

Edition 2020



# Test and Simulation Equipment

for quality control, research  
and production

Temperature

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Humidity

---

Light

---

CO<sub>2</sub> Gassing

---

-proof Execution

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Seed tests

# RUMED®

Rubarth Apparate GmbH



 Dieser Katalog steht auch in deutscher Sprache zur Verfügung.

 Ce catalogue est aussi disponible en français.

 Этот каталог имеется также и на русском языке.
















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Concept and Design: Kessler Werbung GmbH · Text and Editor: Rubarth Apparate GmbH, vitamin be-Kommunikation

Photos: Bayer CropScience AG, Molecular Dimensions, UFAG AG, Kessler Studios, Depositphotos: alexraths, Fotolia: Jasmin Merdan, Givaga, psdesign1, lily, Sergej Toporkov, .shock, Denchik, science photo, Syda Productions, raksitar, Africa Studio, Lars Eric Kärneheim, Black Mamba, savanno, Alex011973, gemini62, Sinnlichtarts, kasto, tycoon101, Kzenon, capifrutta, khwanchai.s, wawritto, Vasily Koval, Alexandr Makarov, fabiantr, WavebreakMediaMicro, B. Wylezich, okinawakasawa, strixcode, montego6, Victoria, Coprid, Nyo009



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## Your success is our success!

According to this motto, Rubarth Apparate GmbH produces since more than 70 years high-precision environmental simulation equipment for science and industrial laboratories all over the world.

Well-known companies, such as Novartis, BAYER, Nestlé or Dr. Oetker, research institutions, such as the Max-Planck-Gesellschaft or the American National Institute of Health, had been relying for decades on the advanced technology of the brand RUMED®. We deliver to all branches of industry and are leading innovator in the field of low-vibration equipment for protein crystallization, in storage of explosive liquids and gases, or for equipment for the in vitro cultivation of plant cell cultures. If in the Antarctica,

on the research vessel „Polarstern“, or in a seed test centre in Africa – our equipment provides reliable results, even under most difficult research conditions. The precision equipment of the brand RUMED® resolves your problems perfectly.

*Dipl.-Ing. Volker Rubarth  
Manager*

## History

- 2018** ATEX approval for the X- and T-line
- 2015** Development and launch of the operating and control unit CONTROL2015 *touch*
- 2008** Further extension of the company headquarters
- 2000** Launch of the first microcontroller system Control 2000
- 1997** The company is certified successfully according to QM ISO 9001, and the first ATEX certificate for ex-proof equipment is received
- 1996** The Rubarth Apparate GmbH receives the eco-audit certificate for their environmentally conscious production
- 1992** The company moves to Laatzen, adjacent to the Hannover Fairground
- 1984** Dipl.-Ing. Volker Rubarth takes over the Rubarth Apparate GmbH in the second generation
- 1956** Georg Rubarth receives a patent for the Light Thermostat, which has been developed by him
- 1947** The engineer Georg Rubarth founds a factory for medical and electrical equipment in Hannover





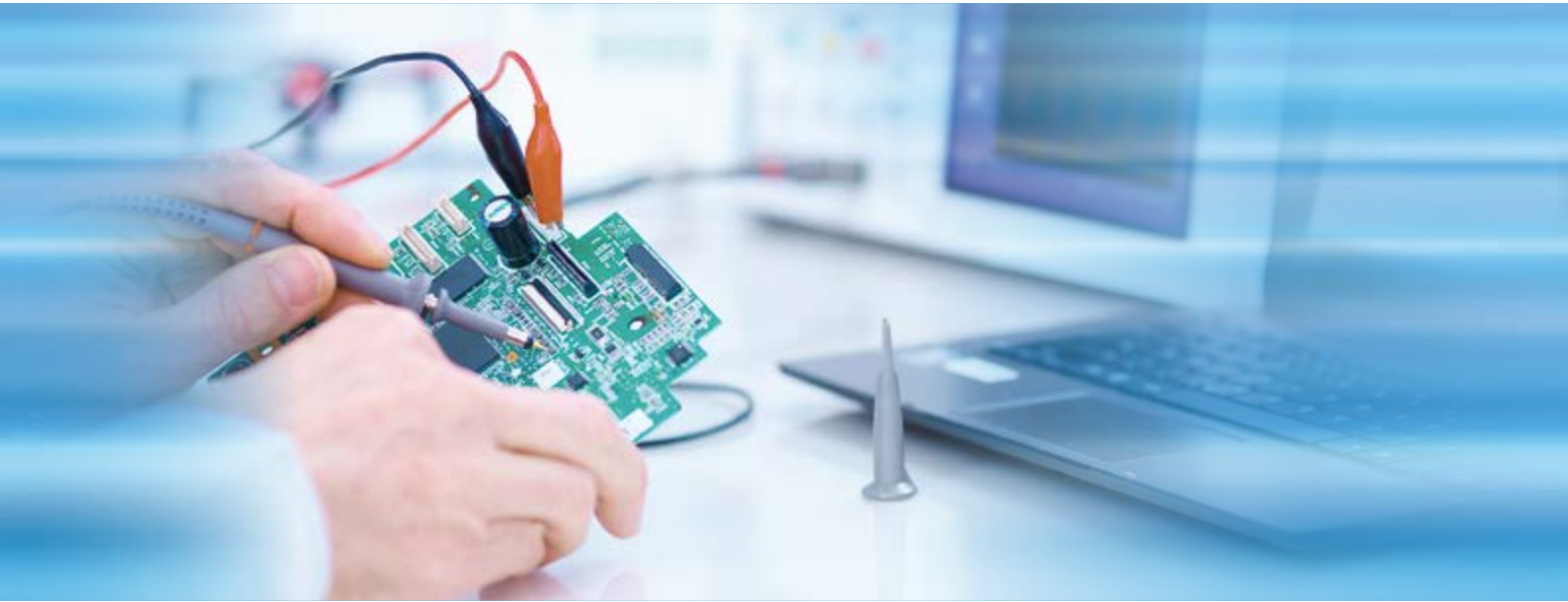
## „Made in Laatzen“ – applied all over the world

To maintain our high quality standards, all our products are manufactured in our factory in Laatzen near Hannover being equipped with most advanced manufacturing technology. From there, they are delivered worldwide. Our customers come from all continents.

The entire production process is subject to a strict quality control, and each appliance is again checked comprehensively prior to delivery. The export packing, which has been developed for our products, ensures that the precision equipment arrives at the customer safe and undamaged. A well thought-out

plug-in system without nails and screws facilitates packing and unpacking. Shock-absorbers minimize jerks during transport. Furthermore, the units are equipped with sensitive „spies“, such as shockwatch and tiltwatch. During transport, they are warning of improper handling.

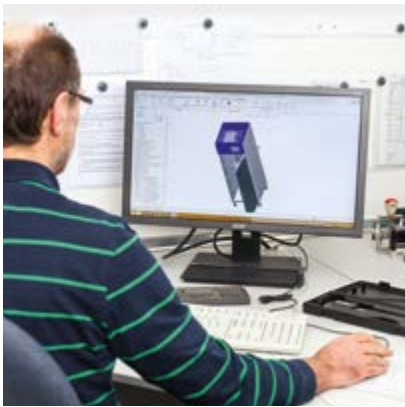




## Strong in innovations

We are investing continuously in the further development of our product range. In this way, the wide RUMED® program of test and simulation equipment for research, quality control and production developed. The variety of our options and accessories helps you to configure the appliance, which is the most suitable for your requirements. Also customized solutions are possible by means of our 3D construction.

In close cooperation with our customers we continuously develop also new solutions for science and industry. Examples for the innovations, which had been developed this way, are, for instance, the plasma exposure systems, the explosion-proof Cold/Heat and Climatic Test Cabinets or small appliances, such as soil divider for samples.



## Environmentally conscious production as a matter of principle

Rubarth Apparate GmbH was the first company in Southern Lower Saxony receiving the eco-audit certificate for environmentally conscious production, already in 1996. In cooperation with the Leibnitz University Hannover and state-aided by the German Environment Foundation, further ecological development of our products had been pursued consistently.

The major part of our products consists entirely of high-quality stainless steel. For construction of all appliances, the modular construction is observed allowing a quick separation of the materials for optimum recycling. A part of the products had already been converted to natural refrigerants. The bypass circuit in the refrigerating machine makes all our units extremely energy-efficient. Apart from that, we offer

many products with energy-saving water/brine cooling. Also our special thermo fluorescent lamps and the LED lighting systems are extremely efficient and energy-saving.





## Certified quality for a fair price

Optimum quality for a fair price – this is our policy from the foundation of the company. Already in 1997, our quality management system according to DIN ISO 9001 had been certified by the TÜV NORD CERT. Quality „Made in Germany“ is not a set phrase, but reality. Apart from 100 % routine tests and functional checks during the manufacturing process, all units are subject to stress and load tests for several days.

Explosion-proof appliances of the RUMED® Safety Lines have successfully passed a demanding type examination according to annex III of the ATEX 2014/34/EU.

Yearly inspections (conformity of the type, annex VI of the ATEX 2014/34/EU) by a notified body ensure the high quality and safety requirements. Consequently, it is not only declared, but guaranteed, that the appliances comply with the valid standards, and their CE-sign is justified. Only with the ATEX certificate you are on the safe side.



Realization and evaluation of the environmentally responsible product design in development of Climatic, Test and Simulation Cabinets.

## Personal service is one of our top priorities

With us, the same employee is always responsible for you. From the first consultation up to the start-up of the product and for any questions, which might arise. Our principle „one face to the customer“ ensures optimum support at any time. The decades' experience of our employees in the sales department helps you to configure the appliance, which is the most suitable for your requirements from the variety of our options and accessories. We are also pleased to assist you in all questions of validation, recalibration and maintenance or to execute the work on your behalf.





E 100

E 160

E 230

E 400

## The Eco-Line

Precise, extremely reliable, easy to operate and almost vibration-free – these are only a few quality features of the test and simulation equipment of the RUMED® Line Eco. The most budget-priced Eco appliances are ideal for tests in the standard temperature range from 0 °C to 50 °C with only low requirements regarding humidity control and luminous intensity.

The precision appliances of the Eco-Line have proven worldwide, even under most adverse research conditions. Their freedom from vibration is the basis for successful research. Therefore, they are applied by many Nobel laureates. Very often, the appliances are used for protein crystallization, but they are also indispensable in microbiology and for seed tests. The housings of this series consist of electro-galvanized sheet-steel with white powder coating. Due to their high, slim format the floor space required in the laboratory is minimized, while offering plenty of volume: from 100 l to 400 l. The interior consists of shock-resistant plastic material, the shelves consist of plastic-laminated wire. Smooth surfaces and rounded edges ensure easy cleaning.

### General view of the most important advantages:

- Test room volume 100 l to 400 l
- Temperature range 0 °C to +50 °C
- High operating convenience, intuitive handling by means of the CONTROL2015 *touch*.
- Vibration-free, energy-efficient cooling by solenoid valve-bypass-technology
- Telescope-like retractable shelves, adjustable in height
- Possibility of combination with the options light and humidity
- Space-saving construction
- Easy cleaning
- Extremely durable





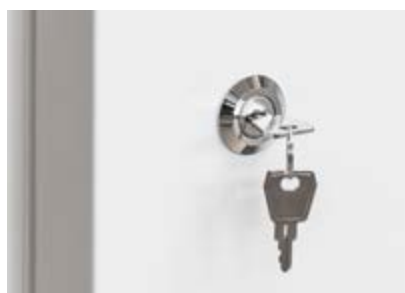


## Technical Data

Type	E 100	E 160	E 230	E 400
<b>Test room</b>				
Volume (l)	100	160	230	400
Minimum temperature	0 °C	0 °C	0 °C	0 °C
Maximum temperature	+50 °C	+50 °C	+50 °C	+50 °C
Temperature deviation in time ( °C)	±0,5 °C	±0,5 °C	±0,5 °C	±0,5 °C
Height (mm)	510	875	1265	1265
Width (mm)	510	460	460	600
Depth (mm)	415	425	425	550
Number of shelves (standard delivery scope)	2	3	3	3
Maximum load per shelf (kg)	40	40	40	50
<b>Unit</b>				
Height (mm)	1070	1470	1860	1860
Width (mm)	600	600	600	750
Depth (mm)	670	620	620	745
Electric connection (V/Hz)	230/50	230/50	230/50	230/50
Net weight of standard unit (kg)	50	60	75	90
<b>Options</b>				
Additional shelf	E0100-01	E0160-01	E0230-01	E0400-01
Glazed panel door	–	E0160-02	E0230-02	E0400-02
Execution 110V/60Hz	E0100-03	E0160-03	E0230-03	E0400-03



The small graduation of the support for the shelves allows optimum disposition of the test room.



Lockable appliance door with magnetic rubber gasket. The opened door does not protrude the housing width.



Free view on the specimen is ensured by an optional glazed door.



P 210

P 350

P 530

P 850

## The Premium-Line of stainless steel

Extremely high quality, durable and flexible – these are the characteristics of the RUMED® Premium-Line of stainless steel. Thanks to the variety of options and accessories, the precision test cabinets can be configured almost boundlessly for any kind of climatic test.

No matter if stability test in pharmacy, cultivation of test plants, or artificial ageing of products – the influence of temperature, humidity, light and CO<sub>2</sub> on the specimen can be tested reliably by means of RUMED®s Stainless Steel Premium-Line. We offer a selection of 6 test room volumes from 210 l to 1700 l, which is unique on the market. Particularly the large-volume appliances with only small space requirements in the laboratory have an extremely good cost-benefit ratio relating to the volume. The next pages will give more details concerning the standard execution and the possible options.

### General view of the most important advantages:

- Test room volumes from 210 l to 1700 l
- Test room and external housing of corrosion-resistant stainless steel
- Suitable for installation in a clean room, easy cleaning.
- Temperature ranges from -30 °C to +80 °C
- High operating convenience, intuitive handling by means of the CONTROL2015 *touch*.
- Eco-friendly refrigerants
- Energy-saving lighting and refrigeration technology
- Noise minimization by speed-controlled compressor fan
- Extremely durable
- Possibility of calibration and validation





P 1060



P 1700

## Technical Data

Type	P 210	P 350	P 530	P 850	P 1060	P 1700
<b>Test room</b>						
Volume (l)	210	350	530	850	1060	1700
Standard minimum temperature	0 °C	0 °C	0 °C	0 °C	0 °C	0 °C
Standard maximum temperature	+50 °C	+50 °C	+50 °C	+50 °C	+50 °C	+50 °C
Temperature deviation in time ( °C)	±0,5 °C	±0,5 °C	±0,5 °C	±0,5 °C	±0,5 °C	±0,5 °C
Height (mm)	600	990	1500	1500	1500	1500
Width (mm)	610	610	610	610	2 x 610	2 x 610
Depth (mm)	585	585	585	935	585	935
Number of shelves (standard delivery scope)	2	3	3	3	6	6
Maximum load per shelf (kg)	25	25	25	25	25	25
<b>Unit</b>						
Height (mm)	1180	1600	2105	2105	2105	2105
Width (mm)	730	730	730	730	1460	1460
Depth (mm)	820	820	820	1170	820	1170
Electric connection (V/Hz)	230/50	230/50	230/50	230/50	230/50	230/50
Net weight of standard unit (kg)	80	125	160	200	260	350

## Standard Equipment Premium-Line



Insert the stainless steel grid shelves with the distance 13 mm for optimum utilization of the test room.



The appliance door is lockable. If the aperture angle is less than 90 °, it closes automatically.



Easy maintenance: The magnetic rubber door gasket can be replaced without any tool.

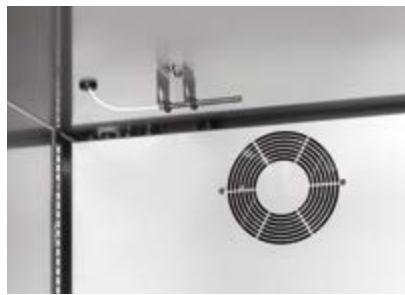


## Standard Equipment Premium-Line



### Tubular port

A 45 mm duct in the left side panel allows insertion of measuring lines and hoses into the test room. Delivery including cover.



### Recirculating air cycle

Optimum spatial temperature distribution by means of recirculating air. The smooth stainless steel surfaces can be easily cleaned.



### Fin evaporator

Temperature-conditioning is realized by an efficient fin evaporator and a fin tube heater in the air-conditioning duct.

## Optional Equipment Premium-Line



### Heated glass panel door

The triple glazed glass panel door always ensures an optimum view into the test room. A pane heating avoids formation of condensate.



### Internal glass door

Another option: the internal glass door. When the appliance door is open, it allows a visual check of the specimen – without any unnecessary disturbance of the climate in the test room.



### Plate evaporator

The stainless steel plate evaporator is always recommendable, whenever acid resistance is required, such as for *Drosophila* cultivation.



## Options

Type	P 210	P 350	P 530	P 850	P 1060	P 1700
Additional shelf (max. 25 kg)	P0210-01	P0350-01	P0530-01	P0850-01	P1060-01	P1700-01
Shelves of the standard delivery scope in reinforced execution (50 kg load per shelf)	P0210-02	P0350-02	P0530-02	P0850-02	P1060-02	P1700-02
Additional shelf, reinforced (50 kg maximum load per shelf)	P0210-03	P0350-03	P0530-03	P0850-03	P1060-03	P1700-03
Glazed panel door with pane heating	P0210-04	P0350-04	P0530-04	P0850-04	P1060-04	P1700-04
Interior glass door	P0210-05	P0350-05	P0530-05	P0850-05	P1060-05	P1700-05
Minimum temperature -20 °C	P0210-06	P0350-06	P0530-06	P0850-06	P1060-06	P1700-06
Minimum temperature -30 °C	P0210-07	P0350-07	P0530-07	P0850-07	P1060-07	P1700-07
Maximum temperature +80 °C	P0210-08	P0350-08	P0530-08	P0850-08	P1060-08	P1700-08
Speed rate in temperature change 2 °C/min. in the operating range of 0 to +80 °C	P0210-09	P0350-09	P0530-09	–	P1060-09	–
Stainless steel plate evaporator	–	P0350-10	P0530-10	P0850-10	P1060-10	P1700-10
Water-cooled refrigerating machine	–	–	P0530-11	P0850-11	P1060-11	P1700-11
Direct water cooling at restricted temp./humidity range	–	–	P0530-12	P0850-12	P1060-12	P1700-12
Execution 110V/60Hz	P0210-13	P0350-13	P0530-13	P0850-13	P1060-13	P1700-13



### Reinforced insertion grids

The reinforced stainless steel grid shelves are recommendable for building material testing or beer Forcier tests. Their maximum carrying capacity is up to 50 kg.



### Condensate collecting pan

Collecting pan for dew water or condensate. It can be easily withdrawn to the front.

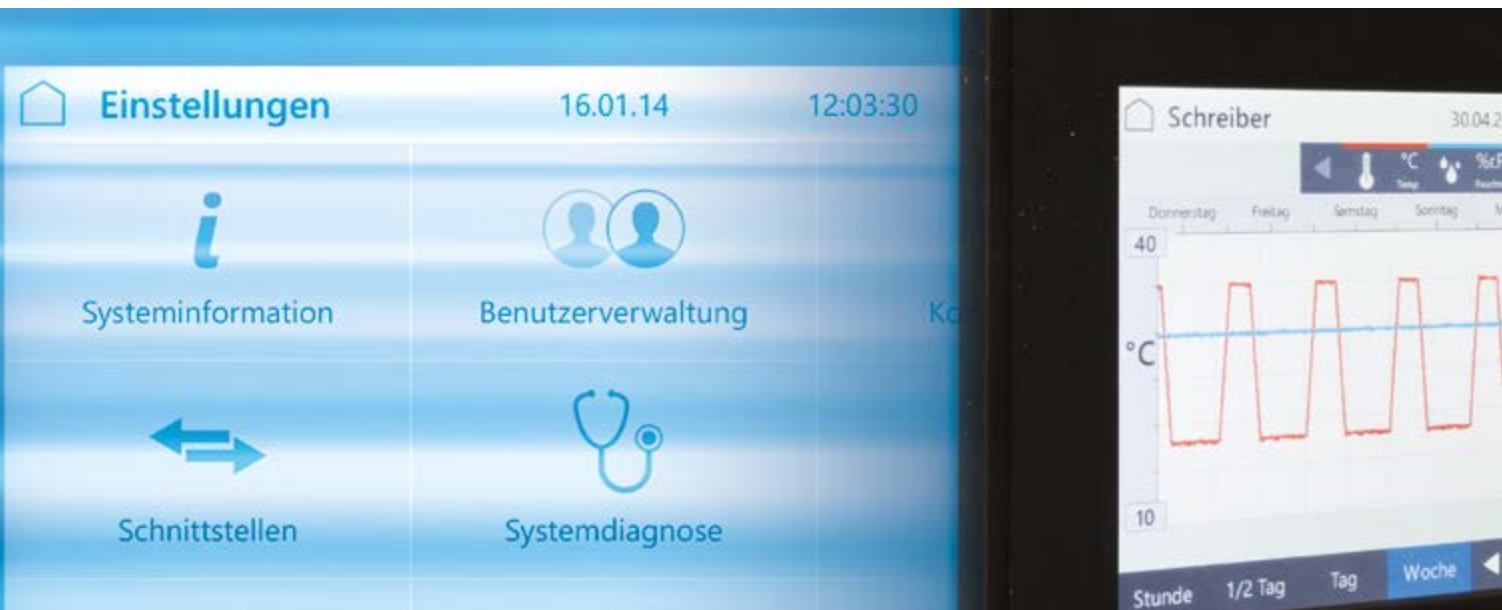
Order No.: P9910-01



### Heated condensate collecting pan

Convenient application: A self-controlling heating rod ensures automatic evaporation of the condensate. Thus, periodical emptying of the pan can be omitted.

Order No.: P9910-02

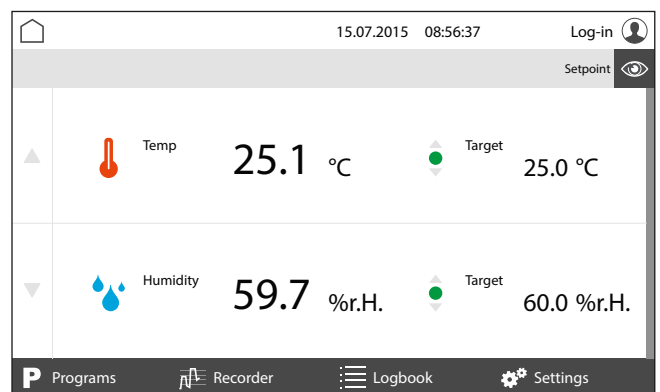


## CONTROL2015 touch – one control for everything

- Easy:** Intuitive operation of the clearly arranged 7" colour touchscreen display.
- Good:** High-precision sensors and the possibility of adjustment allow highly precise working, which is qualifiable and validatable at any time.
- Safe:** The documentation by means of the integrated recorder and the logbook ensures transparency, easy operation and convenient archiving. The optional digital signature provides conformity with 21CFR part 11.

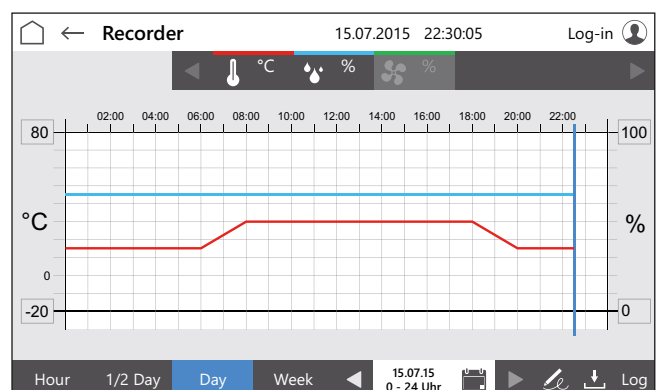
### Intuitive operation

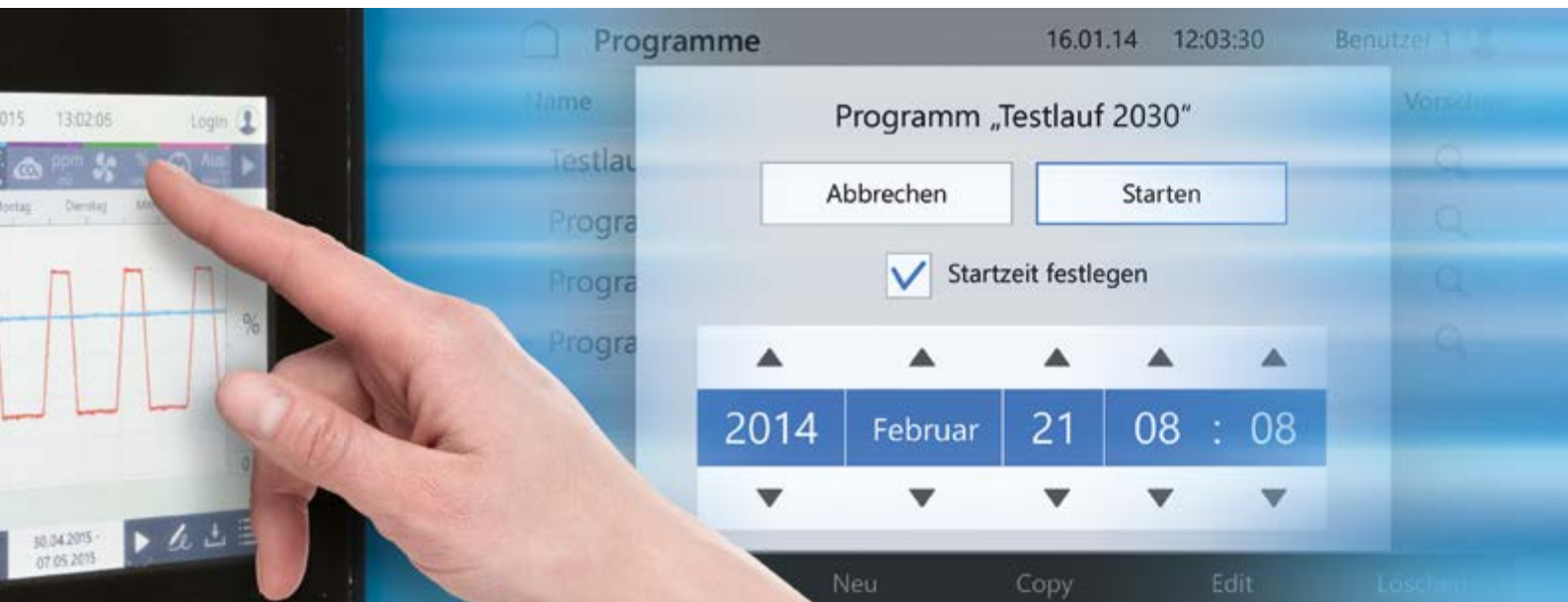
- Clearly arranged and easily to operate representation of the actual values and setpoints of all regulator and control circuits.
- The favourite function for the main page ensures that the user has always an overview of the data, which are important to him.
- Convenient operation with language support in many languages.



### Integrated screen recorder

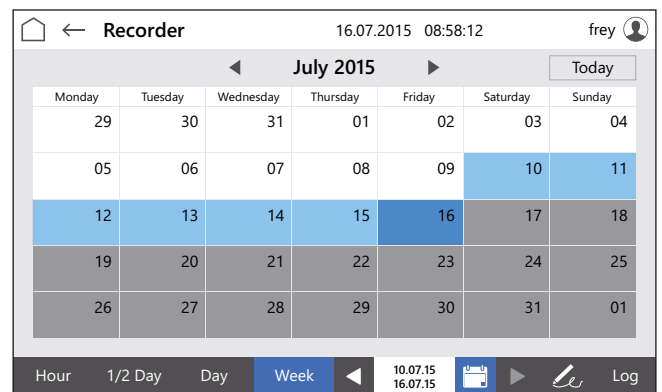
- Recording of actual values of all regulator and control circuits.
- For clearness, all channels can be shown or hidden.
- Past periods can be scrolled conveniently page-by-page.
- Even with power failure, a restricted, battery backed monitoring is effected.





## Calendar

- The calendar function allows quick direct access to past recording periods – no matter if to the recorder, to the logbook or for data export.
- All days for which data have been recorded are colour-highlighted.



## Program control is standard

- Day, week or process time programs are possible.
- The user can name the programs created by him meaningfully.

Name	Type	Action	Preview
Stress test Seed Preparation	Process time	▶	🔍
Spring	Day Program	▶	🔍
Accelerated Germination	Week Program	▶	🔍
Product Preparation	Week Program	▶	🔍

## Program input

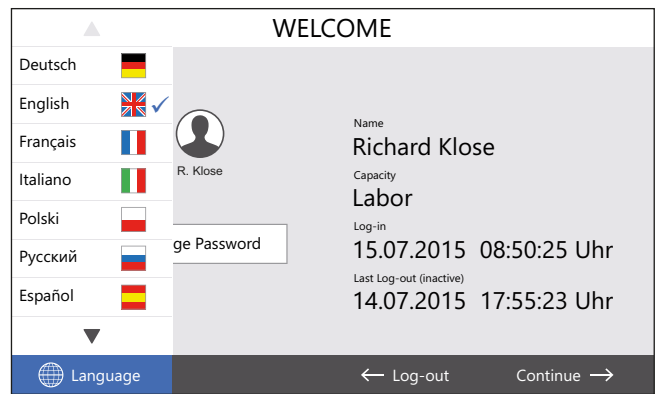
- Tabular arrangement of the program input, convenient editing and preview function.
- No limitation of the program steps and of the number of programs.
- Programs can be linked to each other.

No.	Time (h)	Target
1	06:00	
2	08:00	
3		
4		
5		



## User login

- In the user management, the preferred language can be assigned to the users. A quick change is possible at any time.
- Thanks to the user management, the activities of each user can be traced exactly.
- In connection with the option Electrical Door Release, even the door opening can be allocated to a user.



## User management

- The user management can be customized: It can be deactivated completely, or different rights can be allocated to the users. Passwords can be restricted in time, and the access can be locked after a defined number of failed login attempts.
- The user management allows the use of the appliance in conformity with 21CFR part 11.

User Management					
User ID	First Name/Name	Capacity	Status	Created on	
blume	Anna Blume	Laborant	new	01.08.2014	
fernandez	Sylvia Fernadez	Laborant	blocked	28.08.2014	
klose	Richard Klose	QT	inactive	02.02.2015	
wimmer	Erwin Wimmer	Leitung	active	20.05.2015	
frey	Otto Frey	Laborant	active	19.06.2015	

## Logbook

- Gapless event documentation in real time, inseparably connected with the recorded data.
- Filter function for the quick, selective display of the events.
- Free comments with login name are possible at any time.

Date	Message	All
16.07.2015 08:04:23 Uhr	Door open	Note
16.07.2015 08:05:34 Uhr	Door closed	Note
16.07.2015 08:30:02 Uhr	Door open	Note
16.07.2015 08:32:21 Uhr	Door closed	Note
16.07.2015 14:02:45 Uhr	Interior had been cleaned (frey)	Comment
16.07.2015 16:59:29 Uhr	Door open	Note
16.07.2015 17:00:29 Uhr	Door closed	Note





## Comment entry

- Complete keyboard for entry of comments into the logbook and for entry of individual names for program creation.
- The assignment of the keys is adapted automatically to the selected language.

The screenshot shows the 'Logbook' interface for 16.07.2015 at 17:06:30, user 'frey'. The screen prompts 'Please enter the comment' and shows a blue box with the text 'Internal Audit successfully completed'. There are 'Save' and 'Cancel' buttons. Below the text is a keyboard with German characters.

## Digital signature

- Signature of the checked periods directly at the recorder of the control in conformity with 21CFR part 11.
- Undersigned areas are marked correspondingly in the recorder.

The screenshot shows the 'Recorder' interface for 16.07.2015 at 22:20:35, user 'blume'. The screen prompts 'Create signature for the period 16.07.2015 00:00-22:20 Uhr'. There are 'Cancel' and 'Yes' buttons. A signature icon is visible in the top right corner.

## Calibration and adjustment

- The 5 adjustment points per sensor ensure highest precision.
- If the user has noticed a deviation, a readjustment can be effected.
- The tabular entry of the supporting points and correction values can be displayed at any time, thus offering highest transparency.

The screenshot shows the 'Adjustment' interface for 16.07.2015 at 16:06:40, user 'admin'. The table displays calibration data for a Temperature Sensor.

▼ Temperature Sensor		
Correction Value 0	°C	0.6
Supporting Point 1	°C	-20.0
Correction Value 1	°C	0.6
Supporting Point 2	°C	0.0
Correction Value 2	°C	0.5
Supporting Point 3	°C	25.0
Correction Value 3	°C	0.4
Supporting Point 4	°C	60.0
Correction Value 4	°C	0.3



## The temperature – precise and constant

No matter, if continuous incubation of microbiological cultures or freeze-thaw alternating tests in building material testing – RUMED®s Cooled Incubators perfectly master all demands on temperature tests. The precision appliances reliably provide reproducible results for the most different application ranges in research and quality control.



*Protein crystals are very fragile: Freedom from vibration is a requirement for formation of these crystals.*



*Test field electrical engineering: The board will be exposed to different temperatures.*



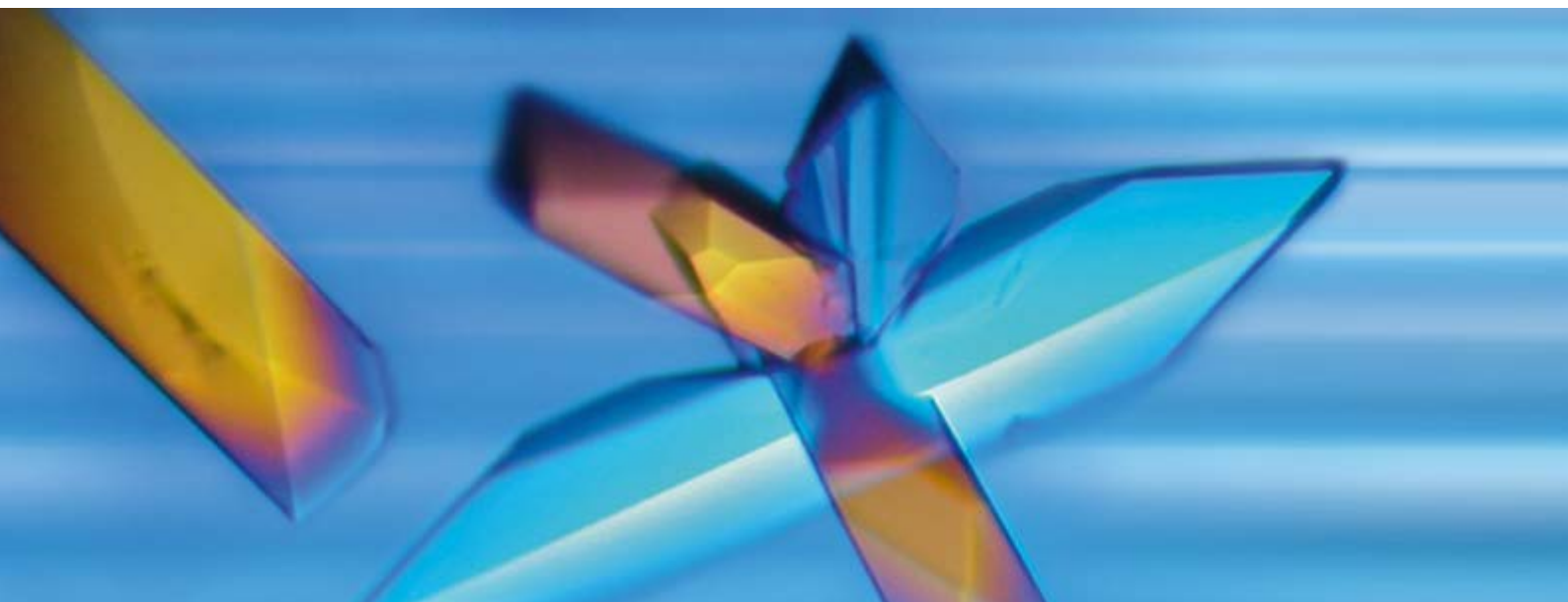
*Living cultures in the Petri dish require a precise observation of the temperature.*

What happens to an ointment, if it is stored continuously at 30 °C? What is the behaviour of a mobile phone in case of a sudden temperature drop below 0 °C? After which time the beer becomes cloudy? RUMED®s Temperature Test Cabinets provide quick and reproducible results in fast motion in all fields of research and quality control concerning these and other questions. The appliances of the Eco-Line are designed for tests with temperatures from 0 °C to 50 °C. The temperature range of appliances of the Premium-Line can be extended down to -30 °C and up to +80 °C. The common feature of all appliances is a continuous, wear-free heating and an energy-saving, efficient cooling.

RUMED® Temperature Test Cabinets offer various possible applications in research and industry:

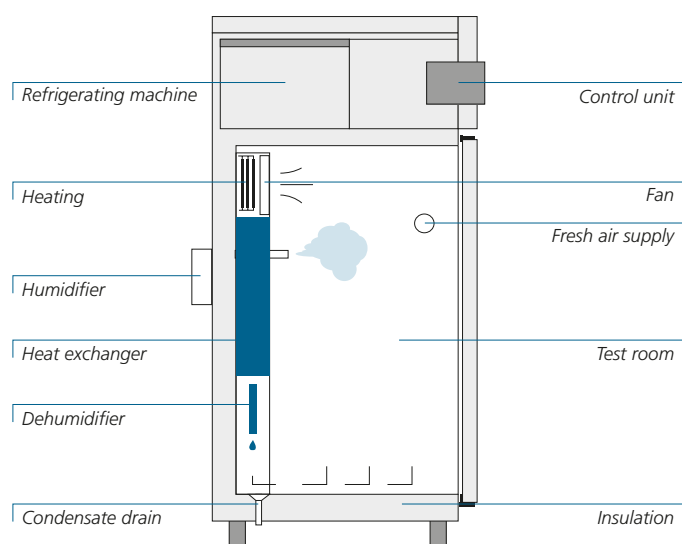
- Crystal growth
- Microbiology and bacteriology
- Seed tests and seed research
- Zoology and botany
- Pharmacy and medicine
- Electrical industry and electronic industry
- Automotive industry
- Plastics industry
- Forcier test in quality control of breweries





## The heating – continuous and wear-free

The high temperature accuracy in time, as well as in space is ensured by a continuously running fan. If required, the speed can be reduced, such as, for example to avoid drying of cultures. Coasting of temperature is almost avoided due to the low mass of the electric resistance heater. The heater is arranged directly in front of the recirculating air fan. The continuous and contactless control by means of a solid state relay allows an extremely direct and precise control. The advantage: High temperature accuracy and minimum wear.



## The cooling – energy-saving and powerful

The standard execution includes an air-cooled refrigerating machine, which, in some appliances, is working with natural refrigerants. The compressor is running quietly and almost vibration-free. The efficiency of the heat exchanger is optimal. The entire cooling circuit is working with energy-saving solenoid valve-bypass technology ensuring that the compressor will only be disconnected, if cooling capacity had not been required for a longer period. The result: Reliability, high operating safety and durability.

Optionally, water-cooled compressors can transfer the waste heat directly to a water chiller of the customer to avoid unnecessary heating of the installation place. If only a restricted temperature and humidity range is required, a direct cooling by means of brine can be effected instead of the refrigerating machine.





*Storage at constant climates according to the ICH guideline in the pharmaceutical industry.*



*Freeze-thaw alternating tests in building material testing show the durability of the material.*



*Avoidance of condensation with temperature alternating tests by expansion of dry compressed air, such as for clock production.*

## The humidity – decisive for the optimum climate

Apart from the temperature, the issue air humidity plays a central role, if climatic conditions shall be simulated in the laboratory. With RUMED® Test and Simulation Equipment almost any climate can be simulated precisely.

Equipped with the options humidification and dehumidification, a temperature test cabinet becomes a climatic test cabinet, which is suitable for various applications in research and quality control. You have the choice between the appliances of the Eco-Line, which are working exclusively with evaporation humidifiers, and those of the Premium-Line offering alternatively also the ultrasonic atomization. Combined with the different possibilities of dehumidification, the humidity range of the ultrasonic atomization extends from 20 % to 95 %. Thanks to the variety of options and accessories, the RUMED® program can be customized flexibly to your requirements. The used advanced technology with the controller CONTROL2015 *touch* ensures a perfect interaction of temperature and humidity.

The application ranges of the RUMED® Climatic Test Cabinets:

- Stability and temperature swing tests in pharmacy according to the specifications of the Good Laboratory Practice (GLP) and the ICH Guidelines for pharmaceutical products
- Artificial ageing of products, such as in the packaging industry
- Freeze-thaw alternating test, such as for building material testing
- Storage under defined conditions
- Quality control during production of electronic component groups





## Evaporation Humidifier – a simple and cost-effective alternative

For this low-cost version, an evaporation humidifier is installed in the test room. Application of an evaporation humidifier is always recommendable, if it is required to keep air humidity values beyond 60 % to avoid drying of the specimen. In case of higher requirements to the control performance, an ultrasonic atomizer is recommendable (see next page). With an evaporation humidifier, the relative humidity is controlled by a PID-controller being integrated into the CONTROL2015 *touch*. The sensor is a temperature-compensated, capacitive sensor, which can be calibrated. The water supply is either realized automatically by direct connection to the drinking water supply or by periodical manual refilling of drinking water.

The evaporation humidifier is the exclusive way of humidification of the ECO Appliance Line. The Premium-Line furthermore includes the high-precision controllable ultrasonic atomization.



## Humidification in the Eco-Line

Type	E 100	E 160	E 230	E 400
<b>Humidification</b>				
Evaporation humidification	–	–	E0230-20	E0400-20



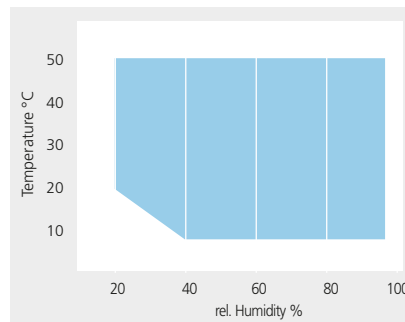
## Ultrasonic atomization – the precise and energy-efficient way of humidification

For all applications requiring an exact setting of the air humidity, the ultrasonic atomization in combination with the dehumidification methods is the best choice. This way of humidification is only available in the Premium-Line. The desired humidity can be preselected by means of the electronic PID-controller, which is integrated in the CONTROL2015 *touch*. The adjacent diagram gives an overview of the application range. The dehumidification can be effected in three different ways: as standard dehumidification, as deep dehumidification and as compressed air dehumidification (see below).

This combination of humidification and dehumidification allows quick humidity variations and a wide range of climate simulations. For instance, it is possible to achieve high humidity values at low temperature values. The ultrasonic atomization has many further advantages: In comparison with the steam humidification, the ultrasonic atomization avoids an

unintended heating of the test room. The humidification by means of an ultrasonic atomizer is considerably more economic regarding energy and water consumption and, in addition, requires only low maintenance, since demineralized water is used.

### Temperature-humidity Diagram



*Aerosol mist without heat introduction into the test room.*

### Standard dehumidification

The dehumidification is realized by condensation or freezing of the water vapour contained in the air at a plate heat-exchanger of stainless steel in special design. Periodical hot gas defrosting thaws the frozen water, which will be dripping into the condensate drain.

### Deep dehumidification

This version is a modification of the standard dehumidification with higher efficiency. The air flow above the humidifier is controlled or reduced by means of a special valve.

### Compressed air dehumidification

Extremely low humidity values at low temperatures can be achieved by our compressed air dehumidification. The customer-supplied dry compressed air will expand in the test room, thus reducing the relative humidity. This application is particularly advantageous for temperature alternating tests, where it is essential, that condensation is to be avoided completely.



## Ultrasonic humidification: Variable possibilities of water supply

The ultrasonic humidification is connected directly to the demineralized water supply of the customer. If such a supply is not existing, the humidifier can be connected to the drinking water pipe via an ion exchanger. If a drinking water supply is not within reach or if it is not desired, a manually refillable canister can be used.



### Ion Exchanger

Ion exchanger for direct connection to the drinking water pipe, if demineralized water supply is not available.

Order No.: P9920-01



### Canister

Canister for water supply at installation places without water connection.

Order No.: P9920-02



Test room bottom with slope to the condensate drain.

## Humidification and dehumidification in the Premium-Line

Type	P 210	P 350	P 530	P 850	P 1060	P 1700
<b>Humidification</b>						
Evaporation humidification	–	P0350-20	P0530-20	P0850-20	P1060-20	P1700-20
Ultrasonic humidification*	P0210-21	P0350-21	P0530-21	P0850-21	P1060-21	P1700-21
<b>Dehumidification</b>						
Standard dehumidification	P0210-22	P0350-22	P0530-22	P0850-22	P1060-22	P1700-22
Deep dehumidification	P0210-23	P0350-23	P0530-23	P0850-23	P1060-23	P1700-23
Compressed air dehumidification	P0210-24	P0350-24	P0530-24	P0850-24	P1060-24	P1700-24

\*Unit depth is then +160 mm, removable for transportation



## The light – the decisive growth factor

With the factor light, the RUMED® Test and Simulation Equipment offers the third and decisive module for simulation of environmental conditions. Make your choice from the wide range of lighting possibilities to find the suitable solution for your application.



*Plant research: Plants need natural light for prosperity.*



*In vitro cultivation: Many plants out of one plant – under the right conditions.*



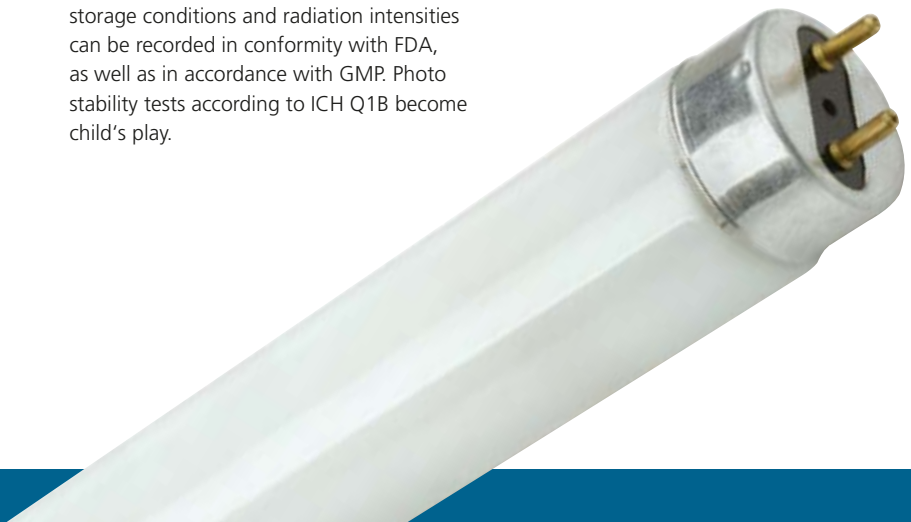
*Photo stability tests of drugs according to ICH Q1B.*

RUMED® Light Thermostats are applied very often in plant research or for seed tests, but are also playing a major role, wherever photo stability tests are required. The RUMED® Precision Equipment can be equipped with the most different light spectra and luminous intensities. From the natural spectrum for reproducible environmental and growth conditions in plant research, over monochromatic light for systematic simulation, up to special UV spectra for accelerated ageing tests. Due to the manifold combinations, the suitable equipment variant for any requirement profile can be found.

The application ranges of the RUMED® Light Thermostats:

- Plant research
- Seed tests and seed research
- In vitro cultivation
- Zoology and botany
- Photo stability tests in the fields foodstuffs, cosmetics or pharmacy
- Packaging industry

By means of the CONTROL2015 touch, the most complex temperature and humidity lighting profiles can be realized. Also storage conditions and radiation intensities can be recorded in conformity with FDA, as well as in accordance with GMP. Photo stability tests according to ICH Q1B become child's play.







## The lighting – the right variant for every application

The spatial arrangement of the light, the required luminous intensity and the required growth height of the test plants are the most important parameters for the choice of the suitable lighting. The RUMED® program offers a multitude of options, particularly in the Premium-Line. You have the choice between lateral lighting, lighting in several levels, as well as lighting from above.

Suitable lamps are fluorescent lamps, LEDs and metal halide vapour discharge lamps. For in vitro cultivation, equipment with a specific recirculating air system is at disposal. Apart from that, we offer appliances with the options ICH illumination and photo stability. The model variants are shown on the next pages, and all options are listed in the overview on page 29.



*LED Light bars: They are economical and offer more possibilities in the arrangement of the test room.*



*Particularly suitable for illumination of small plants: LEDs on each level.*



*Much light, but not too much heat. These fluorescent lamps are thermally insulated from the test room.*

## Fluorescent lamp – flexible and universally applicable

The fluorescent lamp is dimmable, cost-efficient and energy-saving. It can be replaced easily, and it dissipates less heat into the test room. It allows variations of the light spectrum by changing the tube type, such as from daylight to Natura or Biolux. The optionally available multi-channel light control allows control and dimming in groups of fluorescent lamps in different lighting levels and light spectra. Apart from that, further light colours for fluorescent lamps are available. Please contact us!

## LED – High Tech for your plants

LEDs are space and energy saving and dissipate only less heat into the test room. The special plant growth LEDs allow individual mixing of the red and blue portions of the spectrum by means of a two-channel control. Different light colours are available, the spectra of which are shown in the graphs on page 28. Thus, light spectra can be changed program-controlled, or they can be combined freely with each other.



### LED lighting in the test room

The vertically arranged LED light bars allow free and flexible arrangement of the test room. Appliances of the Eco-Line are equipped with 2 LED bars on the back panel of the test room, those of the Premium-Line are equipped with 2 LED bars on each side panel.

For the following appliances of the Eco-Line:  
E160, E230, E400

For the following appliances of the Premium-Line:  
P 350, P 530, P 850, P 1060, P 1700



### Lighting in several levels

Appliances with lighting by means of LEDs in several levels are the best choice for plants with low growth height. They distinguish by optimum economy of space. Depending on the appliance and the desired growth height, executions with 2 or 3 illuminated levels are available.

For the following appliances of the Eco-Line:  
E160, E230, E400

For the following appliances of the Premium-Line:  
P 350, P 530, P 850, P 1060, P 1700



### Lighting from both sides

The fluorescent lamps are arranged in lighting units, which are retractable to the side. A double glazing effects a thermal insulation between the lighting equipment and the test room. A vertical forced air conduction cools the lighting and minimizes the heat introduction into the test room. The illuminated test room space can be extended by additional shelves.

For the following appliances of the Premium-Line:  
P 350, P 530



### Lighting from above

For high-growing plants and normal luminous intensities, an illumination from above with fluorescent lamps is appropriate. If average to high luminous intensities are required, metal halide vapour discharge lamps will be applied. Light densities of up to 800  $\mu\text{E}/\text{m}^2$  (corresponding to approx. 40.000 lux) can be achieved.

For the following appliances of the Premium-Line:  
P 210, P 350



### Lighting in several levels "In vitro"

This execution had been developed particularly for in vitro cultivation. It is equipped with a specific recirculating air system avoiding condensation. No formation of condensate drops means: no contamination of the cultures by dripping water and no burning glass effect. The appliance is equipped with 4 illuminated levels, which can be switched and dimmed independently of each other by means of the option multi-channel light control.

For the following appliances of the Premium-Line:  
P 530, P 1060



### Lighting "Photo Stability ICH Q1B"

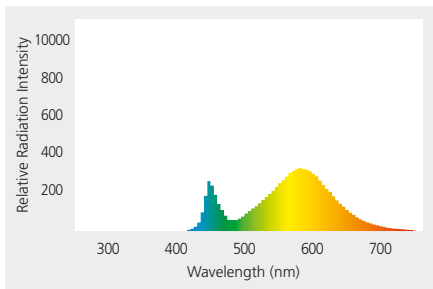
For photo stability tests according to the ICH guideline Q1B. The lighting in the 4 shelves can be controlled independently of each other. The light dose will be measured and documented per shelf. If the preset light dose is reached, the lighting of the concerned level is automatically switched-off by the appliance.

For the following appliances of the Premium-Line:  
P 530

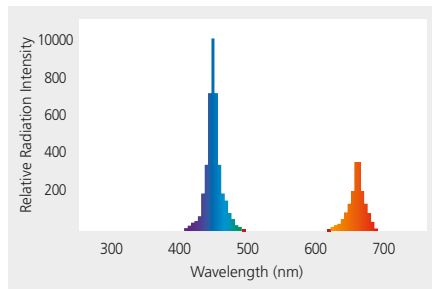


## Spectral distribution of radiation of the lighting equipment

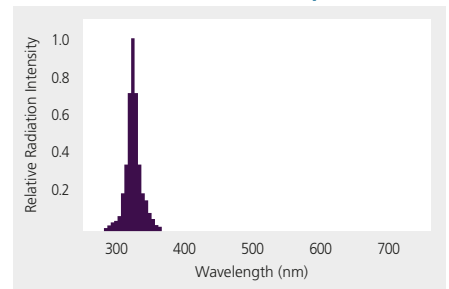
LED Warm White



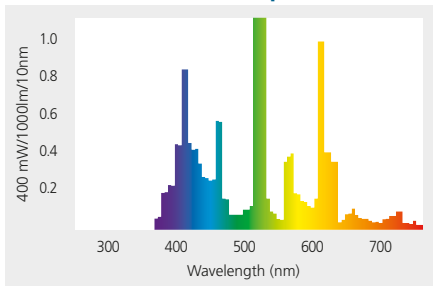
LED Plant Growth



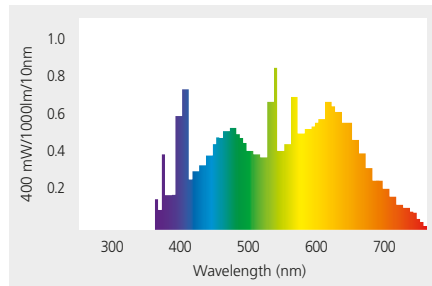
UV-Fluorescent Lamps



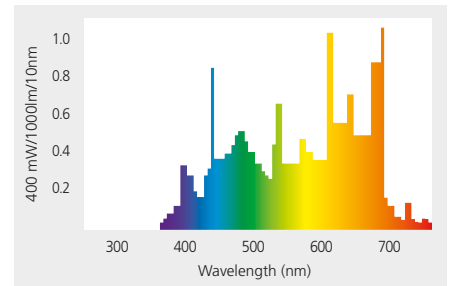
Flourescent Lamps



Daylight

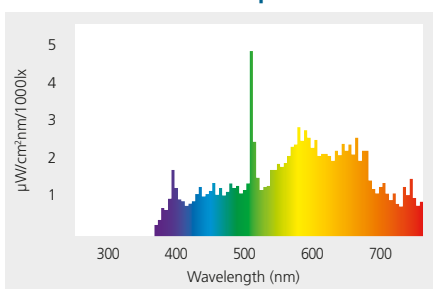


Biolux

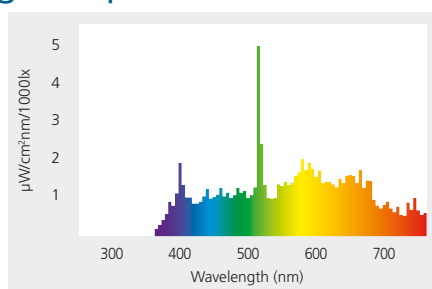


Natura

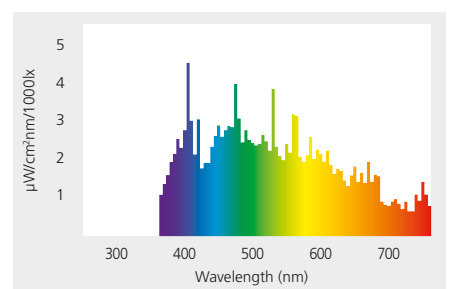
Metal halide vapour discharge lamps



3500 K



4500 K



6500 K



## Overview Lighting Eco-Line

Type	E 100	E 160	E 230	E 400
Lighting rear side with LEDs warm white, dimmable	–	E0160-30	E0230-30	E0400-30
Lighting rear side with LEDs plant growth, dimmable	–	E0160-31	E0230-31	E0400-31
Lighting in 2 levels with LEDs, dimmable	–	E0160-35	E0230-35	E0400-35
Lighting in 3 levels with LEDs, dimmable	–	–	E0230-36	E0400-36
Multi-channel light control	–	E0160-60	E0230-60	E0400-60

## Overview Lighting Premium-Line

Type	P 210	P 350	P 530	P 850	P 1060	P 1700
<b>Lighting in the test room</b>						
Lighting on both sides with LEDs warm white, dimmable	–	P0350-30	P0530-30	P0850-30	P1060-30	P1700-30
Lighting on both sides with LEDs plant growth, dimmable	–	P0350-31	P0530-31	P0850-31	P1060-31	P1700-31
Lighting in 2 levels with LEDs, dimmable	–	P0350-33	P0530-33	P0850-33	P1060-33	P1700-33
Lighting in 3 levels with LEDs, dimmable	–	–	P0530-34	P0850-34	P1060-34	P1700-34
In vitro execution with special air conduction, dimmable	–	–	P0530-35	–	P1060-35	–
Photo stability lighting	–	P0350-36	P0530-36	P0850-36	P1060-36	P1700-36
Lighting in conformity with ICH Q1B	–	–	P0530-37	–	–	–
<b>Lighting from above, thermally insulated from the test room</b>						
Fluorescent lamps Daylight 10.000 Lux, dimmable	P0210-40	P0350-40	–	–	–	–
Fluorescent lamps Natura, dimmable	P0210-41	P0350-41	–	–	–	–
Fluorescent lamps Biolux, dimmable	P0210-42	P0350-42	–	–	–	–
UV permeable glazing	P0210-49	P0350-49	–	–	–	–
Then, the unit height is...	1620 mm	2010 mm	–	–	–	–
<b>Illumination laterally, thermally insulated from the test room</b>						
Fluorescent lamps Daylight 10.000 Lux, dimmable	–	P0350-50	P0530-50	–	–	–
Fluorescent lamps Natura, dimmable	–	P0350-51	P0530-51	–	–	–
Fluorescent lamps Biolux, dimmable	–	P0350-52	P0530-52	–	–	–
Fluorescent lamps Daylight 25.000 Lux, dimmable	–	P0350-53	P0530-53	–	–	–
UV permeable glazing	–	P0350-54	P0530-54	–	–	–
Unit width is then 930 mm, reducible for insertion						
<b>Multi-channel light control</b>	P0210-60	P0350-60	P0530-60	P0850-60	P1060-60	P1700-60

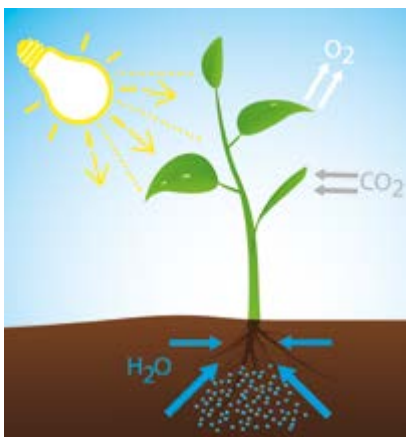


## The CO<sub>2</sub> Gassing – stimulation of the photosynthesis

RUMED® Test and Simulation Equipment can be equipped with the option CO<sub>2</sub> Gassing to test the direct effects of increase of the CO<sub>2</sub> concentration on plants with simultaneous temperature, humidity and light control.



Tests with "CO<sub>2</sub> manuring": The growth of some plant species is by up to 40 percent quicker.



Research field plant ecology: Which is the effect of the CO<sub>2</sub> rise on the atmosphere?

Option	Order No.
CO <sub>2</sub> Gassing	P9940-01
Reduction of the CO <sub>2</sub> concentration	P9940-02

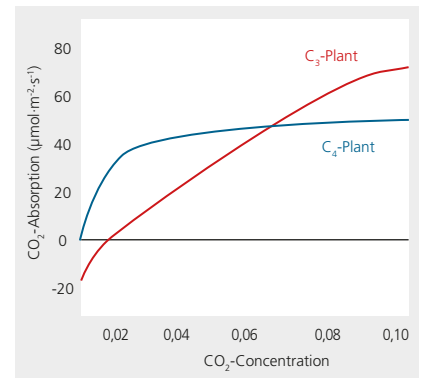
As fourth module, the CO<sub>2</sub> Gassing allows examination of the short- and long-term effects of the so-called "CO<sub>2</sub> manuring effect" on plants of the categories C3 or C4. The CO<sub>2</sub> sensor is equipped with a multi-position CO<sub>2</sub> and temperature adjustment, which is a guarantee for outstanding measurement accuracy. Due to the NDIR two-beam method the sensor is insensitive to soiling, and ageing effects are compensated automatically. Furthermore, the CO<sub>2</sub> sensor has an excellent long-term stability and auto-calibration. The CO<sub>2</sub> concentration is controlled by the CONTROL2015 touch, the documentation of the measured concentration is effected by the integrated recorder. This option ensures successful plant growth tests.

The CO<sub>2</sub> Gassing is only available in the Premium-Line.

Application ranges of the CO<sub>2</sub> Gassing:

- Plant research
- Zoology and botany, such as for measurement of the effects on the CO<sub>2</sub> rise in the atmosphere

### Carbon dioxide manuring





## Optional accessories for the Eco-Line and Premium-Line



### Tubular port

A 45 mm duct in the side panel allows insertion of measuring lines and hoses into the test room. Delivery including cover. For the Eco-Line or as additional duct in the Premium-Line.

Order No.: E9930-01 (Eco-Line)  
P9930-01 (Premium-Line)



### Closing plug

Gas-tight closing plug, matching to the tubular port. The gasket system with a flexibility in the range of 4 mm to 23 mm is based on a rubber module with removable skins and can be adapted to the cables, tubes etc. in different sizes.

Order No.: E9930-02 (Eco-Line)  
P9930-02 (Premium-Line)



### Fresh air rosette

2 Fresh air rosettes, air flow rate adjustable, located in the upper and lower area of the test room, ensure the fresh air supply into the test room.  
Application: Plants, test animals.

Order No.: E9930-03 (Eco-Line)  
P9930-03 (Premium-Line)



### Steering rollers

Mobile version of the test cabinet with 4 steering rollers, 2 of them lock-type with brake.

Order No.: E9930-04 (Eco-Line)  
P9930-04 (Premium-Line)



### Socket

Test room socket for connection of shakers, magnetic mixers etc. in the test room. The switching-on times can be freely programmed by means of the CONTROL2015 touch

Order No.: E9930-05 (Eco-Line)  
P9930-05 (Premium-Line)



### Door release

Electromagnetic door release by means of the CONTROL2015 touch. Door unlocking only after successful authorization with entry in the logbook (name, date, time).

Order No.: E9930-06 (Eco-Line)  
P9930-06 (Premium-Line)



*Temperature and storage tests of aerosol cans.*



*Temperature-conditioning of solvents.*



*Curing of adhesives and paint under defined climatic conditions.*

## Ex-proof Equipment-Line Safety T and Safety X

Working safe with RUMED®: If explosive material is to be tested or if the installation place is exposed to the danger of explosions, the RUMED® Ex Equipment-Lines ensure highest safety. All units have an ATEX type approval for zone 1 – A particularity on the market.

Two executions are available: In the Safety T-Line, the test chamber is explosion-proof, in the Safety X-Line, the entire unit is explosion-proof. The units of the Safety X-Line can also be used in explosive areas of zone 1 and zone 2, such as in refineries or chemical plants.

All units are manufactured from stainless steel. Thus, they are resistant to solvents and chemicals. Material and processing guarantee easy handling and durability. The explosion-proof recirculating air fan provides a good temperature distribution in space, as well as quick heating and cooling. If the door had been opened, the initial temperatures will be achieved within the shortest time.

All appliances of the T-Line and X-Line have successfully passed a demanding type examination according to annex III of the ATEX 2014/34/EU. RUMED® is a manufacturer of explosion-proof equipment being certified according to ISO 9001:2015. This involves periodical inspections (audits) by a notified authority and a highly effective quality management system of worldwide importance.

RUMED® Ex Equipment fulfils various tasks in the chemical and petrochemical industry, in the pharmaceutical production, for stability tests, as well as in the laboratory.

- Stability tests of pharmaceutical products
- Storage of aerosols
- Storage of solvents
- Drying of coatings containing solvents
- Drying tests on adhesives and paint







## Explosion groups

Explosion group I	Explosion group II
Electrical equipment for use in mining operations with a firedamp risk, e.g. coal-mining: coal dust, methane gas	Electrical equipment for use in all areas with an explosion hazard, other than mining operations with a firedamp risk, e.g. the chemical industry: paints, acetylene

## Making the right choice – Selection criteria for electrical equipment

Ex zone gases, vapors, mists (EN 60 079-10)	Unit category	A dangerous, potentially explosive atmosphere ...	No effective ignition source ...
Zone 0	1G	... is present either continuously or for lengthy periods (>1000 hours/year)	... in fault-free operation, for rare operational faults or in the event of frequent operational faults
Zone 1	2G	... only occurs occasionally (10 - 1000 hours/year)	... in fault-free operation or with frequent operational faults
Zone 2	3G	... less than 30 minutes per year	... in fault-free operation

## Temperature classes in explosion group II

Temperature class	Maximum permissible surface temperature of the equipment	Ignition temperature of the flammable material
T 1	450 °C	> 450 °C
T 2	300 °C	> 300 °C ≤ 450 °C
T 3	200 °C	> 200 °C ≤ 300 °C
T 4	135 °C	> 135 °C ≤ 200 °C
T 5	100 °C	> 100 °C ≤ 135 °C
T 6	85 °C	> 85 °C ≤ 100 °C

## Division of flammable gases and vapors into explosion groups and temperature classes

Explosion group	Temperature class					
	T1 (450 °C)	T2 (300 °C)	T3 (200 °C)	T4 (135 °C)	T5 (100 °C)	T6 (85 °C)
IIA	Acetone (540 °C)	Cyclohexanone (430 °C)	Petrol (220 °C–300 °C)	Acetaldehyde (140 °C)	–	–
	Ethane (515 °C)	i-amyl acetate (380 °C)	Diesel (220 °C–300 °C)			
	Propane (470 °C)	n-butane (365 °C)	Heating oil (220 °C–300 °C)			
	Toluene (535 °C)	n-butyl alcohol (340 °C)	n-hexane (240 °C)			
IIB	Town gas (560 °C)	Ethyl alcohol (425 °C)	Hydrogen Sulfide (270 °C)	Ethyl ether (180 °C)	–	–
		Ethylene (425 °C)				
		Ethylene oxide (440 °C)				
IIC	Hydrogen (560 °C)	Acetylene (305 °C)	–	–	–	Carbon disulfide (95 °C)



T 320



T 500




T 820

## Safety T-Line

The RUMED® Safety T-Line offers a variable program of cold/heat and environmental test cabinets with explosion-proof test chambers for zone 1. Choose from 5 sizes and a multitude of options.

The units of the Safety T-Line are suitable for safe storage of explosive materials, such as aerosols, or for tests with adhesives or paint – even if the storage tests might occasionally or temporary cause an explosive atmosphere. Development of a permanent or long-term explosive atmosphere must be avoided by means of the option Technical Ventilation. The units are suitable for storage of material of the temperature classes T1, T2 and T3 of explosion group IIA and IIB+H2. All appliances of the T-Line have successfully passed a demanding type examination according to annex III of the ATEX 2014/34/EU. RUMED® is a manufacturer of explosion-proof equipment being certified according to ISO 9001:2015. This involves periodical inspections (audits) by a notified authority and a highly effective quality management system of worldwide importance. Optionally available with extension of the temperature range to -20 °C/+80 °C, humidification and dehumidification and further options. Configure your test equipment, which is the most suitable for your requirements.

### General view of the most important advantages:

- Test room  II 2/- G Ex db eb h [ib] mb IIB+H2 T3 Gb
- 5 Test room sizes: 320 l to 1.640 l
- Test room and external housing of solvent-resistant stainless steel
- Recirculating air fan for good temperature distribution in space
- Intuitive handling by means of the CONTROL2015 touch
- Temperature ranges from -20 °C to +80 °C
- Humidification and dehumidification possible
- Possibility of calibration and validation
- Robust and extremely durable






T 1000



T 1640

## Technical Data

Type	T 320	T 500	T 820	T 1000	T 1640
<b>Test room explosion-proof  II 2/- G Ex db eb h [ib] ib mb IIB+H2 T3 Gb</b>					
Volume (l)	320	500	820	1000	1640
Minimum temperature	0 °C	0 °C	0 °C	0 °C	0 °C
Maximum temperature	+35 °C	+35 °C	+35 °C	+35 °C	+35 °C
Temperature deviation in time ( °C)	±0,5 °C	±0,5 °C	±0,5 °C	±0,5 °C	±0,5 °C
Height (mm)	990	1500	1500	1500	1500
Width (mm)	610	610	610	2 x 610	2 x 610
Depth (mm)	585	585	935	585	935
Number of shelves (standard delivery scope)	3	4	4	8	8
Maximum load per shelf (kg)	25	25	25	25	25
<b>Unit</b>					
Height (mm)	1600	2105	2105	2105	2105
Width (mm)	760	760	760	1520	1520
Depth (mm)	900	900	1250	900	1250
Electric connection (V/Hz)	230/50	230/50	230/50	230/50	230/50
<b>Options</b>					
Additional shelf	T0320-01	T0500-01	T0820-01	T1000-01	T1640-01
Additional shelf, reinforced (maximum load per shelf 50 kg)	T0320-02	T0500-02	T0820-02	T1000-02	T1640-02
Glazed panel door, no pane heating	T0320-03	T0500-03	T0820-03	T1000-03	T1640-03
Extension of temperature range down to -20 °C	T0320-04	T0500-04	T0820-04	T1000-04	T1640-04
Extension of temperature range up to +80 °C*	–	T0500-05	T0820-05	T1000-05	T1640-05
Speed rate in temperature change 1 °C/min (0 °C to +35 °C)	T0320-06	T0500-06	T0820-06	T1000-06	T1640-06
Speed rate in temperature change 1 °C/min (-20 °C to +80 °C)	T0320-07	T0500-07	T0820-07	T1000-07	T1640-07
Ultrasonic humidification + dehumidification**	T0320-20	T0500-20	T0820-20	T1000-20	T1640-20

\*Electric connection is then 400 V/230 V/50 Hz, unit depth is then + 225 mm

\*\*Unit depth is then +160 mm, removable for transportation



X 320



X 500




X 820

## Safety X-Line

If ignitable mixtures exist temporarily at the installation place, highest safety standards and thus the completely ex-proof appliances of the RUMED® Safety X-Line are required. They are approved for operation in explosive areas of zone 1.

Despite these increased safety requirements, the RUMED® Safety X-Line offers almost the same equipment possibilities as the Safety T-Line. Units of the X-Line can be installed in zone 1 and zone 2. This is possible due to a multitude of different types of protection (pressure-proof housing, intrinsic safety, increased safety, encapsulation). All appliances of the X-Line have successfully passed a demanding type examination according to annex III of the ATEX 2014/34/ EU allowing an application in zone 1 and zone 2. RUMED® is a manufacturer of explosion-proof equipment being certified according to ISO 80079-34. This involves periodical inspections (audits) by a notified authority and a highly effective quality management system of worldwide importance. The units are suitable for storage and tests of material of the temperature classes T1, T2 and T3 of explosion group IIA and IIB.

### General view of the most important advantages:

- Entire system  II 2 G Ex db eb h [ib] ib mb IIB T3 Gb
- Approved for installation in the ex area zone 1
- 5 Test room sizes: 320 l to 1.640 l
- Test room and external housing of solvent-resistant stainless steel
- Recirculating air fan for good temperature distribution in space
- Easy handling by means of a precise temperature controller with digital display
- Temperature ranges from -20 °C to +80 °C
- Optional dehumidification and humidification
- Possibility of calibration and validation
- Robust and extremely durable






X 1000



X 1640

## Technical Data

Type	X 320	X 500	X 820	X 1000	X 1640
<b>Entire unit explosion-proof </b>					
Volume (l)	320	500	820	1000	1640
Minimum temperature	0 °C	0 °C	0 °C	0 °C	0 °C
Maximum temperature	+35 °C	+35 °C	+35 °C	+35 °C	+35 °C
Temperature deviation in time ( °C)	±0,5 °C	±0,5 °C	±0,5 °C	±0,5 °C	±0,5 °C
Height (mm)	990	1500	1500	1500	1500
Width (mm)	610	610	610	2 x 610	2 x 610
Depth (mm)	585	585	935	585	935
Number of shelves (standard delivery scope)	3	4	4	8	8
Maximum load per shelf (kg)	25	25	25	25	25
<b>Unit</b>					
Height (mm)	1600	2105	2105	2105	2105
Width (mm)	760	760	760	1520	1520
Depth (mm)	900	900	1250	900	1250
Electric connection (V/Hz)	400/230/50	400/230/50	400/230/50	400/230/50	400/230/50
<b>Options</b>					
Additional shelf	X0320-01	X0500-01	X0820-01	X1000-01	X1640-01
Additional shelf, reinforced (maximum load per shelf 50 kg)	X0320-02	X0500-02	X0820-02	X1000-02	X1640-02
Glazed panel door, no pane heating	X0320-03	X0500-03	X0820-03	X1000-03	X1640-03
Extension of temperature range down to -20 °C	X0320-04	X0500-04	X0820-04	X1000-04	X1640-04
Extension of temperature range up to +80 °C*	–	X0500-05	X0820-05	X1000-05	X1640-05
Speed rate in temperature change 1 °C/min (0 °C to +35 °C)	X0320-06	X0500-06	X0820-06	X1000-06	X1640-06
Speed rate in temperature change 1 °C/min (-20 °C to +80 °C)	X0320-07	X0500-07	X0820-07	X1000-07	X1640-07
Humidification by evaporative humidifier + dehumidification	X0320-20	X0500-20	X0820-20	X1000-20	X1640-20

\*Unit depth is then + 225 mm



## Standard Equipment Safety X-Line



### Switch cabinet – pressure-proof housing

The switch cabinet is equipped with a pressure-proof housing. Thus, large part of the electric system can be manufactured using standard components. This pressure-proof housing „d“ according to DIN EN 60079-1 effectively avoids inflammation of the atmosphere surrounding the switch cabinet.



### Fan motor

Up to a working temperature of 35 °C, the fan and the integrated motor are located in the test room. For higher working temperatures, the motor driving the fan wheel in the test room will be installed outside the appliance. In any case, the motor will be disconnected permanently by a protective motor switch in case of a failure.



### Digital control

Operation and control of the appliances is effected by means of the modern, digital control unit. A digital interface for this control unit is optionally available. The option Program Control allows complex, several days' programs with cyclizations and loops.



### Refrigerating machine – open compressor with belt drive

The open refrigerating machine is driven by a conductive V-belt and a motor with pressure-proof housing. The explosion-proof solenoid valve bypass system ensures precise control. The refrigerating system is protected against malfunction by an explosion-proof pressure switch, as well as by a protective motor switch.



## Optional accessories of the Safety T-Line and Safety X-Line



### Tubular port

A 45 mm duct in the side panel allows insertion of measuring lines and hoses into the test room. Delivery including cover.

Order No.: T9930-01 (T-Line)  
X9930-01 (X-Line)



### Closing plug

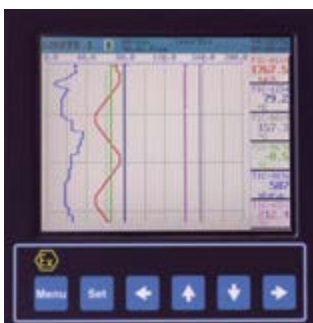
Gas-tight closing plug, matching to the tubular port. The gasket system with a flexibility in the range of 4 mm to 23 mm is based on a rubber module with removable skins and can be adapted to the cables, tubes etc. in different sizes.

Order No.: T9930-02 (T-Line)  
X9930-02 (X-Line)

### Technical ventilation

If an evaporation of solvents cannot be avoided by procedural means, a technical ventilation is compulsory. The ventilation prevents the formation of a permanent explosive atmosphere (zone 0). Its efficiency is supervised redundantly by two flow switches. Depending on the density, the gases will be exhausted out of the unit either at ceiling level or at floor level. The air supply is effected vice-versa, at floor level or at ceiling level, to ensure, that the air flow covers all areas of the room. The fan ensures a high ventilation rate.

Order No.: T9980-01 (T-Line)  
X9980-01 (X-Line)



### Digital recorder

The digital recorder of the X-Line is working without any paper, and it can be equipped with a digital interface, just like the controller. Due to corresponding transmitters, recording and control can be executed in areas being not explosion-proof.

Order No.: X9990-01 (X-Line)



### Steering rollers

Mobile version of the test cabinet with 4 steering rollers, 2 of them lock-type with brake.

Order No.: T9930-04 (T-Line)  
X9930-04 (X-Line)

### Humidification

Equipped with the options humidification and dehumidification, an explosion-proof cold-heat test cabinet becomes an explosion-proof climatic test cabinet. Humidification of the Safety T-Line is effected by a specially controlled ultrasonic atomizer. Humidification of the Safety X-Line is realized by an explosion-proof version of evaporation humidification being installed in the test room. A plate heat-exchanger of stainless steel, which is optimized for this application, effects a dehumidification by falling below dewpoint. This combination of humidification and dehumidification allows a wide range of temperature/humidity combinations. The sensor is a temperature-compensated, capacitive sensor, which can be calibrated.



## Walk-in chambers – for everything requiring space

The RUMED® Walk-in Environmental Test Chambers provide customized solutions in XXL format for any kind of climatic tests in science and industry.

You are looking for a solution for storage of stability specimen, a measuring room for standard climates, plant Gassing with CO<sub>2</sub>, or even an explosion-proof chamber for storage of aerosol cans? The RUMED® Walk-in Environmental Test Chambers make almost everything possible. Due to their variable size and equipment, the test chambers provide customized solutions for each place of installation and each task.

### General view of the most important advantages:

- Test room volume up to 40 m<sup>3</sup>
- Individual dimensions, extremely variable equipment
- Available as temperature chamber, climatic chamber or plant growth chamber
- Intuitive handling by means of the CONTROL2015 touch
- Gapless documentation
- Energy-saving refrigeration technology
- Possibility of calibration and validation
- Optionally available in explosion-proof execution



*RUMED® Chambers are space-saving, since they can be installed directly side by side.*



*Stability test of drugs according to the ICH Guideline in the climatic chamber.*



*Breeding of high growing plants in the light chamber.*





## One chamber – many possibilities

The RUMED® Walk-in chambers have a wide application range:

- Stability test according to the ICH Guideline
- Measurement at standard climates
- Plant growth
- Storage of aerosol cans (Ex-proof version)

- The chambers consist of sandwich elements with tongue and groove profile. Thanks to this manufacturing technology, also an installation in confined locations is possible. The insulation layer of the sandwich elements consists of high-quality polyurethane foam. The insulation thickness is between 80 and 120 mm, depending on the chosen temperature range.

- The chamber floor consists of non-slip structural stainless steel. The standard surface of the sandwich elements is manufactured from sheet steel with white coating. Optionally, an execution in stainless steel is available.

- The standard installation of the chambers is at ground level. If the chamber shall be accessible with a trolley, this can either be realized by means of a ramp or by reduction of the ground level by the customer.

- The standard stop of the lockable door is outside, but also a version with inside stop is available. The door can be equipped with a window for observation of the specimen. A porthole of 225 mm diameter or a square glazing of the size 400 x 400 mm are available. Incidence of extraneous light can be avoided by a shutter on the window.

- The chamber is equipped with aluminium shelves. Also an execution in stainless steel or a mobile shelving system is available.

- An efficient recirculating air fan with bionic fan wheel ensures a perfect temperature and humidity accuracy in space at a low noise level. The humidification is realized by a redundant ultrasonic humidifier. The refrigerating machine is installed space-saving above the switch cabinet.

- The CONTROL2015 *touch* takes over the entire control and documentation. All components are easily accessible for maintenance purposes.

- The chamber can also be designed completely redundantly. Being equipped with two independent air-conditioning and control components, it meets the highest safety requirements. In case of a failure, it can simply be switched to the second unit without relocation.





Seed samples: With RUMED® equipment counting and dividing become child's play.



The Jacobsen method: germinated seed under a germination dome.



All Jacobsen Germinators can be retrofitted with lighting without any problems.

## The Seed-Line – ideally applicable for systematic ISTA compliant seed tests

From sample division over purity examination up to determination of germination – RUMED® Germinators are the professional alternative to cooled incubators, wherever high reproducibility of the results is required.

### The Jacobsen Method

The Jacobsen germinator mainly consists of a germination plate being temperature-conditioned by means of the water basin below. The water bath is equipped with an automatic temperature control.

The germination spirals being equipped with a paper wick and a paper substrate are placed on the germination plate. The wick is being led through slots in the germination plate and reaches into the water bath below, thus supplying the required humidity and the desired temperature to the paper substrate. The circular filter papers are covered with a transparent cover dome to provide the air humidity being required for the germination. A little hole in the upper end of that dome ensures sufficient supply of fresh air and minimum evaporation at the same time.

Units being executed with active cooling allow day-night temperature alternation, as well as any temperature profile.

### The Rodewald Method

Rodewald germinators are mainly consisting of a tub being filled with silica sand, which is hanging in a temperature-conditioned water basin for temperature conditioning and moistening.

The Rodewald method is particularly suitable for vegetable or forest seed due to the adjustable low humidity and the inferior tendency to fungal growth. The seed is deposited on filter papers on the sand. A water channel being integrated in the sand insertion tub with adjustable level regulation gives moisture to the seed via wicks in the sand and the capillary effect of the sterilized crystal silica sand.

An acrylic glass cover avoids drying-out of the sand. The glass cover can be steplessly opened for ventilation. A surrounding groove avoids dripping of the condensate water into the sand.

## The Jacobsen Method



S 120

S 180

## The Rodewald Method



S 240

S 360

## Technical Data

Type	S 120	S 180	S 240	S 360
<b>Method</b>	Jacobsen	Jacobsen	Rodewald	Rodewald
Minimum temperature	+5 °C	+5 °C	+5 °C	+5 °C
Maximum temperature	+40 °C	+40 °C	+40 °C	+40 °C
Number of germination domes	120	180	–	–
Width of the effective surface (mm)	960	1440	900	1390
Depth of the effective surface (mm)	820	820	700	700
<b>Unit</b>				
Height (mm)	1010	1010	1160	1160
Width (mm)	1155	1650	1165	1660
Depth (mm)	920	920	935	935
Electric connection (V/Hz)	230/50	230/50	230/50	230/50
Net weight of standard unit (kg)	115	150	130	170
<b>Options</b>				
Lighting	S0120-30	S0180-30	–	–

## Control 2000

Light bar menus in plain text ensure clearness. Two languages are standard (German/English). The tabular arrangement of the program input allows an uncomplicated entry of the desired temperature profile and of the optional illumination profile.





## Soil Divider for Samples

The soil divider for samples being completely executed in stainless steel makes the reliable and representative sampling of partial samples dead easy. The seed is just to be placed into the opened cover and it is to be distributed more or less uniformly. Due to the special construction with 18 channels, the seed will be separated into two partial samples of the same size as soon as the cover is closed. After the separation, the partial samples can be withdrawn easily from the two lateral drawers. The void-free construction ensures easy cleaning without any residues. Due to the electropolished surfaces sticking of residues is practically made impossible.



H x W x D: 440 mm x 280 mm x 510 mm  
Weight: 8,5 kg

Order No.: S9910-01

## Seed Blower

The seed blower serves for quick and easy separation of light and heavy seed. The seed is filled into a drawer of the acrylic glass cylinder. A fine-meshed sieve closes the upper end of the cylinder. A speed-controlled blower in the cylinder generates a constant upward air column. Depending on its size and weight, the seed will fall into one of the 3 collecting vessels being installed at the cylinder. The light seed will be deposited in the upper collecting vessel,

whereas the heavy seed will be deposited in the lower collecting vessel. A further sieve at the bottom of the cylinder avoids penetration of seed into the blower. After disconnection of the blower, the sieve contains also the deposit, consisting of the residues and eventually of small stones. The collecting vessels are equipped with a snap buckle clip allowing easy removal.



H x W x D: 1045 mm x 440 mm x 220 mm  
Weight: 7,5 kg

Order No.: S9920-01



## Vacuum Seed Counter

This extremely practical device facilitates the tiring and time-consuming counting and uniform depositing of seed for germination. It is particularly suitable for seed being regularly shaped and relatively even, such as grain, brassica and trifolium sorts. The seed counter consists of three main components: a vacuum system with connection hose, a number of counting heads corresponding to the different seed sorts and a valve to dissolve the vacuum. The vacuum capacity can be adjusted by a potentiometer. The counting heads with 100, 50 or 25 bore holes are some smaller than the paper substrate and are equipped with an edge to prevent the seed from rolling off. The diameter of the holes is adapted to the size of the seed and the suction capacity of the vacuum.



The delivery scope includes 1 Counting Head, each, Order No.: S9930-20 and S9930-30.

H x W x D: 270 mm x 440 mm x 220 mm  
Weight: 6 kg

Order No.: S9930-01

Accessories	Order No.
Counting head 70 mm Ø for tobacco (100 Bore holes, 0,4 mm Ø, each)	S9930-10
Counting head 70 mm Ø for grass (100 Bore holes, 0,7 mm Ø, each)	S9930-20
Counting head 70 mm Ø for clover (100 Bore holes, 1,0 mm Ø, each)	S9930-30
Counting head 70 mm Ø for cabbage (50 Bore holes, 1,3 mm Ø, each)	S9930-40
Counting head 70 mm Ø for wheat (50 Bore holes, 1,5 mm Ø, each)	S9930-50
Counting head 70 mm Ø for peas (25 Bore holes, 2,0 mm Ø, each)	S9930-60
Counting head 70 mm Ø in special execution, diameter and number of bore holes according to the customer's request	S9930-70
Counting head in special execution, square, dimensions and bore holes according to the customer's request	S9930-99



Counting head 70 mm Ø



## Communicative is standard

### The RS485 interface

The serial interface RS485 with Control2000 compatible protocol offers the possibility of integration into existing systems.

### The Ethernet interface

The Ethernet interface with Modbus/TCP protocol for integration into many universal software packages and systems supporting Modbus/TCP, such as LabVIEW.

### The USB connection

The USB connection for USB flash drives allows data backup and archiving directly at the unit.

### Fault message contact

Configurable potential-free fault indicator contact for communication of failure messages to a control room.

### Further interfaces:

Additional measuring sensor PT1000 for temperature control and recording of specimen.

**Order No.: Z9980-03**

Analogue output test room temperature for external recorder

Signal 0-10 V, 0-20 mA, 4-20 mA

**Order No.: Z9980-11**

Analogue output test room humidity for external recorder

Signal 0-10 V, 0-20 mA, 4-20 mA

**Order No.: Z9980-12**

Analogue output specimen temperature for external recorder

Signal 0-10 V, 0-20 mA, 4-20 mA

**Order No.: Z9980-13**

6-channel screen recorder for integration into a control by the software PCA-3000

**Order No.: Z9980-21**

## Software

### RCS 3.5

- Monitoring of up to 32 appliances
- Supports Control2000 and CONTROL2015 *touch*
- Data logging and graph representation
- Logging of door openings with time stamp
- Logging of alarms with time stamp
- Automated daily print is possible
- Weekly and monthly print
- Archiving per day and control circuit
- Automated backup on server drive is possible
- Export to CSV for further evaluations is possible

**Order No.: Z9980-30**

### RCS 4.0

- Monitoring of appliances with CONTROL2015 *touch*
- Data safety in conformity with the guidelines 21CFR Part 11
- All events are recorded in a digital logbook, inseparably connected with the recorded data.
- Signature in connection with the user management of the appliances
- Automated prints are possible
- Automated backups on server drive are possible

**Order No.: Z9980-40**





## Calibration and qualification – Traceability guaranteed

### Validation and recalibration

We are always ready to support the validation of your appliances. If desired, the validation can be executed by our company. The validation includes the necessary measurements, as well as any documents, such as DQ, IQ, OQ and PQ, manuals, wiring

diagrams, plans, appliance logbook, manufacturer certificates for the sensors and for the most important components. If required, we are also at your disposal for the annual recalibrations.



### Calibration and adjustment – the last step to precision

If the appliances are equipped with the CONTROL2015 *touch*, calibration and adjustment of the temperature sensors, as well as of the air humidity sensors is possible. The adjustment is effected by means of a supporting point correction. The supporting points and the entered correction values can be read-out at the control at any time for verification.

### Reliable measuring instruments – an important feature

A further option is the calibration in our factory. We are using periodically checked top-quality products for that calibration to ensure the traceability to DKD or ÖKD standards at any time.





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