media storage and simplified waste collection

Empty and refill hassle-free via easily accessible quick connect fittings

Environment friendly with minimized water and energy consumption

Low noise, optimal for laboratory environment



Performance specifications

Cleaning time:	Up to 3.5 minutes is all it takes to empty and clean vessels in one dissolution tester with 6 vessels (900ml per vessel)
Add media:	It only takes additional 75 seconds to dispense the media (tester with 6 vessels à 900ml)
Additional option:	Just 1.5 minutes are necessary to clean the upper parts (evap. covers, cannulas, temp. probes and shafts (for a tester with 6 vessels)
Autonomy:	5 dissolution testers with 6x900ml vessels (before re-fill is necessary) 9 dissolution testers with 6x500ml vessels (before re-fill is necessary)
Unit refilling time:	Approximately 9 minutes (empty waste, add new media & hot water)
Internal battery capacity:	Clean and dispense up to 250 vessels (à 900 ml)

Dimensions and data

Construction materials:	Aluminium, Stainless Steel, Engineered Plastics
User Interface:	LCD Touchscreen
Height:	97 cm (38")
Length:	60 cm (23.5")
Width:	46 cm (18")
Weight:	<50 kg (110 lbs) - empty; <95 kg (210 lbs) - full, ready for operation
Media Container Volume:	2x15 Liters (2x4 Gallons)
Hot Rinse Container Volume:	1x13 Liters (3.5 Gallons)
Waste Container Volume:	1x43 Liters (11.5 Gallons)
Fill Port:	Quick Connect/Disconnect Fittings on Side Panel
Battery Charging Voltage:	230V/50Hz or 110V/60Hz

dissoWASH&DOSE®
Semi-automated
washing and media
handling system



The world's first fully automated dissolution system with clip-on/off capability.

Sequential cleaning, media dispensing and sample introduction

Suitable for Apparatus 2 (paddles) and Apparatus 1 (baskets)

Internal tanks and external connections

Advanced dissolution automation is build around world's leading dissolution systems, like: Agilent 850-DS Dissolution Sampling Station and optional filtration module.

Agilent 708-DS Dissolution Apparatus

dissoBOT® Automated Dissolution System



Working principle

Advanced automation is performed with the help of the latest technology in collaborative robotics. The clip-on/off capability enables users to extend to extend working cycles on their existing dissolution systems. There is no interference in the dissolution process and the clip-on procedure takes less than a minute. DissoBOT® system takes over the control of the dissolution apparatus and sampling station.

Advanced dissolution automation technology of dissoBOT® performs fully automated sequential cycles of cleaning, media dispensing, and introduction of new dosage forms to the dissolution apparatus.

System components

Collaborative table-top robot

Cleaning tools, baskets and samples are moved by a small collaborative table-top robot, perfect for light tasks and automated workbench scenarios. The robot's safety system is approved and certified by TUV (The German Technical Inspection Association).



Clip-on/off platform

Clip-on/off platform allows users to move the dissoBOT® around the laboratory. Two 47 L containers are installed into dissoBOT platform. One is used to hold the dissolution medium and the other for cleaning solution. External connections are also available for waste, DI water and medium.



Cleaning procedure

The cleaning cycle is performed in two sequential steps. The first step is cleaning of paddles/basket shafts, evaporation covers, temperature probes and sampling cannulas with hi-pressure nozzles. The second step of cleaning procedure removes waste and cleans the vessels. Different cleaning cycles can be performed.



Dissolution process

When dissoBOT® takes care of cleaning, media dispensing and dosage forms introduction, it is time for a dissolution process. The Dosage Delivery Module (DDM) is activated automatically. The dissolution itself is performed with standard 708-DS Dissolution Apparatus featuring a smooth-operating, motorized lift for reproducibility and integration with automated systems. Sampling is performed with an automated sampling manifold using the 850-DS Dissolution Sampling Station and optional filtration module. The system collects samples into test tubes, HPLC vials or well plates for subsequent analysis. Temperature is monitored with precise in vessel monitoring Auto-Temp. The individual vessel values may be documented initially, at each pre-programmed time point, and after the test has concluded.

Samples introduction

Samples are introduced with easy to use sample holder. 8 batches of 6 samples are individually stored at exact positions. For Apparatus 2 (paddles) configuration samples (dosage forms) are presented directly on DDM (Dosage Delivery Module) of Dissolution Apparatus 708-DS. For Apparatus 1 (baskets) configuration with a single set of baskets is used.

Media dispensing

Media dispensing is done with unique dissoDOSE® technology. Fast, reliable and accurate volume dispensing is performed with direct volume measurement. Different speeds of pumping can be set to minimize the influence on foaming and degassed media.

Technical specifications

Suitable for methods	Apparatus 2 (paddles) and Apparatus 1 (baskets)
Media types	Compatible with all typical dissolution media containing surfactants
Number of working positions	Up to 6 vessels
Number of samples	Up to 8 batches of 6 samples
Number of sampling points	Up to 16
Internal rinse container	47 l (12.4 gal)
Internal media container	47 l (12.4 gal)
External waste container	100 l (26.4 gal) - optional
External rinse connection	Optional
External media connection	Optional
<hr/>	
Filtration options	Cannula filters: 10, 35, and 70 µm; Filter plates: 0.45 µm
Media replacement	Standard, up to 100% of sample removed
Sampling accuracy	10 ml ±2.5%
Sample volume per vial/tube	0.1-14 ml (up to 28 ml with dual sample)
Sample frequency	Method specific with minimum of 2 minutes
<hr/>	
Evaporation	Less than 1% evaporative loss under specific conditions
Water bath temperature range	Ambient +5 to 55 °C
Probe accuracy	±0.1 °C
Spindle speed range speed	10-250 RPM ±1% over 25 RPM
Accuracy speed selection	± 2% 10-25 RPM
Spindle shaft material	Stainless steel
Dissolution drive unit lift	Motorized drive
Dissolution bath features	Dosage Delivery Module (DDM), Autosampling, AutoTemp
<hr/>	
Media dispense principle	Volumetric media dispensing with dissoDOSE® technology < 1%
Media dispensing accuracy	(range from 400 ml to 1000 ml dispense)
<hr/>	
Operating environment	5 to 40°C
Humidity (non-condensing)	Not more than 80% RH

dissoBOT®

*Advanced Dissolution
Automation Module*

Operating height	190 cm
Operating width	135 cm
Operating depth	70 cm
Weight (machine dry)	80 kg

708-DS

Dissolution apparatus

Width	62.2 cm
Operating height	67.95 cm
Clearance height	99.06 cm
Depth	59 cm
Weight (machine dry with vessels and paddles)	54.4 kg

850-DS

Dissolution Sampling Station

Height	40 cm
Height with filter module	60 cm
Width	39 cm
Width with filter waste bin	48 cm
Depth	60 cm
Weight	27 kg

dissoBOT®
Automated
Dissolution
System



The dissoSWITCH® is a valve box for redirecting sample and communication paths between different systems, whether they are compatible with each other or not. It is simple to connect, 16 position three-way valve device, which can connect with up to 25 communication pins. It does not need additional software for operation. A single push-button switch redirects communication paths between different systems (PCs, sampling stations, dissolutions etc.) and also serves as the main ON/OFF switch. Valves are used to redirect sample paths and are carefully chosen to sustain the most demanding solutions.

dissoSWITCH®
Efficiency and Operation
Enhancement Solution
for Dissolution Systems

Configuration example

The perfect self-explaining scenario for dissoSwitch unit use is a set-up with:

- Agilent 708-DS Dissolution Apparatus
- Agilent 850-DS Sampling Station
- Agilent Cary 60 UV/Vis Spectrophotometer

Based on our knowledge and experience in the pharmaceutical industry and testimonials of our customers,

we know that systems with the configuration shown in the figure are most of the time used without scanning with a spectrophotometer most of the time (approx. 80%).

The solution is a single system that can be operated as a whole and doesn't have the above-mentioned deficiencies if used only partially.

01

03

One click provides two operation modes

PC control

The methods are set in and controlled from the computer using the Cary Win-UV SW when whole system is in use.

Sampling station control

- Shorter sample lines to minimizing dead volume.
- Extending the life time of the flow through cuvettes bypass them when they are not needed.

Specifications

Functions:	2x8-position 3-way valve switching device
Controls:	none required, optional control via PC (USB or RS232)
Comm Ports:	3xRS232, 1x mini USB
Dimensions:	285x130x80mm (WxDxH)
Weight:	1.3kg
Required supply:	100 V - 240 V AC (+/-10 %), 50/60 Hz, 1A
Max Consumption:	30W



02

Other application options

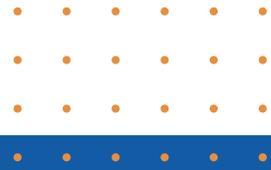
- 1x Agilent 850-DS + 2 x Agilent 708-DS in case of expanded procedures.
- 1 x Agilent 708-DS + 2 x Agilent 850-DS if there is a need to use vials and well plates simultaneously.
- Other possibilities in combination with spectrophotometers, auto-samplers or PCs that are usually not compatible with each other.
- Bypassing filter changer, manual filters, etc.





In the dissolution laboratory medium preparation is typically a time consuming and labor-intensive task. Maintaining prepared dissolution medium heated and degassed and precise volumetric media dispensing require diligence, patience and care. Automated methods can streamline these tasks while freeing the chemist for more productive analytical work. The automation carries the added benefit of eliminating human errors.

dissoGUARD[®]
Dissolution
Surveillance
System



Basic model

dissoGUARD®

The basic model is a simple recorder. With some unique features such as motion detector and LED illumination it is able to record good quality videos for six vessels. With optional easy to install light shield around the bath and adaptive LED illumination it is an ideal system for applications that are visible light sensitive. After the recording is taken the user is able to pinpoint and mark individual stages of the dissolution procedure. Because of the unique camera position different operations are well visible (tablets drop or baskets immersion, sampling cannula or temperature probe immersion). The timing of different events can be determined down to seconds.

Pro model

dissoGUARD PRO®

The PRO version is an ultimate guardian for the dissolution procedure and apparatus. The dissoGUARD® PRO is not meant to be a qualification tool, but it will keep you on the safe side during periodical OQ/MQ measurements. With unique software algorithms excessive wobble for individual basket or paddle can now be successfully predicted. Measuring of individual paddle speed of rotation (RPM) is possible from the video itself. Proper centering of vessels and shafts can be checked. Software is able to warn a user about status of a run. Once the system is installed it will run almost automatically. After the recording is taken the user is able to pinpoint and mark individual stages of the dissolution procedure. The timing of different events (tablets drop or baskets immersion, sampling cannulas or temperature sensors immersion) can be determined down to seconds.



The first dissolution surveillance system

This product is not meant to be a qualification tool but it can dramatically improve the control over your dissolution apparatus. It can guard dissolution procedure before and during every single run preventing from having questions like:

Do you know, what is happening with your Dissolution Apparatus between periodical OQ/MOs?
 What do YOU do it periodical OQ/MO fails?
 Were the timings and position of manual sampling correct?
 Were baskets placed properly in the last run?

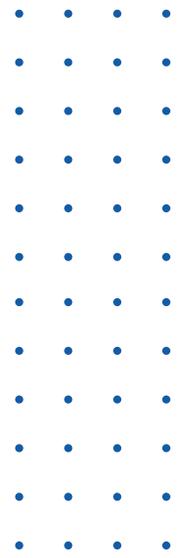
With a unique design and powerful software the dissoGUARD® is a **dissolution surveillance system that will revolutionize the way you see the dissolution procedure**. With cameras placed underneath the dissolution bath the user is not only able to see and store real time videos, export pictures or complete videos for future analyses, but we also took a step forward. For the first time, the user is able to measure or predict different physical parameters of their dissolution apparatus. **With different algorithms the software can evaluate the wobble and measure RPM, determine the proper center alignment of individual shafts, and much more**. Through the various stages of dissolution procedure it is possible to evaluate the proper position of dosage forms, timing and position of sampling cannulas, behavior or particles in vessels, etc.



System functionality overview

	<i>dissoGUARD</i>	<i>dissoGUARD PRO</i>
Real time preview of 6/7 vessels	✓	✓
Acquire video for 6/7 vessels	✓	✓
Preview and export of video for 6/7 vessels	✓	✓
Dynamic LED (white/red) illumination for 6/7 vessels	✓	✓
Motion detector	✓	✓
Light shield around the bath	○	○
RPM measurements	✗	✓
Wobble detection	✗	✓
Detection of vessel/shaft centering	✗	✓
Vibration/level sensor	✗	○

System overview



Adaptive Light Intensity Control

Cameras and Optics (DDS or DDS Pro)

Dedicated PC with Software



Matching dissolution testers

Designed for Agilent 708-DS and 709-DS Dissolution Apparatus.
For other models please contact us.

Specifications

Functions:

Basic Setup:

Integrated lighting:

Controls:

PC Requirements:

Dimensions:

Weight:

Required supply:

Max Consumption:

Automated Dissolution Surveillance System DG11-1302

6, 7 or 8 Camera Positions + External USB Camera

White and Red LED light

PC, Microsoft Win 7

Minimum Intel® Core™ i3, 2 GB RAM (4 recommended), 512 GB disk free space (1 TB recommended), 2x free PCI or PCI-Express Slots

530x300x50mm (WxDxH)

6kg

100 V - 240 V AC (+/-10 %), 50/60 Hz, 0.7A

30W

dissoGUARD®
Dissolution
Surveillance
System



Modular and robust design: tailor and scale your laboratory setup with ease, adapting to evolving research demands.

Variety of applications: customize applications to suit specific research needs, ensuring versatility across multiple disciplines.

Accurate repeatability of methods: achieve consistent and reliable results with our system's precision in method execution.

Automated measurements recording: streamline data collection with automated recording, enhancing efficiency and accuracy.

21 CFR Record keeping: ensure compliance with FDA regulations for electronic records, providing peace of mind and integrity in documentation.

**Merel
Collaborative
Laboratory System
Furniture for
Laboratory
Automation**



NEW!

Introducing the Merel Collaborative Laboratory System, a pioneering solution designed to automate laboratory workflows in pharmaceutical, chemical, and related industries.

The Merel Collaborative Laboratory System is designed as a collaborative workspace aimed at the partial or full automation of selected simpler work processes in pharmaceutical, chemical, and similar laboratories. The system integrates a standard laboratory workspace integrated with a collaborative robot and all necessary electronic control units, setting a new standard for laboratory operations.

Key features:

01.

Collaborative workspace

At the heart of our system is the collaborative workspace, designed for both partial and full automation of laboratory tasks. This innovative approach allows for human interaction where automation alone is not feasible or efficient, blending the best of human expertise and robotic precision.

01.

Customizable and scalable

The system's modular design ensures it can be easily customized and scaled to fit the specific needs of any laboratory. Whether expanding existing capabilities or integrating new applications, the Merel Collaborative Laboratory System grows with your research demands.

02.

Precision and reliability

With our focus on accurate repeatability of methods, the system ensures that every procedure is executed with precision, providing consistent and reliable results that you can trust.

03.

Enhanced data management

Automated measurements recording coupled with 21 CFR compliant record keeping simplifies data management, ensuring accurate and reliable documentation that meets FDA regulatory requirements.

04.

Human-robot collaboration

The inclusion of a collaborative robot in the workspace not only facilitates autonomous automation but also supports partial automation involving human intervention. This flexibility allows for operations where human involvement enhances efficiency and effectiveness, creating a truly collaborative environment.

Applications

The Merel Collaborative Laboratory System is versatile, supporting a wide range of applications in pharmaceutical, chemical, and related fields. From routine analytical tasks to more complex experimental setups, our system provides a robust platform for innovation and discovery.

Application case studies

The Merel Collaborative Laboratory System is versatile, supporting a wide range of applications in pharmaceutical, chemical, and related fields. From routine analytical tasks to more complex experimental setups, our system provides a robust platform for innovation and discovery.



1.

1. Ultrasonic bath sample exchanger: Revolutionizes sample preparation by providing an automated, efficient, and precise method for cleaning and exchanging samples within an ultrasonic bath, reducing manual handling and improving throughput.



2.

2. Solution mixing system for API Reactor: Facilitates the automated mixing of solutions in API reactors, ensuring consistent and homogeneous mixing critical for pharmaceutical manufacturing processes.



3.

3. Flask shaker: Offers automated shaking capabilities for flasks, improving the mixing or incubation processes of various solutions with adjustable speed and duration settings to meet specific experimental requirements.



4.

4. Inficon Contura S400 Automation: Integrates with the Contura S400 system to automate leak detection in packaging, ensuring product integrity and compliance with industry standards without manual intervention.



5.

5. UV/Vis 3-Port Autosampler: Automates the sampling process for UV/Visible spectroscopy analyses, allowing for high-throughput testing and efficient sample management with minimal manual input.

Key Project Success Factors

The success of the Merel Collaborative Laboratory System is driven by several key factors that underscore its innovation and value to laboratories:

Complete automation solution: provides a comprehensive automation framework that transforms laboratory operations, enabling higher productivity, precision, and repeatability across a wide range of applications.

21CFR11 Compliant software: ensures that electronic records and signatures are managed in compliance with FDA regulations, offering a secure and audit-ready system for laboratories in regulated environments.

Standard piece of laboratory furniture: designed to seamlessly integrate into existing laboratory spaces without the need for extensive modifications, making it an adaptable solution for any laboratory setting.

Fume hood integration for hazardous applications: offers compatibility with fume hoods to safely automate processes involving volatile or hazardous substances, ensuring operator safety and environmental protection.

Upgradable, easy to expand, safe: engineered with safety and scalability in mind, the system is easily upgradable and expandable to adapt to future laboratory needs, ensuring a long-term solution that grows with your research.

Special Feature

Digestory integration with the Merel Collaborative Laboratory System

One of the standout capabilities of the Merel Collaborative Laboratory System is its integration with laboratory digestories, enhancing safety and efficiency in handling and processing hazardous materials. This special feature is designed to ensure that laboratories dealing with volatile or dangerous substances can do so in a controlled, automated, and secure environment.

By focusing on these applications and success factors, the Merel Collaborative Laboratory System stands as a cutting-edge solution for modern laboratories, driving efficiency, compliance, and innovation in research processes.





Fully automated gas extraction unit based on Multi-cycle Mercury free Vacuum extraction method coupled with Agilent GC system by a pump and tube according to international standards IEC 60567 and ASTM D-361. Mercury free Toepler principle produces more extracted gases, because extraction is made in high vacuum. Transfer of gas from the pump to the GC is done with very small dead volume, which can be measured and used to apply corrections. If the content of gas is too low to inject into GC, it can be automatically diluted with air or argon.

Merel GE-567 Transformer oil gas analyzer

System components

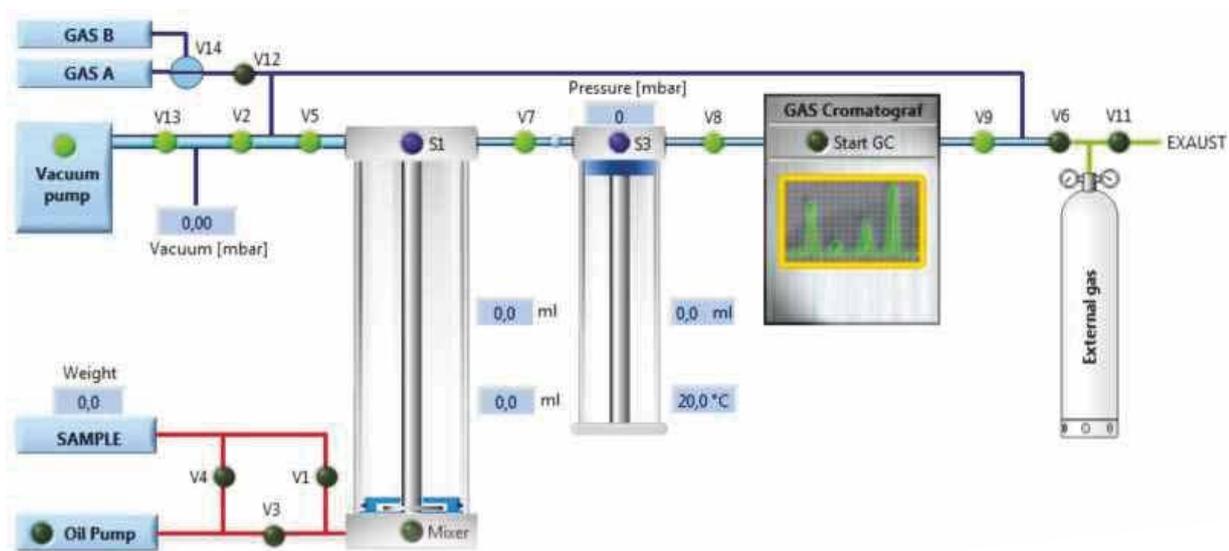
Dissolved Gas Analysis (DGA) is a widely used technique to estimate the condition of oil-immersed transformers. Incipient faults within the transformer may be detected by analyzing the gases which are dissolved in the transformer-oil.

DGA is a diagnostic tool for detecting and evaluating of incipient faults in oil-immersed transformers. In this context, a fault is defined as a process that causes abnormal dissipation of energy within the transformer. When a fault occurs in the transformer, the insulation system will undergo chemical degradation which leads to production of various gasses that dissolve in the oil. These gases are often referred to as key gases, and their concentrations can be related to different types of faults in the transformer by various interpreting methods.

The gases that are of interest for the DGA analysis are the following:

- H₂ – hydrogen
- CH₄ – methane
- C₂H₄ – ethylene
- C₂H₆ – ethane
- C₂H₂ – acetylene
- C₃H₆ – propene
- C₃H₈ – propane
- CO – carbon monoxide
- CO₂ – carbon dioxide
- O₂ – oxygen
- N₂ – nitrogen
- TCG – total combustible gas content (H₂, CH₄, C₂H₄, C₂H₆, C₂H₂, CO, C₃H₆, C₃H₈)

Operating principle



DGA procedure

Today DGA technique is best performed in laboratory since it requires measuring instruments with high accuracy. One could summarize the DGA procedure in following four steps:



01.

Sampling of transformer oil

The oil samples should preferably be taken in the moving oil so that the gases generated are conveniently and rapidly transported from the point of generation to the sampling point. Suitable locations are valves in the cooler/radiator circuit. It is not always possible to take samples at these locations because of design limitations. Other places to draw samples from are cover, bottom valve, conservator and the Buchholz relay. In addition, it is very important that the sampling is made in such a way that the contamination of the sampling vessel is held at a minimum and that gases are not lost during sampling or transportation to the laboratory.

The removal of the gases from the oil can be accomplished by various methods:

- partial degassing (single-cycle vacuum extraction)
- total degassing (multi-cycle vacuum extraction)
- stripping by flushing the oil with another gas.
- by the headspace technique in which gases are "equalized" between a free gas volume and the oil volume.

02.

Extraction of the gases from the oil

TOGA analyzer Merel GE-567 uses total degassing method. The gas extractor is a fully automated vacuum degassing unit for extracting gas from transformer oil with multi-cycle Mercury free Vacuum extraction according to international standards IEC 60567 in ASTM D-361.

03.

Analysis of the extracted gas mixture in a gas chromatography, GC

After extraction the extracted gas mixture is fed into adsorption columns in a GC where the different gases are adsorbed and separated to various degrees and consequently reach the detector at different points in time. In this way the gas mixture is separated into individual chemical compounds, identified and their concentrations in volume gas STP/volume oil is calculated and expressed in ppm. (STP=standard temperature and pressure).

04.

Interpretation of data

When the different gases in the oil sample have been identified and quantified, all that remains is to interpret the results. Evaluation of the condition of the transformer oil is made on whether the amount of dissolved gases can be considered as normal/acceptable or not. In the case where there is an abnormal gas production it is necessary to try figuring out the origin of the gas production, i.e. finding possible fault causes.

Key attributes

The system fully complies with norm IEC 60567.

- Sample volume 10 to 250 ml.
- The possibility of measuring the low levels of gas under 0.5 ml / l.
- Free-setting of extraction parameters. (Define number of strokes and duration of each).
- "Dead volume" could be measured for diagnostic and (or) volume correction.
- The piston pump diagnostic with injection of 10 ml of air to verify the tightness of the piston.
- Export measurements-value in EXCEL
- View all operating parameters, including intermediate extraction with the announcement of the final result.
- The conversion of the normalized value of 1013.25 mbar and 20 °C
- All phases in extractions could be done manually in steps.
- Calibration of the scale, pressure sensor, temperature sensor and vacuum sensor is included in the SW.
- Buchholz gas analysis.
- Analysis of the external gas (cylinder).
- Use and hardware software leading manufacturer in the field of measuring / control equipment (National Instruments).
- The user interface could be translated to the local language.



Specifications

Auto-sampler

Oil sample volume:

No. of positions:

Gas extractor

Type of transformer oils:

Dual stage vacuum oil pump:

Gas extraction cycles and times:

Vacuum measurement/range:

Oil sample measurement/accuracy:

Gas volume measurement:

Gas volume measurement corrected:

Pressure sensor accuracy:

Pressure sensor and balance calibration:

Extracted Gas volume range:

Extracted Gas volume accuracy:

Gas transfer and analyses:

Power input:

Power Input:

Dimensions (WxHxD):

Weight:

10 @ 200 ml

20 @ 120 ml

new and used

ultimate pressure 2×10^{-3} mbar

set in software

1.3×10^{-3} mbar – 1333 mbar

gravimetric / ± 0.05 ml

precision glass burette/precision pressure sensor – T compensated to standard atmosphere (1013.25 mbar / 20 °C)

± 0.05 % @ 1013 mbar / 10-40 °C

performed in software

1 ml/l – 200 ml/l

$\pm 10\%$ @ 1 ml/l – 20 ml/l, $\pm 2\%$ @ 20 ml/l – 200ml/l

Standard TGA GC instrument (loop volume 0.25 – 1.0 ml)

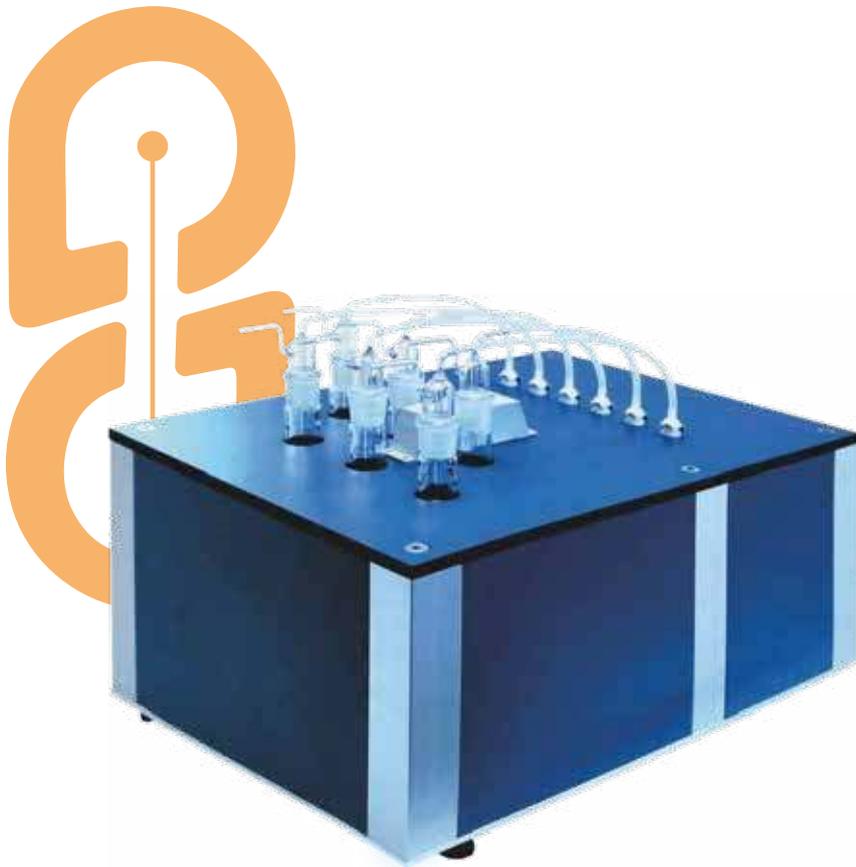
115 – 240 VAC, 50 – 60 Hz

950 W

440 x 1040 x 620 mm

50 kg

Merel GE-567
Transformer oil
gas analyzer



Modular design
(6, 12, 18 or more positions)

Low weight of single module (less than 36 kg)

Data plotting, logging and report generating
(temperature and individual flows)

PC based user-friendly interface

Quick heat-up time (less than 2 h)

Merel AOS-125
Apparatus for
oxidation of
insulating liquids

OXIDATION STABILITY PROCEDURE

Why is it important?

Because of its properties and price, mineral oil is the most commonly used oil in power transformers. Downside is that during operation, it is subjected to thermal and electrical stress in an oxidizing atmosphere, which causes deterioration of its insulating properties. With time, acidity increases and causes mud formation.

Oil aging analysis helps determine the 'age' of the oil more precisely, it means that we are able to predict when the oil needs to be changed. This results in more efficient use of oil throughout its full lifespan and prevents potential damage to transformer due to aged oil.

How can we make it simpler?

With this method it is important to sustain a consistent temperature and flow of oxygen during the entire test, otherwise the results may be inaccurate. Problem with these tests is that they are long lasting. For better control over the entire test period we have developed a ground breaking user interface with data logging and plotting of all parameters. We are not only able to see real time oxygen/air flows and temperatures but store and process them for future analysis as well.

We are aware of importance and seriousness of your work, which is why we are striving towards making your work as fluent and as simple as possible.



We have designed an apparatus which suits your needs. A clean, minimalistic design with minimal number of components results in simplicity of use and looks the part too!

Apparatus

Apparatus has unique design in its class. With its outstanding user interface it will change the way you look at measurement of **fluid aging**.

Single module consists of a rigid aluminum frame enclosed by matte finish polymer sides. It hosts a dry bath for oil ageing analysis with 6 glassware positions. Temperature and air flow is kept regulated with extreme stability and reliability. **We have used a dry bath method which keeps the procedure clean, doesn't produce toxic fumes and reduces cleaning time of glassware.** Apparatus has a separate sample holder, which can be easily detached for further analysis

Its modular design enables you to move it around with ease and allows you to stack together multiple modules if necessary. Single module can operate as an independent device or multiple modules can be connected together and operate as a single device for larger sample quantities. They can be monitored via only one user interface. **Our system offers a low-cost solution for analysis of samples and makes simple upgrading to a larger system possible.**



According to standards and more

Apparatus for oxidation of insulating liquids has been built according to IEC 61125 (old IEC 1125) standard and normative which ensures reliability of measurement. You can choose among method A (100°C) and method B (120°C) for aging evaluation.

Method A is related to unused uninhibited mineral insulating oils, while method B is related to unused

inhibited mineral insulating oils, both methods use oxygen gas.

For advanced users it is possible to create custom methods, where start time, duration, temperature of block and each individual flow through oil sample can be set. Each module is able to perform different methods (A, B or custom) simultaneously.

Sludge formation
 Soluble acidity, SA
 Volatile acidity, VA
 Total acidity, TA or Neutralization Value
 Oxidation rate
 Dielectric dissipation factor, DDF or Tan Delta

Method A

Method B



Technical details

Electrical specification - module

Required supply:	100 V - 240 V AC (+/-10 %)
Frequency:	50-60 Hz
Consumption [max]:	1100 W
Current:	4,5 A
Overvoltage category:	II
Heat-up time:	< 2 h

Dimensions

Dimensions - module (WxHxD):	375 x 235 x 500 mm
Weight - module:	36 kg
Dimensions - rack (WxHxD):	375 x 235 x 150 mm
Weight - rack:	5 kg

Environmental conditions

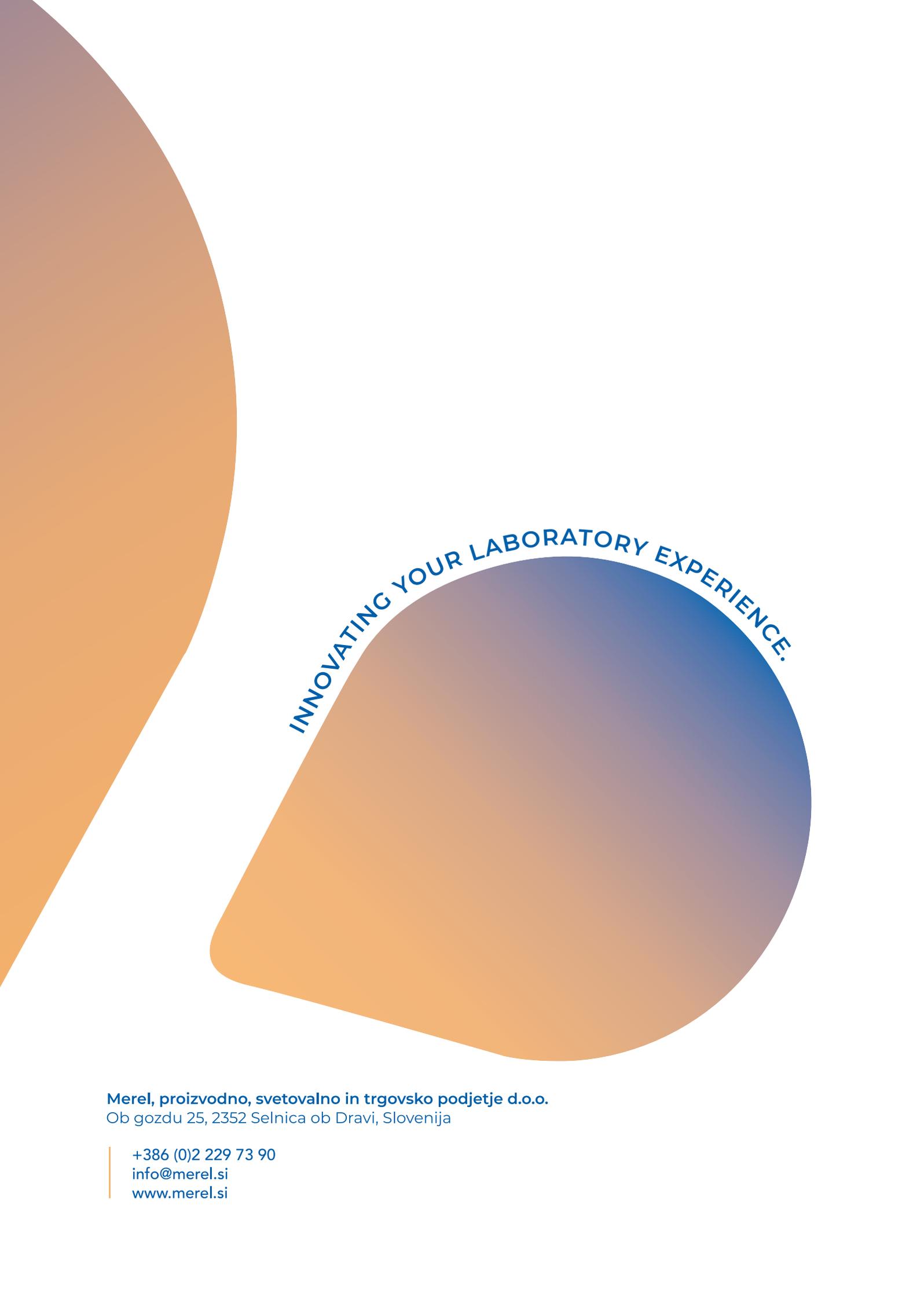
Ambient temperature:	5...40°C (20...25°C is recommended)
Humidity:	15...80 % r.h. (non-condensing)
Pollution degree:	2

Computer and OS requirements

Operating system:	MS Windows 7 Pro (32/64-bit) or MS Windows 8 Pro (32/64-bit) or MS Windows 10 Pro (32/64-bit)
Processor:	minimum Intel® Core TM i3
RAM:	minimum 2 GB (4 GB is recommended)
Hard disk:	8 GB of available hard-disk space for installation
Expansion slots:	PCI expansion card slot for RS485 (optional)



Merel AOS-125
Apparatus for oxidation of
insulating liquids



INNOVATING YOUR LABORATORY EXPERIENCE.

Merel, proizvodno, svetovalno in trgovsko podjetje d.o.o.

Ob gozdu 25, 2352 Selnica ob Dravi, Slovenija

+386 (0)2 229 73 90

info@merel.si

www.merel.si