

# Testing Instruments

for Rubber and Plastics



## 1971 - Founding in Neuried (Munich)

Initially established by Emmeram Karg - E. KARG Industrietechnik ventured in the field of plastics testing at the end of the 80s.

Today E. KARG Industrietechnik in the second generation is still purely a family enterprise where the acquired know-how, the feeling of solidarity as well as the loyalty to the customers are our strength.



## Our competence

E. KARG Industrietechnik is specialized in supplying polymer test equipment and other auxiliary equipment for polymer processing and plastics injection moulding.

We take care about the highest quality standards during the design and manufacturing of our products. Our products are backed by a comprehensive service and unmatched technical after sales. Our expertise and experience are directed toward improving product quality, service and manufacturing efficiency for our customers.

Today we supply instruments for the raw material testing (e. g. laboratory melt indexers, moisture meter, density meter), instruments and machines for the specimen preparation, mechanical testing equipment (a variety of impact testers, tensile testers for film or other standardized specimens) and other small test devices. Through our innovative work with electronics and mechanical design, we've carved a niche in the polymer test marketplace by providing the highest performance per cost ratio in the business. We meet the rheological and physical testing needs of the plastics and rubber industries by providing high quality equipment and services at low cost.

Beside our extensive line of polymer testing equipment, we supply also heating ovens, climatic chamber, ageing ovens not only for the plastic industry.

Due to our broad experience in material testing, we are able to supply also complete laboratories for the plastic industry. We have been built on the principles of innovative products, quality workmanship and outstanding service.

## Our intention

E. KARG Industrietechnik is intended to establish a long-term satisfaction of our employees, customers and business partners on the basis of our success. The relations between us and our employees and customers should be open minded, respective, trustful and reliable.



K 2010 - International Plastics Exhibition in Düsseldorf

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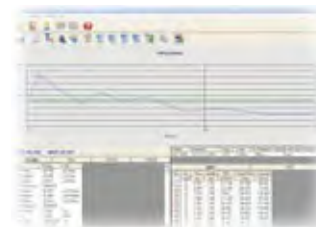
**You don't find your product? Pls. let us have a call , we will be happy to give you an advisory service!**



“**Designed for k-BASE**” - any instrument related to this icon you will find in this catalogue will be driven by our uniform operating software **k-BASE**.

This software offers you these main features and benefits:

- a uniform software platform
- user friendly and unique concept
- intelligent and intuitive operation
- flexible data handling / export
- eLearning program
- personalized and customized software layout



### ***Service / Maintenance / Warranty enlargement:***

Each individual instrument has its own impact on your success. With this understanding, KARG Industrietechnik takes a unique approach to designing service solutions.

In developing your service solution, we specifically tailor a service plan to include appropriate calibrations, certificates, scheduled preventative maintenance, repair services, and regulatory compliance services.



On completion of a maintenance agreement within the first 4 weeks after the purchase (date of invoice) of a KARG instrument, we offer you for free a 2 years \*) warranty enlargement.

\*) Only valid maintenance agreements signed in Germany, Netherlands, Belgium, Austria or Switzerland

### ***Your advantage by signing a maintenance contract:***

- We offer you a **10% Discount** on all spare parts (incl. parts of wear)!
- We supply (if available) **software updates free of charge!**
- We guaranty the preservation and the **increase of the availability** of your devices!
- We work **preventively!**
- We remind you **automatically** and **in time before** the **realization of a maintenance date!**
- We calibrate your instruments with **certified measuring instruments!**
- We create you a **calibrating certificate!**

For further information, please contact our [service department](#) under:

[service@karg-industrietechnik.de](mailto:service@karg-industrietechnik.de)

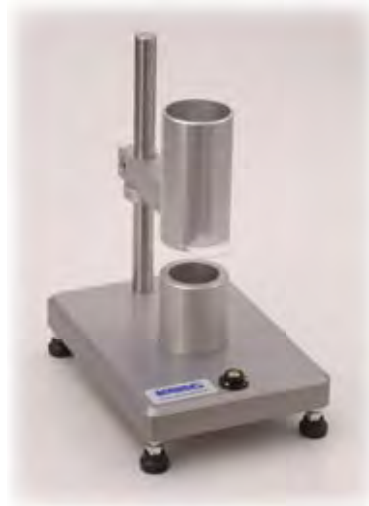
## Fluometer model ADP

Bulk density tester

The bulk density tester to measure the apparent or bulk density of pellets and powders of different raw material supplies. Furthermore, the values determined with this equipment are used for the calculation of the filling space of an injection mould. The bulk density at powdered, granular and other materials is determined according to DIN EN ISO 60.

### Features:

- Robust and stable model
- Up-to-date, modern and ergonomic design
- Leveling device included
- Adjustable feet
- Quick sliding closure
- Adjustable filling funnel
- Polished funnel and cup



### Technical data:

	ADP
<b>Dimensions</b>	
Width (mm)	300
Height (mm)	250
Depth (mm)	150
Weight (kg)	approx. 5
<b>Characteristics</b>	
Filling funnel inner diameter (mm)	56
Filling funnel volume (ml)	approx. 200
Output diameter (mm)	33
Measuring cup diameter (mm)	45 (+/- 5)
Measuring cup volume (ml)	100
<b>Code-No.</b>	1010.000

# Fluometer

## Fluometer model PM

Pourability Tester

As a check and for the control of the pourability of plastics in powder and granulates form by means of the determination of the flow through times by a funnel the pourability tester is used. The EN ISO 6186: 1998 defines two procedures (A and B), whereby from procedure A information can be derived to the processability; procedure B serves particularly for process control during the production.

The equipment consists of a mounting plate with a stable stand for the funnel holding. At the discharge of the funnel a thread for the attachment of different discharge nozzles (diameter 10, 15 or 25 mm) is designated.

The flow time is the time, in which a certain mass or a certain volume of the sample flows through a funnel with exactly defined dimensions. This time is indicated in seconds.

### Features:

- Robust and stable model
- Up-to-date, modern and ergonomic design
- Leveling device included
- Adjustable feet
- Different nozzle included (10, 15 and 25 mm)
- Adjustable filling funnel
- Polished funnel and cup



### Technical data:

	PM
<b>Dimensions</b>	
Width (mm)	300
Height (mm)	250
Depth (mm)	150
Weight (kg), approx.	8
<b>Characteristics</b>	
Output diameter (mm)	10 / 15 / 25
<b>Code-No.</b>	1012.000

## Fluometer according Dr. Pfrengle

As a check and for the examination of the pourability and/or the pouring angle of plastic granulates or powder according to ISO 4324 and DIN ISO 4324.

### Features:

- Glass funnel with large diameter
- Agitator with agitating crank and agitating wing
- Base plate with adjustable knife and rule



### Technical data:

	PAM
<b>Dimensions</b>	
Width (mm)	300
Height (mm)	300
Depth (mm)	150
Weight (kg), approx.	8
<b>Characteristics</b>	
Glass funnel inner diameter (mm)	140
Glass funnel discharge diameter (mm)	10
Basis disk diameter (mm)	100
Basis disk thickness (mm)	25
<b>Code-No.</b>	1011.000

# Melting Point

## Melting Point Instrument Type Kofler Heating Bank

Hotbench according Kofler for melting point determination and quick identification of organic substances

### Features:

- Simple and easy melting point determination
- Bench top instrument
- Temperature range up to +260°C
- Corrosion free metal bench 360 mm length / 40 mm width
- Display via scale and adjustable pointer
- Different substances for calibration including



### Technical data:

#### Kofler Heating Bank

##### Dimensions

Width (mm)	440
Height (mm)	100
Depth (mm)	135
Weight (kg), approx.	2

##### Characteristics

Temperature range (°C)	260
Resolution (K)	1

##### Electrical data

Nominal voltage (+/- 10%) 50 Hz (V)	230
Nominal power (W), approx.	100

## MeltFloW *basic*

The Melt Index Tester series MeltFloW *basic* are highly precise melt index testing instruments for the measurement of the MFR (melt flow rate) in g/10 min. according to ISO 1133 method A, ASTM D 1238 method A and similar standards, used for quality control and research applications.

### Features:

- Robust and stable model for masses up to 21,6 kg
- Up-to-date, modern and ergonomic design
- Precise and longtime constant temperature controlling
- Temperature range up to 400°C (optional 450°C)
- Manual cutting device
- Microprocessor controlled PID temperature regulator
- Different useful accessories available
- Automatic cutting device included (3150.000)



### Technical data:

	MeltFloW <i>basic</i>	MeltFloW <i>basic plus</i>
<b>Dimensions</b>		
Width (mm)	340	400
Height (mm)	470	470
Depth (mm)	310	450
Weight (kg)	26	31
<b>Characteristics</b>		
Temperature range (°C)	400	400
Resolution (K)	0,1	0,1
<b>Electrical data</b>		
Nominal voltage (+/- 10%) 50 Hz (V)	230	230
Nominal power (W)	1300	1300
<b>Code-No.</b>	3100.000	3150.000

# Melt Index Tester

## MeltFloW @on

The Melt Index Tester series MeltFloW @on are highly precise melt index testing instruments for the measurement of the MFR (melt flow rate) in g/10 min. and MVR (melt volume rate) in ccm/10 min. according to EN ISO 1133 method A/B, ASTM D 1238 method A/B and similar standards, used for quality control and research applications.

### Features:

- Real modular melt index tester
- Up-to-date, modern and ergonomic design
- High precision and longtime constant temperature control
- Linear, high precision piston travel transducer
- User friendly and "all-included" Windows Software k-BASE, used for the instrument control and test evaluation, reference-, statistic- and filtering functions
- Automatic cutting device and motorized lifting device optional available



### Technical data:

	MeltFloW @on
<b>Dimensions</b>	
Width (mm)	400
Height (mm)	470
Depth (mm)	450
Weight (kg)	31
<b>Characteristics</b>	
Temperature range (°C)	400
Resolution (K)	0,1
<b>Electrical data</b>	
Nominal voltage (+/- 10%) 50 Hz (V)	230
Nominal power (W)	1600
<b>Code-No.</b>	3200.000

## MeltFloW @on plus

The Melt Index Tester series MeltFloW @on are highly precise melt index testing instruments for the measurement of the MFR (melt flow rate) in g/10 min. and MVR (melt volume rate) in ccm/10 min. according to EN ISO 1133 method A/B, ASTM D 1238 method A/B and similar standards, used for quality control and research applications.

### Features:

- Fully automatic melt index tester
- Up-to-date, modern and ergonomic design
- Integrated set of masses “easy selection”
- Linear, high precision piston travel transducer
- User friendly and “all-included” Windows Software k-BASE, used for the instrument control and test evaluation, reference-, statistic- and filtering functions
- Inert gas overlay available
- Automatic cutting device and motorized lifting device included



### Technical data:

	MeltFloW @on plus
<b>Dimensions</b>	
Width (mm)	400
Height (mm)	1050
Depth (mm)	450
Weight (kg)	85
<b>Characteristics</b>	
Temperature range (°C)	400
Resolution (K)	0,1
<b>Electrical data</b>	
Nominal voltage (±10 %) 50 Hz (V)	230
Nominal power (W)	1,6
<b>Code-No.</b>	3300.000

# Melt Index Tester

## Melt Index Tester Type PETFloW

The Melt Index Tester series PETFloW are highly precise melt index testing instruments for the measurement of the MFR (melt flow rate) in g/10 min., the MVR (melt volume rate) in ccm/10 min. according to EN ISO 1133 method A/B, ASTM D 1238 method A/B, as well as for the determination of the IV (Intrinsic value) in dl/gr. mainly used in quality control and research labs.

### Features:

- Modified Melt Index Tester for the determination of the IV (Intrinsic Value) of PET-Flakes and Granules
- Standardized test conditions!
- Instrument incl. inert gas overlay and/or lifting device for test mass
- Optional: PET flakes Test-Kit
- User friendly and "all-included" Windows Software k-BASE, used for the instrument control and test evaluation
- Temperature range up to 400°C



### Technical data:

	PETFloW @on
<b>Dimensions</b>	
Width (mm)	400
Height (mm)	470
Depth (mm)	450
Weight (kg)	31
<b>Characteristics</b>	
Temperature range (°C)	400
Resolution (K)	0,1
<b>Electrical data</b>	
Nominal voltage (+/- 10%) 50 Hz (V)	230
Nominal power (W)	1600
<b>Code-No.</b>	3200.000 P

# Capillary-Rheometer

## Twin-Bore Capillary Rheometers Series R6000

The R6000 is a laboratory grade twin-bore capillary rheometer. Twin-bore to simultaneously measure long and orifice die entry pressures, hence increasing productivity. In conjunction with the software package it enables you to rapidly make high accuracy rheological measurements on a wide range of materials. Both shear and extensional properties of the specimens can be obtained, at rates representative of those encountered during normal processing, such as extrusion, injection moulding, blow moulding and film blowing. Suitable for research, process development and quality control in the polymer, food, pharmaceutical, ceramics and many other industries.

### Features:

- High quality instrumentation, including 0.25% accuracy pressure measurement
- High capacity 50kN drive system copes with severe test requirements
- Rigid design to reduce errors caused by machine compliance
- Interchangeable, high tolerance, tungsten carbide dies available in diameters from 0.25mm to 5mm, and lengths from 0.25mm to 30mm
- Five data acquisition channels available
- Wide variety of test types
- Graphical touchscreen shows diagnostics and allows basic operation without the software
- World-class analysis software



### Technical Data:

	R6000-50
<b>Dimensions</b>	
Width (mm)	730
Height (mm)	2400
Depth (mm)	800
Weight (kg), approximately	400
<b>Features</b>	
Temperature range (°C)	400
Force (kN)	50
Cylinder diameter (mm)	15 (12, 20 optional)
Cylinder length (mm)	280
Measuring range pressure transducer (psi)	500, 750, 1000, 1500, 3000, 5000, 7500, 10000, 15000, 20000, 30000
<b>Electrical data</b>	
Power supply (±10 %) 50 Hz (V)	230
<b>Order-No.</b>	R6000-50

# Moisture Meter

## Aquatrac 3E

The water content of plastic material has a great influence on the quality of the finished product. The test should be made swiftly on an instrument having a simple test procedure. The AQUATRAC 3E is a moisture meter for use with solid products in granular form and is designed to meet requirements of the plastic processing industry. It detects water content down to 0.0005%. It is robust and portable thus being suitable for shop floor use. As the principle of operation is an absolute chemical method, no calibration is required for each different substance tested. The sample weight is fairly high and is therefore representative for the batch being tested.

### Features:

- The standard in the plastics industry
- High precise moisture measurement
- Usable for granule and finishing parts measurement
- Fully automatic test procedure
- Up-to-date, modern and ergonomic design
- Integrated USB and Ethernet port
- Integrated vacuum pump
- Touchscreen and integrated material data base



### Technical data:

	Aquatrac 3E
<b>Dimensions</b>	
Width (mm)	510
Height (mm)	325
Depth (mm)	230
Weight (kg), approx.	15
<b>Characteristics</b>	
Temperature range (°C)	200
Test time (min.)	10 ... 30
Measuring range (% a.H.)	0 ... 4,0
Measurement accuracy (%)	+/- 2
Reproducibility (%), approx.	1
Sample weight (gr.)	0,1 ... 100
<b>Electrical data</b>	
Nominal voltage (±10 %) 50/60 Hz (V)	110 / 230
Nominal power (W)	450

## Densitometer type AES

The densitometer series AES is a laboratory type density meter for the automatic determination of the density of solids and liquids. It can be used for measuring the density of plastics (film, specimens and finishing parts) according to DIN EN ISO 1183-1 and others.

### Features:

- Precision and price down to a point
- High precise density measurement
- External adjustment CAL
- Up-to-date, modern and ergonomic design
- Step by step user guidance
- Calculated density indicated directly in the display
- Sturdy casing
- DKD certificate available



### Technical data:

	AES 120-4	AES 220-4
<b>Dimensions</b>		
Width (mm)	213	213
Height (mm)	314	314
Depth (mm)	290	290
Weight (kg)	3,2	3,2
<b>Characteristics</b>		
Weighing range (g)	120	220
Resolution (mg)	0,1	0,1
Reproducibility (mg)	+/- 0,1	+/- 0,1
Linearity (mg)	+/- 0,3	+/- 0,3
<b>Electrical data</b>		
Nominal voltage ( $\pm 10\%$ 50 Hz (V))	230	230

# Viscosity Measurement

## Viscometer type ViscoClock

ViscoClock - time is money!

The ViscoClock is the economically priced introductory model in the field of automatic viscosity (absolute and relative) measurements. Manual measurements with a stopwatch and a trained eye is therefore something from the past because time is money. The ViscoClock is an electronic time-measuring unit used to determine absolute and relative viscosity. It consists of a stand which is used to mount a viscometer or the electronic measuring unit. The two measuring levels are integrated in the stand made of high-quality PPA synthetic material, and the electronic measuring unit is included in a PP casing. The large LCD display allows the measured values to be read off easily.

### Features:

- Precision and price down to a point
- High precise viscosity measurement
- Automatic time measurement
- Different type of ubbelohde viscometer available
- Digital LCD display
- Different kind of water bathes available
- Incl. calibration certificate for each viscometer
- Different options for specimen preparation available

Ubbelohde



## Viscometer type AVS 470

„Suction“ and „Pressure“ measurements with just one instrument

The new ViscoSystem® AVS 470 is the first viscosity measuring device that allows “suction” and “pressure” measurements completely independent of a PC. This results in maximum independence and flexibility, allowing you to set up a measuring station that meets highest requirements even under difficult conditions, e.g. to monitor production or control quality in the polymers industry.

### Perfectly Equipped For Fully Automatic Viscosity Measurements

The new ViscoSystem® AVS 470 is a measuring system that includes almost everything you need to take precise and reproducible measurements. All common types of viscosity calculation are already integrated into the device, a small PS2 keyboard is all you need to enter additional data. A serial printer can be used to conveniently document your measuring results. So, in a minimum of space, you can set up a measuring station equal in every way to complex measuring installations in terms of precision and reproducibility.

### Working With the ViscoSystem® AVS 470 Is Easy

The ViscoSystem® AVS 470 is very easy to handle. The desired measuring method can be preselected and started on the device. The entire measurement is done automatically to exclude subjective measurement errors. Once the set pre-heating time is reached, the desired number of measurements are taken while the status of the measurements is indicated on the LC.



**Features:**

- Precision and price down to a point
- High precise viscosity measurement
- Automatic time measurement
- Serial printer connection
- The following viscometers can be used with the AVS 470: Ubbelohde viscometers acc. DIN, ASTM, micro Ubbelohde viscometer to DIN, micro Ostwald viscometer, Cannon-Fenske routine viscometer, TC Ubbelohde viscometer, TC micro Ubbelohde viscometer

**Technical data:**

	<b>AVS 470</b>
<b>Dimensions</b>	
Width (mm)	255
Height (mm)	205
Depth (mm)	320
Weight incl. pump module (kg)	5,4
<b>Characteristics</b>	
Measuring range (s)	up to 9,999.99
Resolution (s)	0.01
Measuring range (mm <sup>2</sup> /s / cst)	0.35 ... 1,800
Suction (mm <sup>2</sup> /s / cst)	0.35 ... approx. 5,000
Measured parameter	Flow-through time (s)
Time measuring accuracy (%)	+/- 0.01
Suction up to approx. (mbar)	-160
Pressure up to approx. (mbar)	+160
Preselectable tempering period (min.)	0 ... 20
Preselectable no. of measurements	1 ... 99
<b>Electrical data</b>	
Nominal voltage (±10 %) 50/60 Hz (V)	90 ... 240

# Viscosity Measurement

## Viscometer type AVS 370

The ViscoSystem® AVS 370 is a measuring device, which not only measures as precisely and consistently as you expect, but also offers you maximum flexibility and possibilities for future extensions. Furthermore, it also saves valuable space on the laboratory bench.

**Now possible for the first time ever: “suction“ and “pressure“ measurement - with one device**

The ViscoSystem® AVS 370 is the first viscosity measuring device, which can be used for both “suction“ and “pressure“ measurement. This enables simple adjustment of the method of measurement to each sample. This significantly reduces investment costs for measuring stations at which pressure and suction methods are to be used. In most cases, using the AVS 370 also achieves noticeable savings in setting up time.

**Can be extended from an affordable individual measuring station up to an 8-sample station**

The basic version of the ViscoSystem® AVS 370 is an affordable starter model, which can be used to measure high or low viscosity liquids. In the version for TC viscosimeters it is ideal, e.g. to measure opaque and black fluids. If necessary, each single measuring station can be extended to form a multiple measuring station with PC-controlled multi-tasking. The WinVisco 370 software included in the standard equipment enables parallel operation of two fully equipped AVS 370s, with a total of eight ViscoPump II modules. Each module can measure a different sample using a different method. All the results can be quickly and easily evaluated and documented independently of each other. It could hardly be more flexible!

Up to eight viscosity measurement modules can be controlled with the software WinVisco 370, part of the standard equipment.

### Features:

- Precision and price down to a point
- High precise viscosity measurement
- Automatic time measurement
- Different type of Ubbelohde capillaries available
- Step by step user guidance
- Different bath thermostats available for different applications available
- Automatic capillary cleaning (option)
- User friendly windows software available

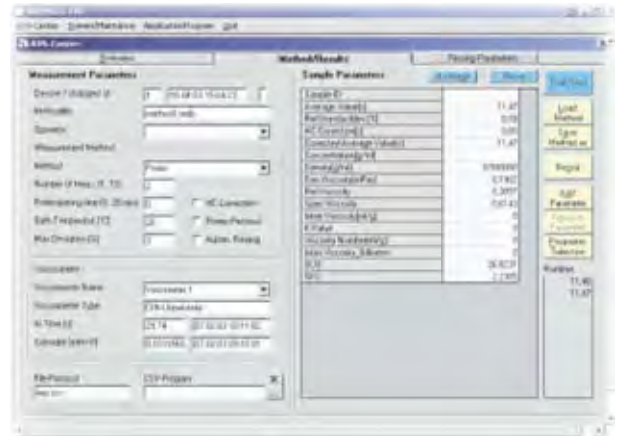


## Options:

The WinVisco 370 software is the ideal software for the ViscoSystem® AVS 370. It is supplied as part of the standard equipment. WinVisco 370 is easy to understand and can be quickly learned.

Up to eight viscosity measurement modules can be controlled with only a few operating steps. The device parameters are easy to enter: Constants, flow time, number of measurements, pretempering period, type of viscometer, date and sample labeling for each measuring station.

WinVisco 370 works in real multitasking mode. This makes it possible for each measurement to be processed independently from the others. It also means that time consuming measurements can be carried out from the same PC, without hampering the progress of other, faster measurements. All data provided by the software can be passed on to an LIMS system.



All the important parameters required for the measurement are displayed on the "Methods/Results" page. If necessary, the parameter editor can be called up using "Add Parameter", in order to enter non-standard or customer specific formulae.

## Technical data:

	AVS 370
<b>Dimensions (for 1 ... 4 modules)</b>	
Width (mm)	255
Height (mm)	205
Depth (mm)	320
Weight incl. pump module (kg)	5,4
<b>Characteristics</b>	
Measuring range (s)	up to 9,999.99
Resolution (s)	0.01
Measuring range (mm <sup>2</sup> /s / cst)	0.35 ... 1,800
Suction (mm <sup>2</sup> /s / cst)	0.35 ... approx. 5,000
Measured parameter	Flow-through time (s)
Time measuring accuracy (%)	+/- 0.01
Suction up to approx. (mbar)	-300
Pressure up to approx. (mbar)	+300
Preselectable tempering period (min.)	0 ... 20
Preselectable no. of measurements	1 ... 10
<b>Electrical data</b>	
Nominal voltage (±10 %) 50/60 Hz (V)	90 ... 240

# Dimension Measurement

## Thickness gauges series TG

The thickness gauges TG series accurately measures the width and/or thickness of specimens made of plastics according different international standards (e. g. ISO 178, ISO 4648, ASTM D 3767, DIN 53534). Different inserts used for film thickness (with reduced spring load), notched specimens or any other application are available.



TGM543-250B



TGH219-081



TGC1210M

### Features:

- Easy measurement
- Direct data transfer to dedicated software (e. g. k-BASE)
- Special inserts for notched specimens available
- Special insert with reduced load (e. g. for film measurement) available
- Different resolution (up to 0,0001 mm) available

### Technical data:

	TGM543-250B	TGH219-081	TGC1210M
<b>Technical Characteristics</b>			
Range (mm)	0 ... 12	+/- 1,8 (0,8)	+/- 2
Resolution (mm)	0,001	0,001 / 0,005 (0,0002)	0,0001
Accuracy	acc. factory standard	acc. factory standard	acc. factory standard
Display	digital	digital	digital
Measuring force (N)	1,2	konstant	0,75 (0,25)
Port (optional)	RS 232 / USB	USB	RS 232
Weight (kg)	0,160	1,5	-
Power supply (V/Hz)	Battery	Battery	90...264 / 47...63

## Strip Cutter “SingleCut”

The Strip Cutter is developed to cut over pieces of parallel strips in one processing step. These strips can be used for further evaluations (e. g. tensile strength, stretch, elastic module, etc.) according to international standards.

### Features:

- Single Cut
- Knives grindable
- Side with scale attack in mm / inch
- Knife protection
- Stable knife guiding
- Dual stockpiled knife axis for precision cuts
- Cutting device for thin cuts from 1 ... 10 mm



### Technical data:

	SingleCut
<b>Dimensions</b>	
Width (mm)	410
Height (mm)	260
Depth (mm)	575
Weight (kg)	9
Cutting length (mm)	380
Cutting width (mm)	variable
<b>Code-No.</b>	2880.000

# Strip Cutter

## Strip Cutter for film and paper

The film-/paper Strip Cutter is developed to cut over for instance DIN A 4 large film or paper sheets up to 10 pieces parallel strips in one processing step. These strips can be used for further tests (e. g. tensile strength, tension, elastic modulus, etc.) according to international standards.

### Features:

- Two-way cutting
- Adjustable connecting strip
- Adjustment over curved surface ensures a clamping free from creases
- Cutting movement over lever guidance
- Cutting angle adjustable
- Easy and save knife exchange
- Knife changing device included



### Technical data:

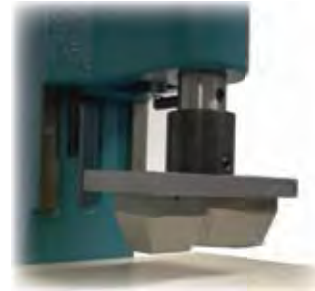
	Strip Cutter
<b>Dimensions</b>	
Width (mm)	420
Height (mm)	340
Depth (mm)	290
Weight (kg)	29
Strip Length (mm)	230
Strip Width (mm)	10, 15 or any other width acc. standard
<b>Code-No.</b>	2800.000

## Specimen punching machine

To punch out specimens from soft to semi-hard materials. The cutting dies with and without ejectors are available in different dimensions and geometries according to the international standards. The handling of the punching machine takes place by means of lever arm or pneumatically.

### Features:

- Different stroke length available
- Extra rigid design of press base
- The working height can easily be adjusted by the series type height setting of press head by means of a threaded spindle
- Easy and quick die exchange
- Our punching dies can be fitted to any kind of present punching machines
- Punching machines can be modified for different applications, such as:
  - gate- and runner cutting
  - tablet pressing
  - FNCT (full notched creep test) specimen preparation



Manual specimen punching machine



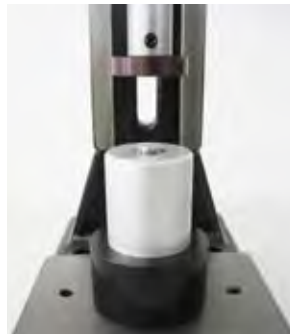
FNCT specimen punching machine



Pneumatic specimen punching machine for aluminium specimens



Specimen punching machine / Gate- and runner cutting



Punching machine with tablet tool (tablet pressing)

### Technical data:

	MPS 7.5	MPS 15-40	MPS 15-60 (gate-/runner cutting)	MPS 30-30	PPS 5	PPS 32	PPS 60
<b>Dimensions</b>							
Width (mm)	250	250	250	250	250	250	350
Height (mm), approx.	500	500	500	600	500	600	700
Depth (mm), approx.	240	350	300	350	300	440	500
Weight (kg), approx.	30	45	50	70	30	110	150
Working stroke (mm)	40	40	60	30	35	40	40
Daylight (mm)	50 - 260	49 - 168	51 - 172	55 - 285	80 - 265	175 - 330	87 - 310
<b>Punching Capacity (N)</b>	7500	15000	15000	30000	5000	32000	60000
<b>Code-No.</b>	2300.000	2400.000	2401.000	2410.000	2510.000	2500.000	2520.000

# Platen Presses

## Laboratory Platen Presses

The laboratory platen presses are used to carry out simple pressings in the plastics, rubber, ceramics and polymer industries, for example the production of:

- thin films from 10 to 100 µm
- Sheets from 1 to 20 mm
- Laminations, backing materials
- Embossing

to be used for optical and/or physical tests.

The presses of type E are designed for simple control (full speed heating / cooling / no ramps); the presses of type P/M are designed for R&D applications (sophisticated control, full speed heating, cooling, heating cooling ramp as per ASTM D 1928) as well as for low pressure heat up applications. Type P/M presses are available with various clamping force levels and multi-daylight. The press frames are consisting of a bottom platen with built-in double-acting hydraulic cylinder, a top platen, four tie bars and the controller. The hydraulic system is integrated into the machine frame. Anti-vibration pads isolate the low vibration pump unit, additionally from the frame. A system of pressure accumulators reduces pressure peaks and guarantees a constant level of pressure. The press plates are provided with inlets/outlets for connection to external temperature regulation systems.

### Features:

- Compact design for ease of setting up and use
- Quiet in operation
- Integral electrical heating and water cooling
- High level of safety with all operating parts enclosed within guarding



### Technical data:

	P 200 E	P 300 E	P 400 E	P 200 PM	P 300 PM	P 400 PM	P 500 PM
<b>Dimensions</b>							
Width (mm)	650	800	1160	1000	1675	1760	2190
Height (mm)	800	1000	1700	860	1625	1675	1810
Depth (mm)	350	510	680	500	530	670	960
Weight (kg)	190	380	900	320	1000	1500	2300
<b>Characteristics</b>							
Plate size (mm)	196 x 196	296 x 296	396 x 396	196 x 196	296 x 296	396 x 396	496 x 496
Useful opening stroke (mm)	100	150	250	100	200	250	300
Pressing force max. (kN)	125	300	500	300	800	1250	1800
Max. spec. pressure (N/cm <sup>2</sup> )	310	350	320	800	920	800	730
Max. working temperature (°C)	300	300	300	300	300	300	300
Temperature deviation (+/- K)	2 (up to 180°C)	2 (up to 180°C)	2 (up to 180°C)	1 (up to 180°C)	1 (up to 180°C)	1 (up to 180°C)	1 (up to 180°C)
<b>Electrical data</b>							
Motor driving power (kW)	0,8	1,0	3,0	0,8	2,5	/3	/3
Electr. heater power (kW)	2 x 2,5	2 x 6	2 x 8	2 x 2,6	2 x 11	2 x 16	2 x 28
Power supply (V/Hz)	400 / 50-60	400 / 50-60	400 / 50-60	400 / 50-60	400 / 50-60	400 / 50-60	400 / 50-60

## ISO Injection Mould

The AIM Mould System is a quick-change mould system developed according to the latest ISO regulations for manufacturing test specimens to determine polymer properties: mechanical (impact strength) and non-mechanical (flammability). The AIM Mould System enables you to obtain data for (or compare data with) CAMPUS®, the plastics database.

The system is a multifunctional injection mould with interchangeable inserts, used on conventional injection moulding machines and capable of producing plastic specimens for quality tests according to international standards. These types of specimens are commonly used to determine key properties of materials such as tensile strength, hardness, stress cracking, flammability, multi-axial impact behaviour and gloss/colour matching.

### Features:

- Increased ease-of-use due to horizontal exchange of inserts
- Full corrosion-resistant
- Excellent alignment thanks to guiding pins and bushes
- Suitable for existing mirror plates and inserts
- Fully complies with all the requirements for an ISO approved injection mould
- Experience in lab moulds since 1989
- World wide acceptance



### Technical data:

	AIM ISO Mould
<b>Dimensions Mould base "Euromap"</b>	
Width (mm)	346
Height (mm)	223
Depth (mm)	296
Weight Mould Base (kg)	85
<b>Dimensions Mirror Plate / Insert</b>	
Length (mm)	196
Width (mm)	100
Depth (mm)	38
Weight Mirror Plate / Insert (kg)	5-6
<b>Mounting requirements ("Euromap")</b>	
Machine plate dimension should allow mould plates of	346 x 296 mm
Machine mounting height should fit	223 mm
...with additional adapter	259 mm
Central ejector pin should fit into machine	dia. 35 x 80 mm
Mounting hole "Euromap" system for	M 12
Hole distance horizontally	140 or 210 mm
Hole distance vertically	280 mm

# CNC Milling Machine

## CNC Milling Machine Type C4U / C2U

Automatic, microprocessor-controlled CNC specimen milling machine (cutter), for the production of standardized or not standardized specimens.

### Features:

- 3-Axis (X,Y,Z) milling table (T-slot) with a large working area
- Various clampings for plates, semifinished parts, pipes, etc. for the production of standardized specimens are available
- Quick release clamp for the production of notched specimens are available
- User friendly 2 or 3D-Software (CAD/CAM software) for the programming and controlling of the milling procedure
- HF spindle (1.1 kW) optionally



### Technical data:

	C4U	C2U
<b>Dimensions</b>		
Width (mm)	620	985
Height (mm)	730	1070
Depth (mm)	850	1300
Weight (kg)	81	170
Stroke in X (mm)	310	600
Stroke in Y (mm)	220	420
Stroke in Z (mm)	160	280
Table size (mm)	375 x 330	625 x 680
Passage between column (mm)	450	810
Passage under gantry (mm)	115	250
Passage under spindle nose (mm)	165	285
<b>Machine data</b>		
Max. speed (mm/s)	100	100
Max. feed rate (mm/s)	100	100
Standard motorization stepper motor (Ncm)	90	90
Resolution (mm)	0,003	0,003
Repeatability (mm)	0,02	0,02
<b>Power supply</b>		
	115/230 V 50/60 Hz	115/230 V 50/60 Hz

## Manual and Motorized Notching Machines

These linear notching machines (manual and motorized version) are developed to prepare, rapidly and accurately, V- or U- notched specimens for impact resilience determinations according to Charpy, Izod and Tensile Impact (ASTM, ISO, DIN or others). Therefore these machines are used in conjunction with impact pendulums. Interchangeable notching knives are designed with a constant profile to notch the specimens with the correct angle and radius as prescribed by the standards. The machines are fitted with two separate motion systems: one to move the specimens and the other to move the knife; the motorized machine has got a frequency controller for an adjustable speed.

### Features MAK:

- Robust and stable instrument
- Ergonomic and modern design
- Precise and stable knife guiding
- Knife tolerances better than 0,01 mm
- Maximum clamping height: 30 mm
- Frictionless and clearance free bearings at loader guiding warranty a very precise and reproducible notch



### Features MOK:

- Robust and stable instrument
- Motorized knife movement
- Knife velocity adjustable by means of a frequency controller
- Plexiglas protection cover with integrated safety switch
- Maximum clamping height: 30 mm



### Technical data:

	MAK	MOK
<b>Dimensions</b>		
Width (mm)	470	470
Height (mm)	215	540
Depth (mm)	220	470
Weight (kg)	16	43
Max. number of specimen	7	7
<b>Electrical data</b>		
Power (kVA)	-	0,4
Power supply (V/Hz)	-	230 / 50
Code No.	2600.000	2700.000

# Notching Machines

## Automatic Notching Machine

This linear automatic notching machine is developed to prepare, rapidly and accurately, V-notched specimens for impact resilience determinations according to Charpy, Izod and Tensile Impact (ASTM, ISO, DIN or others). As an option, the machine can be equipped with a saw, which permits to separate the shoulders of the multipurpose test specimen. Interchangeable notching knives are designed with a constant profile to notch the specimen with the correct angle and radius as prescribed by the standards. The machines are fitted with two separate motion systems: one to move the specimens (z-Axis) and the other to move the knife and the saw (x-Axis). To ensure the greatest possible flexibility, the cutting and notching feed speed as well as the sawing rotating speed are adjustable in a wide range. A special cooling system ensures that even sensitive materials can be processed with the required precision. A new sealing system ensures that even abrasive or glass fiber-reinforced materials can be processed.

The user interface, a 7 "touch screen, allows the programming of the notching or sawing cycles a simple and fast way. Repetitive processing cycles can be stored and are available when needed immediately.

### Features AKM:

- Robust and stable instrument
- Precise guided movement
- Adjustable knife speed
- Adjustable saw rotating speed
- Plexiglas protection cover with integrated safety switch
- Dual knife and saw cooling
- 7", Touch screen, color
- Clear and easy to use user interface
- Programmable notching and sawing cycles



### Technical data:

	AKM
<b>Dimensions</b>	
Width (mm)	1200
Height (mm)	700
Depth (mm)	540
Weight (kg), approx.	150
<b>Machine data</b>	
Max. number of specimen, approx. (depending upon specimen thickness)	50
Cutting speed saw, adjustable (m/min.), approx.	0,3 - 1,8
Rotating speed saw, adjustable (rpm), approx.	1000 - 2000
Cutting speed knife, adjustable (m/min.)	1 - 30
Single pass depth z-axis (specimen loader) (mm)	0,01 - 0,25
Machining length (mm), approx.	200
<b>Electrical data</b>	
Power (kW), approx.	1
Power supply (V/Hz)	230/110 - 50/60
Code No.	2900.000

## Compression Set

Simple testing device for the determination of the compression Set according to DIN ISO 815, DIN EN ISO 1856 and ASTM D 395

### Features:

- DIN, ISO and ASTM conform
- different geometries available
- 1- or 2 layer
- Heating oven upon request



## Tension Set

Simple testing device for the determination of the tension set according to DIN ISO 2285 and ISO 2285

### Features:

- DIN, ISO and ASTM conform
- Different geometries available
- Variable clamping length
- Heating-/cooling oven upon request

# Stress Cracking

## Stress Cracking Tester

To determine of the stability of polyethylene against stress corrosion in accordance with ASTM D 1693 - 70.

Equipment comes with:

- sample holders and sample tubes
- Compact - thermostat with rack for the admission of sample tubes
- 1 notching device with blade
- 1 bending device
- 1 transfer tool

### Features:

- Easy operating stress cracking tester
- Centering device for notching device
- Dial gauge for precise notching depth
- Transfer tool



# Hardness Tester

## Series HD 3000: Shore-Hardness Tester with analog display

Low cost Shore-Hardness tester for the universal use

### Features:

- Conform to DIN, ISO and ASTM
- Drap pointer available
- Large dial surface
- Full 360° dial
- Superior 1/2 point accuracy
- Ergonomic handheld design



## Series HDD: Shore-Hardness Tester with digital display

The new Shore-Hardness tester for precise and reproducible measurements

### Features:

- Conform to DIN, ISO and ASTM
- Large LCD display
- Time set-up from 1 ... 99 s
- Resolution 0,1
- Superior 1/2 point accuracy
- Ergonomic handheld design
- AUTO-OFF function
- HOLD-function
- Measurement memory
- Low battery warning
- Data port: RS 232



### Options:

#### Operating stand OS-2

The Durometer Operating Stand works on the constant load principle.

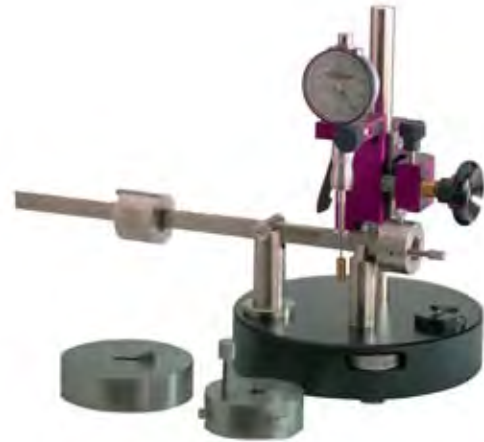
The sample is positioned on the support table. The Durometer is lowered shock-free by means of a manually operated lever. The hardness value can be read directly from the Durometer.



# Hardness Tester

## Calibrator RC-1

The Calibrator Model RC-1 was designed for in-house calibration. The Calibrator comes with weights for calibrating the spring-load of durometers in the A, B, C, D, DO and O scales. Due to the new design it is also possible to use durometers of almost all renowned manufactures by applying our optional adapters. Model RC-1 is a great way for reducing costs in quality control. The calibrator conforms to national and international standards such as DIN 53505, ISO 868, ISO 7619 and ASTM D 2240.



## Technical data:

	HD 3000	HDD	OS-2
<b>Hardness Tester for Shore</b>	<b>A, B, C, D, D0, 0</b>	<b>A, B, C, D, D0, 0</b>	<b>A, B, C, D, 0, 00</b>
Display	Shore analog	Shore digital	-
<b>Dimensions</b>			
Dial diameter (mm)	57	-	
Total length (mm)	121	-	
Width (mm)	-	64	
Height (mm)	-	112	
Depth (mm)	-	26	
Extension (mm)	-	-	115
Support table diameter (mm)	-	-	98
Max. sample thickness (mm)	∞	∞	180
<b>Characteristics</b>			
Range	0 ... 100	0 ... 100	
Accuracy	+/- 0,5	+/- 0,5	
Resolution	1	0,1	
Weight (kg)	0,184	0,279	19,8
Data port	-	RS 232	-

## Micro IRHD Hardness Tester:

The MICRO IRHD SYSTEM provides hardness readings on elastomers according to MICRO IHRD. Recommended specimen thickness is 1 to 5 mm. It complies to international standards such as DIN ISO 48, ISO 48, ASTM D 1415 and BS 903:Part 26A.

### Features:

- Conform to ISO and ASTM
- Fully automatic measurement
- Modular system
- Automatic table movement
- Built-in Auto-Diagnostics
- PC-controlled
- User friendly Windows Software



### Options:

#### O-Ring centering device

The patented O-Ring Center Device fully automatically cooperates with the MICRO IRHD SYSTEM. O-Rings with a cord diameter of 0.8 mm to 8 mm will be placed on the measuring table and pushed to the positioning pin. The cord is keyed into the MICRO IRHD software. Integrated electric motors are exactly driving the measuring table to the measuring axis. This results in measuring the highest position of the O-ring.



#### X-Table centering device with sample holder

The centering device with sample holder fully automatically cooperates with the MICRO IRHD SYSTEM. This fixture is designed to measure O-Rings and round style parts. Each sample requires a sample holder which has an identification number. This number is keyed into the MICRO IRHD software. An integrated electric motor is driving the measuring table to the exact position of the measuring axis. After the first measurement, the sample holder can rotate to the next measurement at a different spot.



# Hardness Tester

## X-Table centering device

The X-Table centering device with digital gauge has to be used with the MICRO IRHD SYSTEM. This fixture is designed to measure small irregular parts. Two straight pins are used as rest positions for the sample. The sample can be easily fixed with modelling clay. The digital gauge enables exact measuring at the measuring axis e. g. the highest point of the sample.

### Features:

- Digital gauge: Measuring range: 0...25 mm, resolution: 0.001 mm
- Standard sample holder: Exterior dia.: 50 mm, Matrix 5 mm x 5 mm, 60 holes dia. 2H7, 2 straight pins included
- Connecting hole in base for sample holder: 8H7
- Sample holder is fixed with a straight pin preventing any rotation

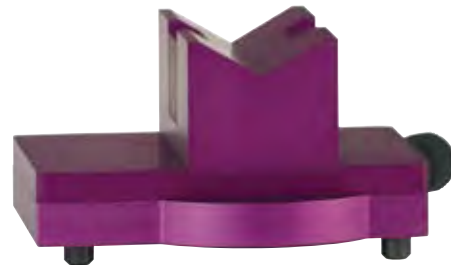


## Prism centering device

The prism centering device is designed to measure hoses and cables.

### Features:

- Fixture enables exact measuring at the measuring axis
- Exterior diameter of sample: 4.....50 mm
- Centering prism is removable to measure bigger parts



## Technical data:

### Micro IRHD

#### Dimensions

Measuring unit (mm)	Ø 200 x 470
Controller	
Width (mm)	290
Height (mm)	75
Depth (mm)	260
Max. sample thickness (mm) (without centering device)	90

#### Characteristics

Resolution (IRHD)	0,1
Weight (kg)	17,5
Data port	RS 232 / USB
Power supply (V/Hz)	230 / 50

## Friction Peel Tester Type 2255

High end friction peel tester according to ASTM D 1894, ASTM D 4521, ASTM D 3330, ASTM F 88, DIN EN ISO 8295, TAPPI T-816, BS 2782 and FINAT 1, 2, 3, 9.

The Friction/Peel tester has rapidly gained worldwide acceptance throughout industry and educational facilities as an accurate, reliable and easy-to-use instrument. Extremely versatile, this instrument measures static and kinetic coefficient of friction as well as peel properties of paper, paperboard, plastic films, adhesives, labels and packaging materials. Continuous software improvement has resulted in an enhanced testing instrument capable of measuring COF, 90° peel, 180° peel, T-peel and seal strength. The standard unit provides a load cell of choice (0.5, 2 or 10 kg), a selection of sleds and peel clamps. The unit also provides data storage with statistics and a printer output. COF- and peel-settings are saved in memory for quick retrieval for future testing. A standard USB port provides result data and continuous curve data for PC interface.

### Friction testing

Testing slip and friction properties of sheeted materials and evaluation of treatments and additives designed to minimise surface contact friction.

### Peel testing

Providing both peak and average peel strength for materials such as pressure sensitive tape, adhesive labels, and low strength bonding agents. Also useful in evaluating the strength of packaging seals.

### Features:

- 5 Standard languages
- Offers the ability to create, save, and password protect test set ups
- Easy to read front display
- Adjustable crosshead and load cell
- Store 128 tests each for COF, Peel and Tensile
- USB and RS-232 Data Communication Port
- Electronic over travel switches
- Selectable force units- g, kg, lbs, oz, N
- Preset industry standard test method storage
- Ability to save customized test setups



### Options:

- **Software:** provides enhanced capabilities and enables the test data to be displayed graphically, to store results and curve data for a series of measurements
- **Sample clamps:** mechanically operated
- **Delamination fixture:** performs a 90° peel test on rigid material to measure lamination strength
- **180° T-peel attachment:** maintains a constant 180° angle during measurements
- **90° peel attachment:** maintains a constant 90° angle during measurements
- **Heated platen:** for measurements up to 204°C



# Friction Peel Tester

## Technical data:

### FP 2255

#### Dimension

Width (mm)	686
Height (mm)	178
Depth (mm)	305

#### Characteristics

Load cell range (gr.)	500, 1000, 2000, 10000
Force resolution (gr.)	0,1
Force accuracy	0,25 % of f.s.
Weight (kg)	20
Force Units	Grams, Kilograms, Ounces, Pounds and Newtons
Test times (s)	0,1 ... 99
Standard COF sleds (gr.)	100, 200, 500, 1000, 1814 and 2000
Speed (mm/min.)	25,4 ... 508
High speed option (mm/min.)	254 - 2794
Power requirements	110/115 VAc +/- 10% / 60 Hz 230 VAc +/- 10% / 50 Hz
Data port	USB / RS 232

# Elmendorf Impact Tester

## ProTear TearTester

The original Elmendorf design

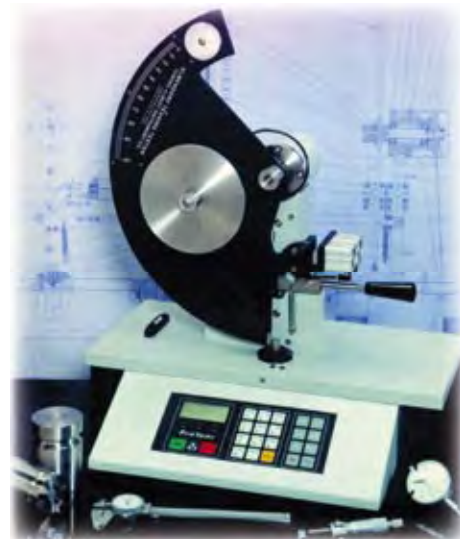
Ergonomically designed for ease of operation and conservation of laboratory space, the ProTear Electronic Model incorporates both mechanics and electronics into a single-footprint design. Other standard features of the electronic model include air-actuated pendulum release and sample clamps, microcomputer-assisted pendulum balancing and a membrane switch display panel. The control panel provides one-touch clamping and test capabilities. Other functions include data entry of sample information such as sample ID, thickness, basis weight, sample direction and number of plies being torn. The “Units” key enables the simple configuration of result units.

### Software

- Test Results include tear strength, tear per ply, average tear strength and tear index
- Quickly enter sample data — thickness, basis weight, sample ID, sample direction
- Obtain results as percent of capacity, grams, pounds or millinewtons
- Calculated Statistics — average, high, low, std. dev., range & variance
- Configurable reports
- Provision to delete and restore test results

### Features:

- Digital encoder ensures accurate results
- Electronic balancing of pendulums
- Configurable display shows test information and software menus
- User-friendly, one-touch software
- Quick capacity change with augmenting weights
- One-touch pneumatic clamping and pendulum release available
- Industry Standards: ASTM D295, D751, D1424, D1922a, D5734, TAPPI T414, T496, BS 4253, 4468, ISO 1974 and others



### Technical data:

#### ProTear Electronic

#### Dimensions

Width (mm)	483
Height (mm)	578
Depth (mm)	389

#### Characteristics

Capacity (gms)	200, 400, 800, 1600, 3200 & 6400
Accuracy (% of penulum capacity)	+/- 0,2
Power Consumption (W)	600
Power Requirements	110V, 50/60 Hz 230 V, 50 Hz
Weight (kg)	15,2
Data port	RS 232

# Impact Tester

## Pendulum Impact Tester Type IMPact 15 / 25

The microprocessor-controlled pendulum impact testing machines IMP 15 and IMP 25 serve the impact strength resulting from an impact at standardized specimens made of plastics. These devices are to be accomplished suitably around examinations in accordance with the following standards:

- EN ISO 179 and 180
- ASTM D 256 method A and B
- ISO 8256 and others.

For the impact determination according IZOD, Charpy and Tensile Impact at different materials with different sample dimensions in the energy range from 1 to 15 J (IMPact 15), as well as from 1 to 25 J (IMPact 25). Various sample supports and clamping devices for different specimen types are available.

### Printer/ PC connection:

Over an attached printer a report with statistic evaluation can be printed. A further serial interface permits the connection of a PC's using our WINDOWS® - software.

Standard device including automatic impact pendulum brake!



### Features:

- Full hammers range, from 1 J to 15 (25) J for charpy, izod and tensile impact testes
- Microprocessor with keypad and LCD-Display (4 different languages available)
- Serial and parallel outputs for PC and printer (not included)
- Automatic hammer brake
- Built-in centering system for charpy specimens
- Direct reading of absorbed energy and resilience at the impact
- Auto-test of main functions when switching on
- Printout of hammer calibration report
- Storage (first-in first-out) and printout up to 50 tests, with average and standard deviation calculations
- User friendly and „all included“ Window Software for the control and evaluation, including statistic



Izod-Vice



Charpy-Vice

## Options:

- **Windows Software:** provides enhanced capabilities and enables the test data to be displayed graphically, to store results and curve data for a series of measurements, incl. statistics
- **Different fixtures / clamping devices:** Charpy, Izod, Tensile Impact
- **Notching Machines:** Manual or motorized version available

## Technical data:

	IMPact 15	IMPact 25
<b>Dimensions</b>		
Width (mm)	800	800
Height (mm)	1000	1000
Depth (mm)	400	400
<b>Characteristics</b>		
Energy range (J)	0 ... 15	0 ... 25
Display	LCD	LCD
Power consumption (W)	200	200
Power supply (V/Hz)	230 / 50	230 / 50
Weight (kg)	240	240
Data port	RS 232 / Centronics	RS 232 / Centronics

# Impact Tester

## Ball Drop

Easy operating falling dart instrument according ASTM D 1709 and ISO 7765-1

This testing instrument covers the determination of the energy that causes plastic film to fail under specified conditions of impact of a free-falling dart.

This energy is expressed in terms of the weight (mass) of the falling dart from a specified height which would result in 50 % failure of specimens tested.

### Features:

- Stable and ergonomic table design
- New Quick-Fix clamping system provides wrinkle-free clamping
- Easy and quick falling height adjustment by guiding lever arm
- Ball drop QC-Link data evaluation system (on request)
- Pre-leveled and ready to operate instrument
- No electrical power supply needed!



### Options:

- Film roll for continuous testing

### Technical data:

	Ball drop
<b>Dimensions</b>	
Width (mm)	560
Height (mm)	2530
Depth (mm)	640
Weight (kg)	60
Compressed air supply (bar)	6
Code No.	4200.000

## Falling Weight Tester

Easy operating falling weight tester according to RAL 716-1 and others.

This testing instrument is designed to perform biaxial falling weight tests on window profiles, frames, pipes, etc. according to different international standards.

### Features:

- Stable and ergonomic floor standing design
- Anti-rebound device prevents double impact on specimens
- Easy and quick falling height adjustment
- Self-centering specimen clamping device
- Different specimen vices available
- Variable dropping height



### Technical data:

	FWT
<b>Dimensions</b>	
Width (mm)	450
Height (mm), approx.	2500
Depth (mm)	600
Weight (kg), approx.	75
Code No.	4100.000

# Impact Tester

## Falling Weight Tester - Series IT

A highly versatile range of drop weight impact testers for performing a wide range of medium energy tests on materials, end products of various geometries and standardized specimens according to ISO 6603-2, EN ISO 4651, ASTM D 4168, ASTM D 7136 & ASTM D 7137 (Standard Test Method for Measuring the Damage Resistance of a Fiber-Reinforced Polymer Matrix Composite to a Drop-Weight Impact Event) and others.

Various options as:

- Wide range of strikers, anvils, fixtures and jigs available for standard test geometries and for custom testing.
  - Optional sample strippers for extracting striker from tough ductile specimens.
  - Optional second impact prevention system for non-penetrating tests.
  - Optional high velocity impact option for impact velocities up to 20 m/s.
  - Optional dynamic displacement measurement system for direct measurement of the sample deformation.
  - Optional high speed, fully integrated video system to provide visualization of specimen failure mode.
  - Optional temperature conditioning chamber, -70°C to +150°C.
- expand the use of this instrument.



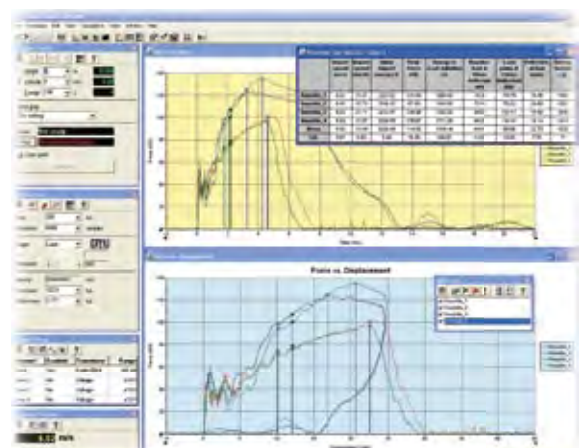
### Features:

- Laboratory grade instrumentation and rigid construction for highest accuracy test results
- Guided mass system to ensure that the impact geometry is correct throughout the test.
- Robust construction stands up to the rigours of dynamic testing to provide high reliability
- Easily interchangeable contact parts simplify maintenance and reduce cost of ownership.
- Very high levels of safety employing multiple redundant systems, compliant with 89/392/EEC and 91/368/EEC directives.

### Software:

The GUI provides both control of the impact test (drop parameters and data acquisition parameters) and analysis of the resulting data.

Control	Impact parameter (height, velocity or energy) Data acquisition parameters (sample rate, sweep length) Impact sequence
Indication	Machine status Current impact mass position (height, velocity, energy)
Data capture	Force vs time Initial impact velocity



## Options:

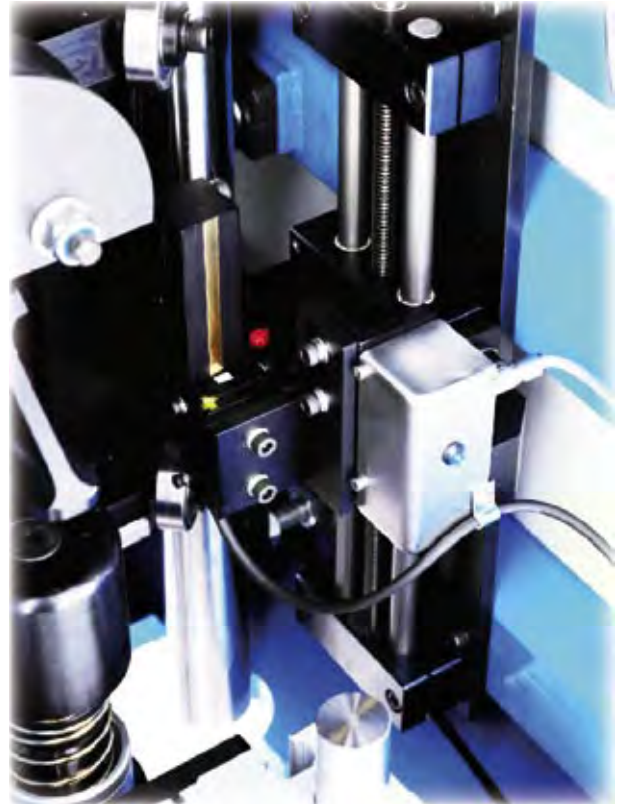
### Displacement Measurement

Highly accurate, optical displacement measurement allows the direct and simultaneous measurement of the specimen deformation and tension. Very high measurement accuracy can be obtained in case of a high change of impact speed during the test.

#### Features:

- Digital system, does not require a periodical calibration
- High - speed measurement allows a synchronous data capturing (force and acceleration)
- Non-contact measurement - no influence thru impact event

Type	optical sensor
Range	10 mm .... 200mm F.S.
Resolution	10 $\mu$ m
Max. velocity	15 m/s
Rate	max. 3000000 data points / sec.
Error	10 $\mu$ m + 3 $\mu$ m / m
Temperature coeff.	22 $\mu$ m / m / °C



### High-Velocity-Option

The High-Velocity option is available for the instrument type IM10-20 and IM100. Test speeds up to 20 m/s (72kph, 45mph) can be obtained.

This option can also be used with the tensile impact kit.

#### Technical specification:

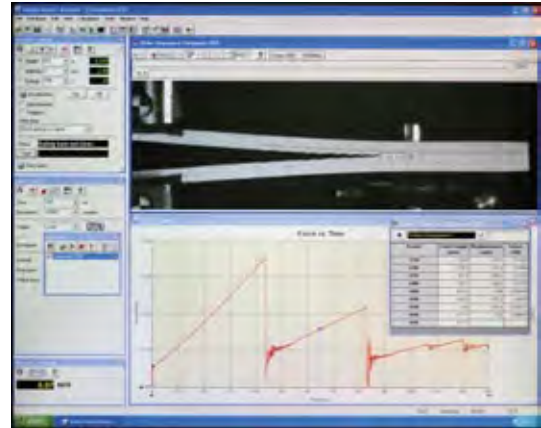
Speed range (10kg mass):	5 m/s ... 20 m/s
Energy range (10Kg mass):	125 ... 2000 Joule
Repeatability:	$\pm$ 1%



# Impact Tester

## High-speed camera

The high-speed option is available for any of the range of impact testers, to greatly enhance understanding of the behavior of a specimen as it undergoes an impact. We offer a fully integrated system under the control of the ImpAcqt software. This is used to both control the camera and analyse the resulting video sequence. Since the camera and the data acquisition share the same trigger, data points and images can be precisely correlated. A video sequence provides a great deal of qualitative information about the impact event, and the software also allows quantitative information to be extracted.



## High Rate Tensile Test

The high rate tensile test allows tensile tests to be performed at strain rates unobtainable using traditional servo hydraulic machines. Using appropriate specimens strain rates up to 1500/s or more may be achieved.

The test apparatus is fitted in the impact chamber of an IM10 system.

The specimen is held between two sets of grips – the upper set fixed and the lower set free to move up and down. A special striker fixed to the weight carriage of the impact tester strikes the lower jaws and provides the force required to stretch the specimen (usually to failure).

A transducer attached to the upper jaws measures the force on the specimen and hence the stress.



## Cylinder Crush Test

The cylinder crush test combines a highly specialised anvil, a striker and software analysis to investigate the flow stress behavior of metallic materials. With appropriate selection of specimen size strain rates of up to 1500/s can be achieved.

Temperature conditioning of the anvil is offered as an option in order to investigate flow stress under different thermal conditions.

The anvil is designed to disperse the initial shock wave in order to minimise reflections that would disrupt the results.

The use of the dynamic displacement measurement system is highly recommended.



## Options:

### Charpy-V-Notch Test

By using the appropriate anvil and striker, in conjunction with a load cell positioned just above the striker, the IM10 can be used to perform instrumented Charpy testing to quality standards such as ASTM E23, DIN EN ISO 179, ISO10045 and ISO14556.

The rigidity of the anvil, together with the precise guidance of the IM10 falling weight ensure accurate results. Adjustments are provided on the anvil to ensure the correct impact geometry.

The whole apparatus is usable in temperature controlled chamber, enabling tests to be performed at lowered and elevated temperatures, to determine the brittle to ductile transition temperature.

In conjunction with the Impact software the test measures total energy to failure.

In addition, because the system is equipped with high-speed instrumentation, values can be obtained for crack initiation energy and crack propagation energy.



### Further options:

- Temperature chamber
  - Temperature range: -70 ... +200°C
  - Dimensions: 360 x 600 x 360 mm (WxDxH)
- Microphone
- Further DAQ - channels (max. 16), 5 ms/s
- CAI - Testing device (Compression after impact testing) according ASTM D7136 & D7137
- Testing device for aluminium honeycombs as well as for polymer foams according EN ISO 4651 and ASTM D 4168





# Impact Tester

**Technical data:**

	<b>IM 10T - 20</b>	<b>IM 1</b>
<b>Falling height (mm)</b>	50 ... 2000	250 ... 1200
<b>Resolution (mm)</b>	1	1
<b>Accuracy (mm)</b>	+/- 2	+/- 1
<b>Falling weight (kg)</b>	8 ... 30	5 ... 10 (15)
<b>Steps of ... (kg)</b>	1	1
<b>Accuracy (%)</b>	+/- 0,5	+/- 0,5
<b>Velocity (m/s)</b>	1,0 ... 6,26	2,2 ... 4,85
<b>....with HV - option (m/s)</b>	1,0 ... 20	-
<b>Energy range (J)</b>	2,5 ... 2000	24 - 120 (176)
<b>Testing area</b>		
<b>Dimension clamping area / T-slot plate W x d (mm)</b>	1200 x 700	depending upon application
<b>Height (mm)</b>	650	
<b>Instrumentation</b>		
<b>Type</b>	Piezoelectric (Kistler)	Piezoelectric (Kistler)
<b>Measuring range (kN)</b>	10 ... 120	10 ... 120
<b>Linearity (%)</b>	< 0,5	< 0,5
<b>Hysteresis (%)</b>	< 0,5	< 0,5
<b>Overload range (%)</b>	+/- 150%	+/- 150%
<b>Data capturing</b>		
<b>Sampling Rate</b>	3.000.000 / sec.	3.000.000 / sec.
<b>Resolution</b>	16 Bit	16 Bit
<b>Number of data points / Test</b>	50.000	50.000
<b>Velocity measurement</b>		
<b>Resolution (ns)</b>	25	25
<b>Accuracy (%)</b>	+/- 0,1	+/- 0,1
<b>Signal conditioning</b>		
<b>Bandwidth</b>	DC - 50 kHz, -3dB	DC - 50 kHz, -3dB
<b>Range (pC)</b>	+/- 100 ... 999000	+/- 100 ... 999000
<b>Output (V)</b>	+/- 10	+/- 10
<b>Linearity (%)</b>	< +/- 0,1	< +/- 0,1
<b>Accuracy (%)</b>	< +/- 0,5	< +/- 0,5
<b>Auto-zero function: automatic zero of force signal output applied</b>	Yes, during test	Yes, during test
<b>Calibrated accuracy (%)</b>	+/- 0,1	+/- 0,1
<b>Timebase accuracy (%)</b>	+/- 0,01	+/- 0,01
<b>Trigger</b>	via force, laser/photodiode or external signal	via force, laser/photodiode or external signal
<b>Further channels (simultaneous / synchronous measurement)</b>	3	3
<b>Dimensions</b>		
<b>W x H x D (mm)</b>	1420 x 4500 x 760	1000 x 3000 x 800
<b>Weight (kg), approximately</b>	2800	800
<b>Electrical data</b>		
<b>Power supply (<math>\pm 10</math> %) 50/60 Hz (V)</b>	230	230
<b>Fusing (A)</b>	16	5
<b>Compressed air (bar)</b>	5 ... 8	5 ... 8

## HotTack Tester

Automatic Hot-Tack measurement according to ASTM F 1921

The Hot Tack Tester is a highly sophisticated instrument for testing sealing properties of packaging material according to ASTM F 1921-98.

It is being used in research and development as well as in SQC/SPC applications for raw materials, semi finished goods and finished packaging products. The Hot Tack Tester permits evaluation of sealability and hot tack under a broad range of testing conditions to optimize packaging machine settings and to ensure consistent quality of the product. The instrument is also a practicable and helpful tool to packaging material manufacturers and end-users for incoming material inspection and for obtaining optimal production line speed.

### Features:

- Sealing and Hot-Tack testing in one single instrument
- Space-saving set up
- Temperature range up to +320 ° C
- Unique specimen clamping system
- Clear configurable test conditions
- Fully automated testing
- Maintenance-free
- Prepared for use with a robot or handling system
- Instrument incl. calibration kit
- User-friendly software



### Technical data:

	Hot-Tack Tester
<b>Sealing characteristics</b>	
Sealing bar, Dimensions (mm)	5 x 50
Specimen width, max (mm)	40
Specimen thickness, max (mm)	1
Sealing time (sec.)	0,1 ... 20
Sealing temperature (°C)	21 ... 320
Sealing pressure (N/mm <sup>2</sup> )	0,1 ... 2,0
<b>Peeling characteristics</b>	
Cooling time (sec.)	1 ... 99
Peeling velocity (mm/s)	1 ... 600
Specimen length (mm)	250
<b>Hot-Tack characteristics</b>	
Measuring range: Force (N)	0 ... 100
<b>Electrical characteristics</b>	
Power supply (±10 %) 50/60 Hz (V)	85 ... 132 or 170 ... 264
Power (W), approx.	200
Compressed air (bar)	6 ... 8
Weight (kg), approx.	26
Dimension, WxDxH (mm)	434 x 290 x 749



# Universal Testing Machine



## Universal Testing Machine „smarTens“

Single ball screw drive with solid state servo and motor controls

An affordable, accurate, single-column materials testing machine for those low capacity testing needs. Designed for use in a variety of applications including quality and production control, R & D and test labs. It is designed to perform a variety of test procedures, including compression, tension, shear, peel and flex. The large application range permits testing of plastics, elastomers, foam materials, papers, ropes, cords, wires as well as strength tests (tensile and compression tests) at finished parts.

Any machine can be used as a stand-alone machine but of course, also used with our extensive library of user friendly Windows®-based software. This software is available or can be upgraded for every testing application according almost every standard including ASTM, BS, DIN, ISO and JIS. Beside this, we are ready to design your specific application software!

### Features:

- Force range up to 3 kN
- Stand-alone or PC-driven version
- User-friendly software
- Cross head guidance system
- Quick-disconnect load cell and fixture system
- Adjustable overload stop
- Load measurement accuracy: Class 1 from 0,8 % to 100% of rated capacity acc. DIN EN ISO 7500 (optionally Class 0,5)
- Variable speed from 0,05 to 1300 mm/min.



### Technical data:

<b>Type of machine</b>	<b>smarTens 003</b>
<b>Dimensions "working space"</b>	
Width (mm)	-
Depth to column (mm)	105
Cross head travel (without tools) (mm)	850
<b>Load frame dimensions</b>	
Width (mm)	380
Depth (mm)	500
Height (mm)	1200
<b>Characteristics</b>	
Max. capacity (N)	3000
Resolution cross head travel (µm)	< 1
Max. velocity (mm/min.)	1300
Power supply (V/Hz)	115/230 - 50/60
Power (VA)	500
Weight (kg)	45

## Universal Testing Machine Series “smarTens”

Twin ball screw drive with solid state servo and motor controls

These universal tensile tester series “smarTens” (table standing) incorporate an advanced microprocessor technology (load resolution of 120000 digits). In combination with our user friendly software we provide an extremely efficient, reliable approach to any materials testing need.

Well-known for their versatile performance and rugged mechanical design, these machines are designed to accommodate a wide range of applications (e. g. quality and production control, R & D and test labs) to be able to meet the most demanding test requirements. It is designed to perform a variety of test procedures, including compression, tension, shear, peel and flex. The large application range permits testing of metals, plastics, elastomers, foam materials, papers, wood, ropes, cords, wires as well as strength tests (tensile and compression tests) at finished parts.

### Features:

- Force range up to 20 kN
- User-friendly software
- Crosshead guidance system
- Quick-disconnect load cell and fixture system
- Adjustable overload stop
- Load measurement accuracy: from 0,8 % to 100% of rated capacity: class 1 (class 0,5 optional)
- Crosshead travel resolution better than 1  $\mu\text{m}$
- Speed var. from 0,01 to max. 1000 mm/min.



### Technical data:

Type of machine	smarTens 005	smarTens 010	smarTens 020
<b>Dimensions “working space”</b>			
Width (mm) (enlargement on request)	420	420	420
Crosshead travel without tools (mm)	1100	1100	1100
<b>Load frame dimensions (without EDC)</b>			
Width (mm)	685	685	685
Depth (mm)	550	550	550
Height (mm)	1420	1420	1420
<b>Characteristics</b>			
Max. capacity (kN)	5	10	20
Resolution crosshead travel ( $\mu\text{m}$ )	< 1	< 1	< 1
Max. velocity (mm/min.)	1000	500	250
Return velocity (mm/min.)	1000	500	250
Power supply (V/Hz)	115/230 - 50/60	115/230 - 50/60	115/230 - 50/60
Power (VA)	0,5 / 0,7	0,5 / 0,7	0,5 / 0,7
Weight (kg)	100	100	130

# Universal Testing Machine



## Universal Testing Machine Series “proTens”

Twin ball screw drive with solid state servo and motor controls for loads up to 250 kN

These universal tensile tester series “proTens” (table standing) incorporate an advanced microprocessor technology (load resolution of 120000 digits). In combination with our user friendly software we provide an extremely efficient, reliable approach to any materials testing need. Well-known for their versatile performance and rugged mechanical design, these machines are designed to accommodate a wide range of applications (e. g. quality and production control, R & D and test labs) to be able to meet the most demanding test requirements. It is designed to perform a variety of test procedures, including compression, tension, shear, peel and flex. The large application range permits testing of metals, plastics, elastomers, foam materials, wood, ropes, cords, wires as well as strength tests (tensile and compression tests) at finished parts.

### Merkmale:

- Force range up to 250 kN
- Two different type of motor (300 W or 900 W)
- User-friendly software
- Cross head guidance system
- Quick-disconnect load cell and fixture system
- Adjustable overload stop
- Load measurement accuracy: Class1 from 0,4 % to 100 % of rated capacity (Optional: Class 0,5)
- Variable speed from 0,01 to 2000 mm/min.



### Technical data:

Type of machine	T3-005	T3-010	T9-010	T3-020	T9-020	T3-050	T9-050	T9-100	T9-250
<b>Dimensions “working space”</b>									
Width (mm) (enlargement on request!)	420	420	420	420	420	420	510	510	510
Crosshead travel without tools (mm) (enlargement on request!)	1100	1100	1100	1100	1100	1100	1100	1100	1100
<b>Load frame dimensions (without EDC)</b>									
Width (mm)	685	685	685	685	685	685	880	880	880
Depth (mm)	550	550	550	550	550	550	670	670	670
Height (mm)	1420	1420	1420	1420	1420	1420	1580	1580	2250
<b>Characteristics</b>									
Max. capacity (kN)	5	10	10	20	20	50	50	100	250
Resolution crosshead travel (µm)	0,01	0,01	0,01	0,01	0,01	0,01	< 1	< 1	< 1
Max. velocity (mm/min.)	2000	1200	2000	600	2000	200	800	400	175
Return velocity (mm/min.)	2000	1200	2000	600	2000	200	800	400	175
Power supply (V/Hz)	115/230 50/60	115/230 50/60	115/230 50/60	115/230 50/60	115/230 50/50	115/230 50/60	115/230 50/60	115/230 50/60	115/230 50/60
Power (VA)	0,7	0,7	1,5	0,7	1,5	0,7	1,5	1,5	1,5
Weight (kg)	100	100	100	130	130	150	320	400	570



# Universal Testing Machine

## EDC Controller

### EDC 220 / EDC 222 / EDC 580:

The measurement and control electronics is built in a separate housing. On the front side of the EDC 222 / 580 there is a digital LCD which displays load and travel measurement as well as buttons to enter the test parameters and to operate the test machine.

Three different configurations are available:

EDC 220: • load resolution better than +/- 180.000 digits  
EDC 222: • 2 BUS channel

EDC 580: • load resolution better than +/- 180.000 digits  
• 8 BUS channels



Hand Keyboard RMC 5



Hand Keyboard RMC 7



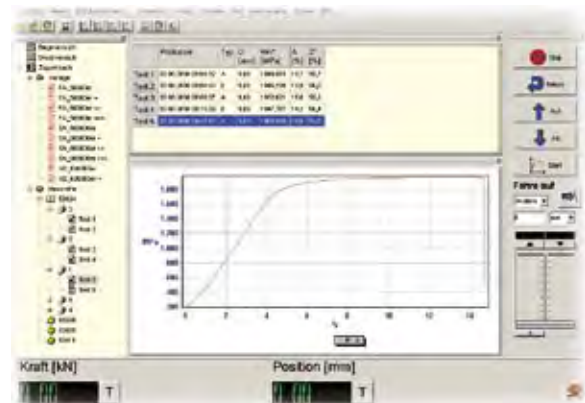
## Software

If ordered, every universal testing machine comes with our basic software program which allows the user to perform any test according his need. We provide user definable test procedures according different kind of testing procedures. Beside these pre-defined programs, we offer our free programable module for users which want to create their individual testing and evaluation process. We can provide the following features:

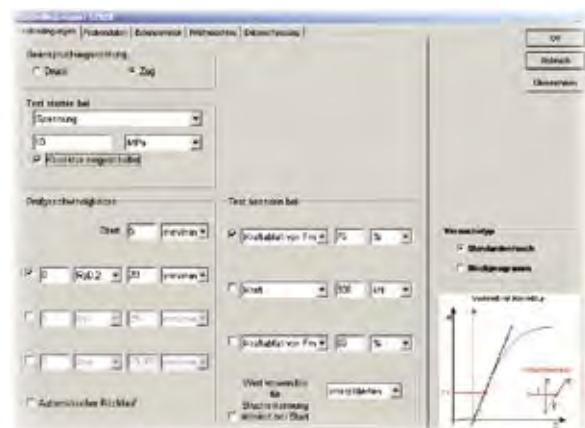
- controlling of the test according to any test procedure in static or dynamic mode
- individual parameter setting with calculation of user defined test results (force, travel, elongation or any other measured parameter)
- test results calculation by any arithmetical formula

Our materials testing software operates under Microsoft Windows® and provides a high level of "Office® - compatibility" by allowing individual test results to be sent to Microsoft Access®, Excel®, ASCII-file or to any other SQL application. The integrated report generator allows the preparation of quality test reports, complete with graphs and statistics (single or series mode).

The software is available in many different languages, e. g. german, english, russian, etc. An integrated online help menu explains all functions/features and offers detailed help about individual test standards.



Main - Window



Parameter Setup - Window

# Universal Testing Machine

## Extensometer

Extensometers are suitable for nearly all test pieces above an initial instrument gauge length ( $L_0$ ) of 10 mm. They enable the determination of the module of elasticity and the restrictions of proof stress and ultimate strain. Simple handling creates the conditions for rational testing of a large number of pieces. Highly precise measurement with an accuracy up to 0.2 % of the indicated value is guaranteed.

### MFA 25 / MFA 12 / MFA 2

The MFA 25 / MFA 12 / MFA 2 enables a travel of 25, 12 mm or 2(3) mm by means of a rotation point system. It is suitable for plastic and metal test specimen.

**Technical data:**

Travel:	25 mm / 12 mm / 2 mm
$L_0$ :	25...100 mm
Class of accuracy:	0.5 / 0.2 (standard EN 10002)



### MFN

The extensometer MFN is available in 14 models and is based upon a modular design. Options include manual, automated and climatic chamber arms.

The MFN-A offers both a small (4 mm) and a large range. It is suitable for determining the E-module from very short gauge lengths and for recording fracture elongation of  $L_0 + \Delta L = 800$  mm.

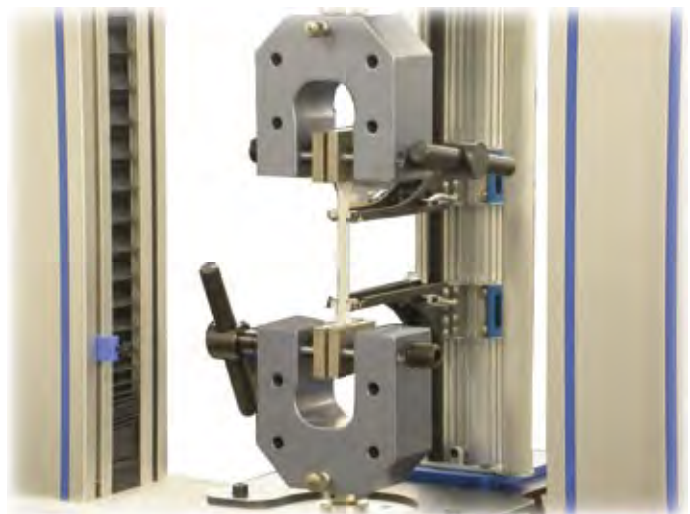
The MFN-B is available as the large measuring range device. The MFN-C is available as the small measuring range device.

**Technical data**

Travel max. 790 mm smallest  $L_0$  10 mm Class of accuracy depending on model 0.2 or 1 (standard EN 10002)

**Technical data:**

Travel:	max 790 mm
Smallest $L_0$ :	10 mm
Class of accuracy depending on model:	1 / 0.2 (standard EN 10002)



**Other types of extensometer available!**

## Environmental chamber

Our standard temperature chambers (temperature range  $-70^{\circ}\text{C}$  to  $+250^{\circ}\text{C}$ ) with or without controlling humidity are robust and have been proven since many years. Each temperature chamber will be manufactured according to our customer demands (max. tension / travel range, dimension of the grips / tools, max. temperature, handling, etc.), but using standardized components.

Our environmental chambers are manufactured for use with double frames.

### Standard features include:

- Electrical resistance heating
- Choice of compressor,  $\text{CO}_2$  or liquid  $\text{N}_2$  cooling
- Microprocessor-based temperature controller
- Portable, height-adjustable floor stand.
- Available temperature range:  $-70^{\circ}\text{C}$  to  $+250^{\circ}\text{C}$  (optional:  $+600^{\circ}\text{C}$ )
- Move-in adapters
- Usable for optical and mechanical extensometer



## Grips / Fixtures / Vices

We offer a large range of specimen grips, fixtures, vices for almost any application. These devices are available in various designs, depending on the test load and test temperature used to cover a wide range of applications for the rubber and plastics testing.

### Pneumatic grips

For low or medium test loads we offer different kinds of pneumatically operated grips which are working single or double sided. The clamping jaws are exchangeable and available in different versions (shape, surface structure and material) to cover all needs to get a slipping free test.



# Universal Testing Machine

## Screw grips

These screw grips are operated manually via screw drive principle. One gripping jaw can be set in a fixed position; the other jaw is operated by a screw drive. Different jaws (fixed or exchangeable) are available to cover different applications.



## Wedge grips

For medium or higher test loads we offer different kind of mechanically operated wedge grips which are actuated manually via a lever, which is pressed against the specimen. The preload is generated by spring inside the clamping system. During the test the gripping force increase with the increasing tensile force. The clamping jaws are exchangeable and available in different versions (shape, surface structure and material) to cover all needs to get a slipping free test.



## Vices for flexural test

Flexure or bending (3- or 4 point) tests can be carried out in 3- or 4-point way. Depending on the standard and the dimensions of the specimens, we offer different tables with different span (adjustable) and heads with different radius.



## Further options:

- Devices for the determination of compressive properties of flexible materials according to ISO 604 and ASTM D 695
- Tools for the determination of the ball indentation hardness according to ISO 2039
- Devices for the determination of the static and dynamic coefficient of friction according to DIN 53375, ASTM D 1894, ISO 8295
- Tools for the determination of the puncture resistance according to ASTM D 5748
- Devices for 90° or 180° peel test
- Unit for the determination of the blocking load of plastic film by parallel platen method according to ASTM D 3354, ISO 11502

## Hot Set Tester

Unique Hot Set Tester

This Hot Set Tester is used to test insulating and sheathing materials of electric and optical cables.

### Features / Equipment:

- 3 or 5 stations unit
- Electronically-controlled preheating chamber technology
- Temperature range up to 300°C
- Unique specimen clamping system
- Optical measuring system with a resolution of 0,01 mm
- Calibrated masses!



### Technical data:

	HST 53-3	HST 115-3(5)
<b>Exterior dimensions</b>		
W x H x D (mm) approx.	640 x 620 x 800	840 x 700 x 870
<b>Interior dimensions</b>		
W x H x D (mm)	400 x 400 x 330	600 x 480 x 400
Interior volume (l)	53	115
<b>Electrical data</b>		
Nominal voltage ( $\pm 10\%$ ) 50 Hz (V)	230	230
Nominal power (W)	1200	1600

# HDT/Vicat Tester

## HDT Vicat 4U

The new generation - user friendly, ergonomic, reliable, precise, modular - the state of the art!

The Model HDT Vicat 4U is the latest generation of our microprocessor controlled automatic HDT/Vicat testing instruments, capable of testing up to four different specimens simultaneously and independently, with an automated testing sequence that proceeds according to user defined control and configuration parameters.

This 4 station testing instrument capable to determine the Heat Deflection Temperature (HDT), the VICAT Softening Temperature (VST) or the creep behavior by three-point loading according to the following standards: ISO 75 part 1 and 2, ISO 306, ASTM D 648, ASTM D 1525, EN ISO 899-2 and equivalents.

### Features / Equipment:

- Universal HDT/Vicat – testing instrument for fully automatic control of entire test cycle
- Modular system (can be upgraded)
- Automatic correction for thermal expansion of test frames
- Electronic transducer (LVDT) integrated for 0,001 mm resolution of deflection and penetration
- Air bearing-guided loading rods for virtually friction free load apply
- Temperature of each station (HDT or VICAT) is measured by a Pt 100 thermocouple
- Inert gas overlay
- Built-in heat exchanger for rapid cooling down
- USB port for PC connection
- Test control and evaluation via k-BASE software program
- Automatic system calibration by k-BASE software program



### Options:

- Motorized station and weight lifting device (optional) for easy insertion and removal of the testing stations
- Additional supports / adapters for three-point bending tests (creep behavior)
- Environmental friendly chilling - our external or internal cryostats
- High stabilized silicon oil - can be used for HDT- or Vicat tests up to 275°C



HDT-Testing (flatwise)

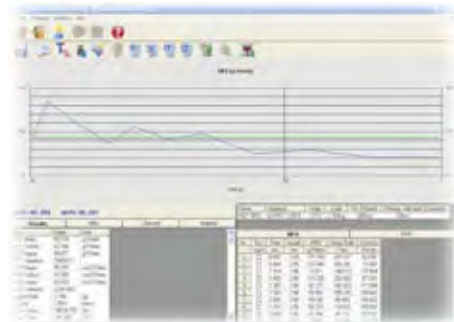


HDT-Testing (edgewise)

## Software:

### k-BASE - your software for user friendly instrument control and programming as well as professional documentation

- Real time data collection system quickly presents you all information and data on screen and during measurement
- Advanced on-line help system allows the operator to access on all hard- and software functions, instrument usage, hardware setup and theory on HDT/Vicat measurement
- Supervisor configuration enables the software to be configured for each specific application. Access can be controlled using a supervisor password option
- Note editor for recording sample details and additional information
- User defined tests can be programmed for easy retrieval and re-use for convenient repetitive testing
- Individual test report preparation, depending on used test station
- Advanced supervisor evaluation
- Fully automatic instrument control
- Automatic weight / indentation / distortion calculation
- Easy data access / export



## Technical data:

	HDT Vicat 4U
<b>Number of stations</b>	1 .. 4
<b>Dimensions</b>	
W x H x D (mm), max. (depending on configuration)	1020 x 690 x 520
Weight (kg), approximately	75 kg
<b>Temperature data</b>	
Temperature range (°C)	max. +300°C
Temperature fluctuation (K)	max. +/- 0,3 K
Temperature deviation (K)	+/- 0,2 K F.S.
Heating rate (K/h)	50 ... 120
Cooling system	Water or chiller
Heat transfer medium	Silicon oil (special type)
Temperature reading	by 1 PT 100 each station
<b>Electrical data</b>	
Nominal voltage (±10 %) 50/60 Hz (V)	110 / 230
Nominal power (W), max.	3000

# Teraohmmeter

## Teraohmmeter TO3 / Milli-TO3

Teraohmmeter for tests according to DIN IEC 60093, VDE 0303 Part 30, DIN 53482 and others.

This instrument is used to determine the volume resistivity as well as the surface resistivity by using an electrode. The instrument will mainly be used for the determination of the electrical properties of a plastic moulded part (insulating material).

### Features:

- Resistivity measuring range:  $1,8 \times 10^{-6}$  Ohm up to  $1,6 \times 10^{15}$  Ohm (Milli-TO3) or  $0,9 \times 10^3$  Ohm up to  $1,6 \times 10^{15}$  Ohm (TO3)
- Current measuring range: 0,1 pA up to 1,1mA
- Adjustable measuring voltage from 1V up to 500V
- Manual or automatic range selection
- Signaling limit by contact and beeper
- Automatic zero control
- Adjustable timer from 10 up to 300 s
- RS 232-interface incl. cables and PC-Software

Milli TO3



TO3

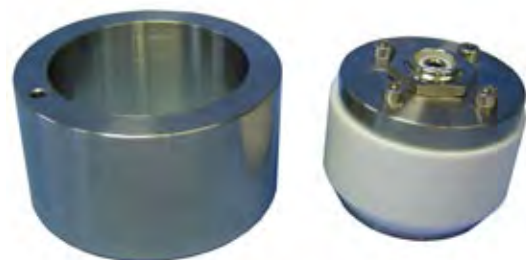


### Options:

#### Protection ring electrode type SE 50

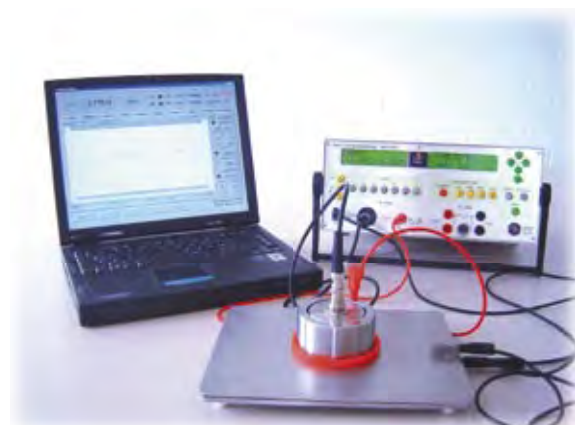
- Electrode for measurement of volume and surface resistivity according to DIN/ IEC 60093
- Inner measuring area:  $1963,5 \text{ mm}^2$  ( $\varnothing 50 \text{ mm}$ )
- Protection ring:  $\varnothing 80 \text{ mm AD}$ ,  $\varnothing 60 \text{ mm ID}$
- Resulting measuring gap: 5 mm
- Effective measuring area:  $23,76 \text{ cm}^2$
- Maximum measuring voltage: 500 V

**Other electrodes on request!**



#### Software

With the graphical user interface, under the operating systems Windows 95, Windows 98, Windows XP and Windows 2000 running, you can easily control and monitor your TO-3 from a PC. With the program you can identify all TO-3 integrated commands from the PC call. Furthermore you can run automatically different programmable measuring tasks (see application examples or simply save the measurement values as a text file.



## Technical data:

	TO-3 / Milli TO-3
Dimensions (W x H x D) (mm)	340 x 150 x 300
Weight (kg)	5,5
Max. permitted environmental conditions (°C / %rH)	15 ... 35 / max. 70
<b>Electrical data</b>	
Voltage ( $\pm 10\%$ ) 50 Hz (VAc)	190 ... 260
Power (W), approximately	20
Protection class / type:	1 / IP 40

# CTI Testing Instrument

## CTI-Testing Instrument CTI-4

CTI-Testing Instrument (Comparative Tracking Index) for tests according to DIN EN 60 112 / IEC 60 112 / or VDE 0303 part 1 and others.

The instrument used to determine the tracking resistance of solid electrical insulating materials according to DIN EN 60 112 / IEC 60 112 / or VDE 0303 Part 1. Checks will be made in accordance with the procedures KA (number of drops or depth of the slow lane) and KB (amount of voltage up to the 50th drop). The values determined are CTI (Comparative Tracking Index) and PTI (Proof Tracking Index). The instrument is designed to do very precise measurements, because of fine setting of test voltage, test current, switch-off time, drop size and number of drops. The device operates fully automatically. The test voltage is adjustable up to 600 V.

### Features:

- Testing instrument for the determining the relative resistance of solid electrical insulation materials against tracking
- Test according to DIN EN 60 112
- Determining the comparative tracking index and proof tracking index (CTI / PTI)
- Recruitment of test voltage, test current, switch-off, droplet size and number of drops
- Time interval 30 s
- Distance gauges, measuring glass, and the drip tray included



### Technical Data:

	CTI-4
Dimensions (W x H x D) (mm), approximately	900 x 1250 x 500
Weight (kg)	50
Max. permitted environmental conditions (°C / % rH)	15 ... 35 / max. 70
<b>Electrical Data</b>	
Voltage (±10 %) 50 Hz (VAc)	190 ... 260
Power (W), approximately	
Protection class / type:	1 / IP 40

## micro-gloss

Efficient gloss measurement makes your QC faster

The first micro-gloss became the industry standard in gloss measurement. The new micro-gloss combines the well known ease-of-use and protected calibration in the holder with a new and unique functionality – designed for today's QC standards.

### In the lab, in production, at the customer's ...

the micro-gloss is always ready, including calibration holder. Small as a digital camera – it is safe in your hand. Thanks to a well structured menu and a new scroll wheel the operation is easier than ever before.

### Features:

- Small and user-friendly – fits into a lab coat pocket even with the calibration holder
- Automatic calibration – ready to measure
- Single button calibration and menu guided operation make gloss measurement simple
- Single measurement and statistic mode incl. number of readings, mean and std. deviation
- High memory capacity: 999 readings
- Data transfer via USB and Bluetooth wireless interface technology
- easy-link Software included for professional documentation and further analysis in Excel®
- Traceable to BAM (Federal Institute of Material Research and Testing, Germany)
- Conform to following standards: ASTM D 523, D 2457, DIN 67530, ISO 2813, ISO 7668, JIS Z 8741



### Software:

#### Fast and professional documentation

Every measurement series can be saved under its own name. Input of sample names can be done quickly with the scroll wheel.

The included software easy-link allows direct data transfer to Excel® and your results are immediately shown in a professional QC-report.

Serial	Name	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	DL	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>
070	Standard green	69.337	-12.2961	-1.206	0	0	0	0
1	green M02	69.028	-12.4954	-1.3007	0.4679	-0.1053	0.3746	
2	green M03	69.0754	-12.4939	-1.3693	0.3624	-0.0879	0.327	
3	green M05	69.0445	-12.5198	-1.3513	0.4079	-0.0971	0.373	
4	green M06	69.0445	-12.5198	-1.3513	0.4156	-0.0852	0.3157	
5	green M08	69.0643	-12.5022	-1.1	0.5772	-0.1082	0.2854	
6	green M09	69.0754	-12.5048	-1.0169	0.377	-0.1081	0.2645	
7	green M10	69.0742	-12.5077	-1.0214	0.3772	-0.1088	0.2729	
8	green M11	69.0426	-12.5073	-1.0369	0.5137	-0.1952	0.3754	
9	green M12	69.0252	-12.5194	-0.8809	0.5488	-0.2223	0.3853	

# Gloss Meter



## Technical data:

	micro-gloss 20°	micro-gloss 60° / micro-gloss 60°S	micro-gloss 85°
<b>Dimensions</b>			
Width (mm)	155	155	155
Height (mm)	73	73	73
Depth (mm)	48	48	48
Weight (kg)	0,4	0,4	0,4
<b>Characteristics</b>			
Geometry	20°	60°	85°
Application	high gloss	medium gloss	low gloss
Measuring area (mm)	10 x 10 (20°)	9 x 15 (60°)	5 x 38 (85°)
Range (GU)	0 ... 2000 (20°)	0 ... 1000 (60°C)	0 ... 160 (85°)
Measuring time (s)	0.5	0.5	0.5
Repeatability			
Measuring range of 0 ... 100 GU (+/- GU)	0.2	0.2 / 0.1 (up to 10 GU)	0.2
Measuring range of 100 ... 2000 GU (+/- %)	0.2	0.2	0.2
Reproducibility			
Measuring range of 0 ... 100 GU (+/- GU)	0.5	0.5 / 0.2 (up to 10 GU)	0.5
Measuring range of 100 ... 2000 GU (+/- %)	0.5	0.5	0.5
<b>Software</b>			
Continuous	actual value, average, min., max.		
Difference and Pass / Fail	memory for 50 references with limits		
Statistics	number of readings per sample are selectable from 2 ... 99		
Display in 3 columns selectable	actual value, average, std. dev., min., max., range, difference, pass/fail		
Memory	999 readings with date and time, with recall function		
Interface and software	USB and Bluetooth (easy link incl.)		
Long term calibration	with automatic check of the calibration standard		
Language	English, Spanish, German, French, Italian, Japanese		
Auto shut-off time selectable (s)	10 ... 99		
Power supply	one 1,5 V - AA Alkaline Battery or external power		

## micro-TRI-gloss

Efficient gloss measurement makes your QC faster

The first micro-gloss became the industry standard in gloss measurement. The new micro-TRI-gloss combines the well known ease-of-use and protected calibration in the holder with a new and unique functionality – designed for today's QC standards.

### In the lab, in production, at the customer's ...

the micro-gloss is always ready, including calibration holder. Small as a digital camera – it is safe in your hand. Thanks to a well structured menu and a new scroll wheel the operation is easier than ever before.

### Recognize deviations from the specification – right away

20°, 60°, 85° in one – as handy as the one angle unit. Having three geometries in one unit allows you to be in compliance with international standards and to quickly recognize quality variations. All selected geometries are measuring at the same location and the results are displayed instantly – including Difference, Pass/Fail and Statistics. The micro-TRI-gloss has all functions of the new generation readily at hand.

### Features:

- Small and user-friendly – fits into a lab coat pocket even with the calibration holder
- Automatic calibration – ready to measure
- Single button calibration and menu guided operation make gloss measurement simple
- Single measurement and statistic mode incl. number of readings, mean and std. deviation
- High memory capacity: 999 readings
- Data transfer via USB and Bluetooth wireless interface technology
- easy-link Software included for professional documentation and further analysis in Excel®
- Traceable to BAM (Federal Institute of Material Research and Testing, Germany)
- Conform to following standards: ASTM D 523, D 2457, DIN 67530, ISO 2813, ISO 7668, JIS Z 8741



### Software:

#### Fast and professional documentation

Every measurement series can be saved under its own name. Input of sample names can be done quickly with the scroll wheel.

The included software easy-link allows direct data transfer to Excel® and your results are immediately shown in a professional QC-report.

Std	Name	L*	a*	b*	D50	Dp*	Dp*
0	Standard (mean)	69.277	-12.2941	-1.2902	0	0	0
1	1 gloss M022	69.025	-12.4964	-0.9007	0.8079	-0.1003	0.3946
2	2 gloss M024	69.0794	-12.4389	-0.9695	0.9024	-0.0879	0.327
3	3 gloss M026	69.0448	-12.3398	-0.9029	0.8079	-0.0071	0.3271
4	4 gloss M030	69.0425	-12.3328	-0.9086	0.4795	-0.0822	0.3157
5	5 gloss M033	69.0545	-12.0022	-1.1	0.0712	-0.1982	0.2869
6	6 gloss M039	69.0754	-12.0046	-1.0109	0.327	-0.1087	0.2645
7	7 gloss M050	69.0762	-12.0077	-1.0024	0.0712	-0.1882	0.2729
8	8 gloss M071	69.0405	-12.0513	-1.0809	0.0507	-0.1982	0.2724
9	9 gloss M072	69.0252	-12.0794	-0.9009	0.0488	-0.2222	0.3865

# Gloss Meter

## Technical data:

	<b>micro-TRI-gloss / micro-TRI-gloss S</b>
<b>Dimensions</b>	
Width (mm)	155
Height (mm)	73
Depth (mm)	48
Weight (kg)	0,4
<b>Characteristics</b>	
Geometry	20° / 60° / 85°
Application	universal
Measuring area (mm)	10 x 10 (20°) 9 x 15 (60°) 5 x 38 (85°)
Autorange (GU)	0 ... 2000 (20°) 0 ... 1000 (60°) 0 ... 160 (85°)
Measuring time (s)	0.5
Repeatability	
Measuring range 0 - 10 GU (+/- GU)	0.2 / 0.1
Measuring range 0 - 100 GU (+/- GU)	0.2
Measuring range 0 - 2000 GU (+/- %)	0.2
Reproducibility	
Measuring range 0 - 10 GU (+/- GU)	0.5 / 0.2
Measuring range 0 - 100 GU (+/- GU)	0.5
Measuring range 0 - 2000 GU (+/- %)	0.5
<b>Software</b>	
Continuous	actual value, average, min., max.
Difference and Pass / Fail	memory for 50 references with limits
Statistics	number of readings per sample are selectable from 2 ... 99
Display in 3 columns selectable	actual value, average, std. dev., min., max., range, difference, pass/ fail
Memory	999 readings with date and time, with recall function
Interface and software	USB and Bluetooth (easy link incl.)
Long term calibration	with automatic check of the calibration standard
Language	English, Spanish, German, French, Italian, Japanese
Auto shut-off time selectable (s)	10 ... 99
Power supply	one 1,5 V - AA Alkaline Battery or external power

## micro-gloss 45

Specialized for gloss measurement of ceramics, plastics and plastic films

The first micro-gloss became the industry standard in gloss measurement. The micro-gloss combines the well known ease-of-use and protected calibration in the holder with a new and unique functionality – designed for today's QC standards.

### In the lab, in production, at the customer's ...

the micro-gloss is always ready, including calibration holder. Small as a digital camera – it is safe in your hand. Thanks to a well structured menu, which makes the operation easier than ever before.

### Features:

- Small and user-friendly – fits into a lab coat pocket even with the calibration holder
- Automatic calibration – ready to measure
- Single button calibration and menu guided operation make gloss measurement simple
- Single measurement and statistic mode incl. number of readings, mean and std. deviation
- High memory capacity: 999 readings
- Data transfer via USB or Bluetooth wireless interface technology
- easy-link Software included for professional documentation and further analysis in Excel®
- Long battery life – up to 10000 readings
- Traceable to BAM (Federal Institute of Material Research and Testing, Germany)
- Conform to following standards: ASTM C 346, D 2457, D 3679, JIS Z 8741, Tappi T 480



### Technical data:

	micro-gloss 45
<b>Dimensions</b>	
Width (mm)	155
Height (mm)	73
Depth (mm)	48
Weight (kg)	0.4
<b>Characteristics</b>	
Geometry	45°
Application	Film
Measuring area (mm)	9 x 13
Range (GU)	0 - 180
Repeatability (GU)	0.2
Reproducibility (GU)	0.5

# Haze Meter

## haze-gard *plus*

The Objective Standard for a Clear View

The haze-gard plus quantifies the visual perception with objective measurement data. All essential criteria for transparency can be measured with one instrument:

- Total transmittance
- Transmission haze
- See-through quality

### Features:

- The Industry Standard according to ASTM
- Reference beam, self-diagnosis, and enclosed optics guarantee accurate readings – any time
- Built-in statistics with average, standard deviation, coefficient of variance, and min/max
- Single measurement and statistic mode incl. number of readings, mean and std. deviations
- Large storage capacity and data transfer to a printer or PC for professional documentation
- RS 232 interface allows you to transfer data to a PC or printer
- Open sample area for small and large specimens
- Foot switch and automatic measurement allow handsfree operation



### Technical data:

	<b>haze-gard <i>plus</i></b>
<b>Dimensions</b>	
Width (mm)	670
Height (mm)	360
Depth (mm)	240
Weight (kg)	18
<b>Characteristics</b>	
Measurement area (mm)	18
Sample port (mm)	25.4
Measuring range (%)	0 ... 100
Repeatability (units)	+/- 1
Reproducibility (units)	+/- 4
Geometry	0°/diffuse
Illuminant C	general purpose
Memory (values)	7 x 999
Interface	RS 232
<b>Electrical data</b>	
Nominal voltage (±10 %) 50/60 Hz (V)	230 / 115
Nominal power (VA)	200

## spectro-guide

Total Appearance Control - color and gloss in one unit.

The overall appearance of a product is influenced by color and gloss. A sample of the same color but higher gloss level is visually perceived darker and more saturated than a low gloss sample. In order to get a uniform appearance, both attributes need to be controlled. The spectro-guide is unique as it measures both attributes simultaneously. Thus, the cause of a mismatch can be clearly defined in any situation.

### Easy to use and handle

The spectro-guide makes quality control simple and secure - even for color beginners. Thanks to the intuitive pull down menu and the four-cursor button operation quality control has never been easier.

### Highly repeatable on textured surfaces

The key criterion for a 45/0 instrument is a circumferential illumination. spectro-guide 45/0 is using a unique, patented measurement principle to achieve a 100% circumferential illumination. A white coated hemisphere acts as a mixing chamber and guarantees completely uniform illumination. Thus, any influence of measurement direction is eliminated and excellent repeatability even on highly textured surfaces is guaranteed.

### Always precise color values

With the new spectro-guide you can measure any color: dark - brilliant - steep reflectance curves.

The 10 nm spectral resolution not only ensures highly precise color results, but also an excellent agreement with competitive color instruments - even bench-top units.

Additionally, a patented illumination control provides temperature independent results - also in extreme conditions.

### Features:

- Color (45/0 or sphere) and 60° gloss are displayed at the same time
- In compliance with international specifications
- DIN approval for gloss measurement
- Light weight and small size-weighs only 500 g
- Ergonomic design - can easily measure difficult to access areas
- Long lasting standard AA batteries - up to 8,000 readings per set
- 10 years warranty on the light source - no lamp charges needed
- Rugged and compact design
- Stable, long-term calibration - needed only every three months



### Standards:

- ASTM D 523, ASTM D 2457, ASTM D 2244, ASTM E 308 and ASTM E 1164
- DIN 67630, DIN 5033, DIN 5036, DIN 6147 and DIN EN ISO 2813
- EN ISO 7668 and ISO 7724

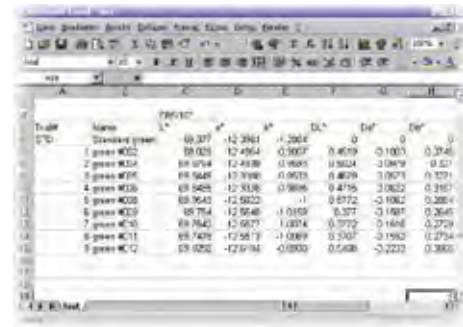
# Color Meter

## Software:

### Professional Documentation with easy-link

ISO 9000 requires documentation of color data. easy-link, included with spectro-guide, offers all of the necessary tools:

- Easy and direct data transfer from the instrument to Excel®
- Predefined QC-report templates (Lab-plot, trend graphs, etc.) are included
- All relevant quality data can be easily summarized in one report: Color/Gloss/Film thickness
- Easy management of your standards



## Technical data:

	spectro-guide gloss / spectro guide gloss S
<b>Dimensions</b>	
Width (mm)	95
Height (mm)	80
Depth (mm)	180
Weight (kg)	0,5
<b>Characteristics Color</b>	
Spectral range (nm)	400 ... 700
Spectral interval (nm)	10
Repeatability	0.01 $\Delta E^*$ , 1 $\sigma$
Reproducibility	0.2 $\Delta E^*$ , 1 $\sigma$
Color system	CIELab/Ch; Lab(h); XYZ; Yxy
Color differences	$\Delta E^*$ ; $\Delta E(h)$ ; $\Delta E_{FMC2}$ ; $\Delta E_{94}$ ; $\Delta E_{CMC}$ ; $\Delta E_{99}$ ; $\Delta E_{2000}$ YIE313; YID1925; WIE313; CIE; Berger; Color strength; Opacity; Metamerism
Indices	
Illuminants	A; C; D50; D55; D65; D75; F2; F6; F7; F8; F10; F11; UL30
Observer	2°; 10°
<b>Characteristics Gloss</b>	
Gloss range	0 - 180 GU
Repeatability	0.2 GU / 0.1 (0 - 10 GU)
Reproducibility	1.0 GU / 0.5 (0 - 10 GU)
<b>Software</b>	
Memory	200 Standards, 999 Samples
Languages	English; German; French; Italian; Spanish; Japanese
Interface and software	serial RS 232 (easy link incl.)
<b>Power supply</b>	one 1,5 V - AA Alkaline Battery (10,000 readings) or external power

## Light booth Series CM

Colors appear differently under different lighting conditions. Use of a light booth to simulate different lighting conditions will help to obtain an objective assessment of color, anytime, anywhere. We offer a light booth which creates defined lighting conditions independently of location and environmental influences.

### Features:

- Comparison of standard and sample in a color-neutral environment
- Five different controlled light sources
- Viewing under ultraviolet light to detect and evaluate optical brighteners or fluorescent pigments
- Addition of UV light to daylight or fluorescent light better approximates standard illuminants
- No warm-up time or flickering which ensures quick and reliable color judgement
- Economic power consumption and low heat generation for high light efficiency
- Diffusing panel to eliminate direct reflection
- Comfortable testing in a compact design – for laboratory and production
- Complies to ASTM D 1729



### Technical data:

	CM 20	CM 25	CM 30	CM mini 1	CM mini 2	CM mini 4
<b>Dimensions</b>						
Outer dimensions (HxWxD) in cm	63 x 76 x 55	79 x 107 x 68	91 x 137 x 80	48 x 67 x 42	46 x 52 x 34	48 x 67 x 48
Viewing area (HxWxD) in cm	48 x 71 x 51	64 x 102 x 64	76 x 132 x 76	36 x 61 x 34	33 x 46 x 25	36 x 61 x 41
Weight (kg)	32	44	70	14	10	17
<b>Light sources</b>						
D 65 or D 50 or D 75 <sup>1)2)</sup>	•	•	•	•	•	•
Store light TL 84 or CWF <sup>1)</sup>	•	•	•	•	•	•
Home light A	•	•	•	•	•	•
UV-Light (UVA BLB)	•	•	•	○	○	•
Optionally	D50, 30U, TL84 or TL83	D50, 30U, TL84 or TL83	D50, 30U, TL84 or TL83	-	-	D50, 30U, TL84 or TL83
<b>Electrical data</b>						
Power (W)	225	602	788	225	602	788
Nominal voltage (±10 %) 50/60 Hz (V)	230 or 115	230 or 115	230 or 115	230 or 115	230 or 115	230 or 115
• (Standard)						
○ (optional available)						

<sup>1)</sup> pls. mention when ordering, <sup>2)</sup> only available for CM 20, 25 or 30



# Flammability Chamber

## Flammability Chamber according FMVSS 302 and DIN 75200

Horizontal flammability chamber for the determination of comparative burn rates of cloth, including pile and napped cloth. It is used world wide to qualify the burn resistance of automotive interior materials according to Society of Automotive Engineers (SAE). The combustion chamber is made of high-grade steel material with heat-resistant pane of glass for the examination of the rate of combustion according to DIN 75200, FMVSS 302 and others.

### Features:

- Stainless steel cabinet
- Specimen frame type A and B included
- Side access door with observation window
- Gas burner with needle valve for flame adjustment for propan or butan gas (has to be specified when ordering)
- Specimen holder assembly
- Specimen frame according VW TL 1010 and Porsche PTL 8501 optional available



### Technical data:

	Flammability Chamber
<b>Dimensions</b>	
Width (mm)	500
Height (mm)	385
Depth (mm)	245
Weight (kg) approximately	22
<b>Characteristics</b>	
Burner for the use with	propan or butan gas
Chamber made of	stainless steel (V4A)

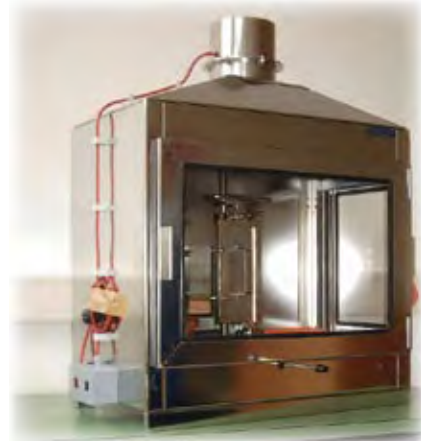
# Flammability Chamber

## Flammability Chamber acc. to DIN 4102 B2 and DIN 53438

The flammability chamber is designed for the flammability testing of plastic materials used in electric devices or other appliances. The chamber is made of stainless steel including and large heat-resistant window for the examination of the rate of combustion according to DIN 4102 B2, DIN 53438 and others. The chamber includes an adjustable specimen support as well as a high precision gas burner.

### Features:

- Bench mounted stainless steel chamber
- Adjustable specimen support
- Adjustable burner angle
- Different specimen fixtures / holders available
- Integrated exhaust fan
- Heat resistant window
- Front access
- Precise gas control system
- Flame height indicator



### Technical data:

#### Dimensions

Width (mm)

#### Flammability Chamber

730

Height (mm)

950

Depth (mm)

450

Weight (kg) approx.

65

#### Electrical data

Nominal voltage (VAc), 50 Hz

90 ... 265



# Flammability Chamber



## Flammability Chamber according to UL 94

Flammability chamber made of high-grade stainless steel material with heat-resistant glass door for the examination of the rate of combustion according to UL 94, ASTM D635, D3801, D4804, D5048, D4986, IEC 60695-11-10 (replaces ISO 1210), IEC 60695-11-20 (replaces ISO 10351), IEC 707 (partial); ISO 9772 and ISO 9773.

### Features:

- High-polished chamber made of stainless steel
- Burner with sliding device and angle adjustment
- Flame ignition safety device
- Positioning device for specimen and burner for horizontal and vertical burning tests
- Specimen holder for 5 different test applications
- Timer (0,2 ... 100 sec.)
- Gas flow thru controller
- Exhaust fan



### Technical data:

#### UL94 Flammability Chamber

#### Dimensions

Width (mm)	1500
Height (mm)	1500
Depth (mm)	600
Inside Volume (m <sup>3</sup> )	ca. 0,86
Usable inside dimension (mm)	1200 x 600 x 1060
Weight (kg) approximately	200

#### Characteristics

Horizontal adjustment range of specimen holder (mm)	840
Vertical adjustment range of specimen holder (mm)	730
Horizontal adjustment range of burner (mm)	240
Burner angle adjustment	0° - 20° - 45°

#### Instrument connections

Gas	Methane
Purity	> 98%
Pipe/Hose connection (mm)	Ø 6
Exhaust air connection (mm)	Ø 97
Volume flow exhaust ventilation (m <sup>3</sup> /h)	170

#### Electrical data

Nominal voltage (VAc)	230/50 Hz or 115 V/60Hz (pls. specify when ordering)
Power (W)	400

## Glow Wire Testing Instrument Type GDP

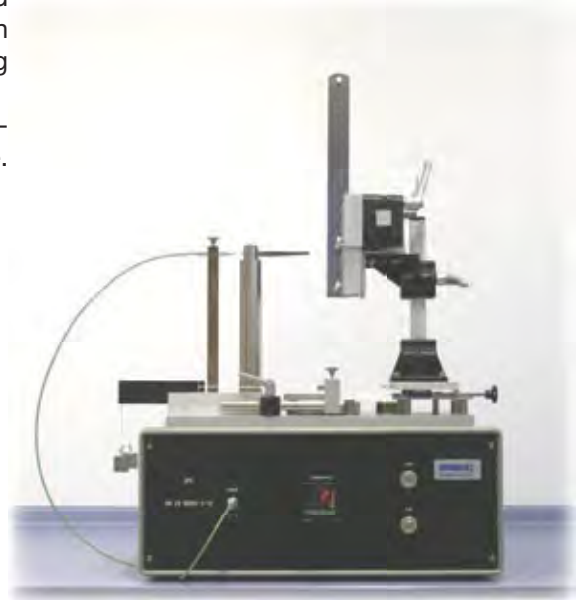
according to DIN EN 60695-2-10, VDE 0471 and IEC 695/2-1

The glow wire testing instrument is designed to simulate the effect of thermal stresses on solid combustible materials, materials used for electrical insulation or materials used in electronic equipment. In reality, these thermal stresses can be produced by different kind of heat sources, e. g. glowing elements or overloaded resistors.

The instrument uses a glow wire, which is a specified resistance wire, electrically heated to a defined temperature.

### Features:

- Adjustable specimen support, traverse unit
- Precise electronic regulator with fuzzy-self controller to optimize temperature stability
- Fixed speed of 11 mm/s
- Temperature range up to 1000°C
- Constant load of 1 N during test
- Scale for flame height and glow wire depth



### Technical data:

	Glow Wire Testing Instrument GDP
<b>Dimensions</b>	
Width (mm)	500
Height (mm) approximately	500
Depth (mm)	400
Weight (kg) approximately	30
<b>Electrical data</b>	
Nominal voltage (VAc), 50 Hz	230

# Drying Ovens

## ED series: Drying ovens with natural convection

Reliable drying tasks, precise warm storage.



### Features / Equipment:

- Electronically-controlled APT.line® preheating chamber technology with natural convection
- Temperature range from 5 °C above ambient temperature to 300 °C
- DS-controller with integrated timer 0 to 99 hours
- Digital temperature setting with degree accuracy
- One ramp function
- Adjustable safety device, Class 2 (DIN 12880), with visual temperature alarm
- Adjustable ventilation by means of rear exhaust duct Ø 50 mm with ventilation flap and front ventilation slide
- 2 chrome-plated shelves
- Units up to 115 liters are stackable
- Optional RS 422 interface for communication software APT-COM® DataControlSystem



## Technical data:

	ED 23	ED 53	ED 115	ED 240	ED 400	ED 720
<b>Exterior dimensions</b>						
Width (mm)	433	634	834	1034	1234	1234
Height (inclusive feet/castors) (mm)	492	617	702	822	1022	1528
Depth (mm)	516	575	645	745	765	865
plus door handle, I-panel and exhaust duct (mm)	105	105	105	105	105	105
Wall clearance rear (mm)	100	100	100	100	100	100
Wall clearance side (mm)	100	160	160	160	160	160
Exhaust duct outer- Ø (mm)	52	52	52	52	52	52
Steam space volume (l)	36	70	142	283	457	808
<b>Interior dimensions</b>						
Width (mm)	222	400	600	800	1000	1000
Height (mm)	330	400	480	600	800	1200
Depth (mm)	277	330	400	500	500	600
Interior volume (l)	20	53	115	240	400	720
Shelves, chrome-plated (number standard/max.)	2/3	2/5	2/6	2/7	2/10	2/16
Load per shelf (kg)	12	15	20	30	35	45
Permitted total load (kg)	25	40	50	70	90	120
Weight (empty) (kg)	22	42	57	86	125	174
<b>Temperature data</b>						
Temperature range from 5 °C above ambient up to °C	300	300	300	300	300	300
Temperature variation <sup>1)</sup> at 70 °C (± K)	1,5	2	1,5	1,5	1,7	1,5
Temperature variation <sup>1)</sup> at 150 °C (± K)	2,5	3,2	2,5	2,5	3	2,8
Temperature variation <sup>1)</sup> at 300 °C (± K)	3,8	4,5	4,5	5,0	5,0	5,0
Temperature fluctuation (± K)	0,3	0,3	0,3	0,3	0,3	0,3
Heating-up time <sup>2)</sup> to 70 °C (Min.)	13	14	15	40	49	56
Heating-up time <sup>2)</sup> to 150 °C (Min.)	24	27	29	48	62	69
Heating-up time <sup>2)</sup> to 250 °C (Min.)	35	61	66	61	74	80
Recov. time after door was open for 30 sec. <sup>2)</sup> at 70°C (min.)	2,5	2	2	5	4	4
Recov. time after door was open for 30 sec. <sup>2)</sup> at 150°C (min.)	5	6	9	13	20	14
Recov. time after door was open for 30 sec. <sup>2)</sup> at 300°C (min.)	8	11	14	18	24	18
Air change at 150 °C (x/h)	13	19	10	10	10	9
<b>Electrical data</b>						
Housing protection acc. to EN 60529	IP 20	IP 20	IP 20	IP 20	IP 20	IP 20
Nominal voltage (±10 %) 50/60 Hz (V)	230	230	230	230	400	400
Nominal power (W)	800	1200	1600	2700	3400	5000
Energy consumption at 70 °C (W)	43	60	90	143	201	220
Energy consumption at 150 °C (W)	148	210	300	447	672	750
Energy consumption at 300 °C (W)	450	600	360	700	1000	1200
Number of doors	1	1	1	2	2	2

1) value without window

2) to 98 % of the set value

All technical data are specified for units with standard equipment at an ambient temperature of 20 °C and a line voltage fluctuation of ±10%. The temperature data is determined in accordance to factory standard following DIN 12880, respecting the recommended wall clearances of 10% of the height, width and depth of the inner chamber. All figures are typical average values for series devices. We reserve the right to alter technical specifications at any time.

# Heating Ovens

## FD series: Heating ovens with forced air convection

Heating-/Drying tasks with reduced processing times.



### Features / Equipment:

- Electronically controlled APT.line™ preheating chamber assuring temperature accuracy and reproducible results
- Temperature range from 5 °C above ambient temperature to 300 °C
- DS control with integrated timer 0 to 99 hrs
- Digital temperature setting with an accuracy of one degree
- Independent adjustable temperature safety device class 2 (DIN 12880), with visual temperature alarm
- Adjustable ventilation by means of front ventilation flap slide and rear exhaust Ø 50 mm
- Units up to 115 liters are stackable
- 2 chrome-plated racks included



**Technical data:**

	FD 23	FD 53	FD 115	FD 240
<b>Exterior dimensions</b>				
Width (mm)	433	634	834	1034
Height (inclusive feet/castors) (mm)	492	617	702	822
Depth (mm)	516	575	645	745
plus door handle, I-panel and exhaust duct (mm)	85	105	105	105
Wall clearance rear (mm)	100	100	100	100
Wall clearance side (mm)	100	160	160	160
Exhaust duct outer- Ø (mm)	52	52	52	52
Steam space volume (l)	36	77	158	308
<b>Interior dimensions</b>				
Width (mm)	222	400	600	800
Height (mm)	330	400	480	600
Depth (mm)	277	330	400	500
Interior volume (l)	20	53	115	240
Shelves, chrome-plated (number standard/max.)	2/3	2/5	2/6	2/7
Load per shelf (kg)	12	15	20	30
Permitted total load (kg)	25	40	50	70
Weight of the unit (empty) (kg)	33	44	62	96
<b>Temperature data</b>				
Temperature range, 5°C above ambient up to °C	300	300	300	300
Temperature variation <sup>1)</sup> at 70 °C (± K)	0,8	0,8	0,8	0,8
Temperature variation <sup>1)</sup> at 150 °C (± K)	2,2	2	1,8	2
Temperature variation <sup>1)</sup> at 300 °C (± K)	4,3	3,7	3,9	4,3
Temperature fluctuation (± K)	0,3	0,3	0,3	0,3
Heating-up time <sup>2)</sup> to 70 °C (Min.)	7	7	7	11
Heating-up time <sup>2)</sup> to 150 °C (Min.)	22	24	28	24
Heating-up time <sup>2)</sup> to 300 °C (Min.)	45	60	49	50
Recov. time after door was opened for 30 sec. <sup>2)</sup> at 70 °C (Min.)	2	2	2	2
Recov. time after door was opened for 30 sec. <sup>2)</sup> at 150 °C (Min.)	4	5	5	6
Recov. time after door was opened for 30 sec. <sup>2)</sup> at 300 °C (Min.)	9	9	12	13
Airchange at 150 °C (x/h)	64	64	32	20
<b>Electrical data</b>				
housing protection acc. to EN 60529	IP 20	IP 20	IP 20	IP 20
Nominal voltage (±10 %) 50/60 Hz (V)	230	230	230	230
Nominal power (W)	800	1200	1600	2700
Energy consumption at 70 °C (W) at 70°C	145	172	230	370
Energy consumption at 150 °C (W) at 70°C	300	429	544	850
Energy consumption at 300 °C (W) at 70°C	720	951	1100	1400
Number of doors	1	1	1	2

1) value without window

2) to 98 % of the set value

All technical data are specified for units with standard equipment at an ambient temperature of 20 °C and a line voltage fluctuation of ±10%. The temperature data is determined in accordance to factory standard following DIN 12880, respecting the recommended wall clearances of 10% of the height, width and depth of the inner chamber. All figures are typical average values for series devices. We reserve the right to alter technical specifications at any time.

# Heating Ovens

## FED series: Heating ovens with forced air convection and multifunctional control

Universal performance for high-precision thermal processing via expanded time functions, including standard APT-COM® DataControlSystem interface.



### Features / Equipment:

- Electronically controlled APT.line™ preheating chamber assuring temperature accuracy and reproducible results
- Temperature range from 5 °C above ambient temperature to 300 °C
- MS controller with several timer functions
- Controller timer functions: delayed ON, delayed OFF, temperature dependent delayed OFF
- Adjustable fan speed
- Adjustable ventilation by means of front ventilation flap slide and rear exhaust 50 mm
- Independent adjustable temperature safety device class 2 (DIN 12880), with visual temperature alarm
- RS 422 interface for use with APT-COM™ DataControlSystem communication software or switch over to printer output with RS 232 / RS 422 interface converter
- Units up to 115 liters are stackable
- 2 chrome-plated racks included



**Technical data:**

	FED 53	FED 115	FED 240	FED 400	FED 720
<b>Exterior dimensions</b>					
Width (mm)	634	834	1034	1234	1234
Height (inclusive feet/castors) (mm)	617	702	822	1022	1528
Depth (mm)	575	645	745	765	865
plus door handle, l-panel and exhaust duct (mm)	105	105	105	105	105
Wall clearance rear (mm)	100	100	100	100	100
Wall clearance side (mm)	160	160	160	160	160
Exhaust duct outer- Ø (mm)	52	52	52	52	52
Steam space volume (l)	77	158	308	498	869
<b>Interior dimensions</b>					
Width (mm)	400	600	800	1000	1000
Height (mm)	400	480	600	800	1200
Depth (mm)	330	400	500	500	600
Interior volume (l)	53	115	240	400	720
Shelves, chrome-plated (number standard/max.)	2/5	2/6	2/7	2/10	2/15
Load per shelf (kg)	15	20	30	35	45
Permitted total load (kg)	40	50	70	90	120
Weight (empty) (kg)	44	62	96	145	195
<b>Temperature data</b>					
Temperature range, 5°C above ambient up to °C	300	300	300	300	300
Temperature variation <sup>1)</sup> at 70 °C (± K)	0,8	0,7	0,8	1	1
Temperature variation <sup>1)</sup> at 150 °C (± K)	2	1,8	2	2,5	2
Temperature variation <sup>1)</sup> at 300 °C (± K)	3,7	3,9	4,3	4,8	5,5
Temperature fluctuation (± K)	0,3	0,3	0,3	0,3	0,3
Heating-up time <sup>2)</sup> to 70 °C (Min.)	6	7	12	18	25
Heating-up time <sup>2)</sup> to 150 °C (Min.)	24	30	27	35	39
Heating-up time <sup>2)</sup> to 250 °C (Min.)	45	49	50	60	65
Recov. time after door was opened for 30 sec. <sup>2)</sup> at 70 °C (Min.)	2	2	2	2	2
Recov. time after door was opened for 30 sec. <sup>2)</sup> at 150 °C (Min.)	5	8	10	17	20
Recov. time after door was opened for 30 sec. <sup>2)</sup> at 300 °C (Min.)	10	15	16	21	24
Air change at 150 °C (x/h)	43	32	20	18	12
<b>Electrical data</b>					
Housing protection acc. to EN 60529	IP 20	IP 20	IP 20	IP 20	IP 20
Nominal voltage (± 10%) 50/60 Hz (V)	230	230	230	400	400
Nominal power (W)	1200	1600	2700	3400	5000
Energy consumption at 70 °C (W)	162	230	370	520	570
Energy consumption at 150 °C (W)	397	544	850	1200	1320
Energy consumption at 300 °C (W)	933	1100	1400	2340	2600
Number of doors	1	1	2	2	2

1) value without window

2) to 98 % of the set value

All technical data are specified for units with standard equipment at an ambient temperature of 20 °C and a line voltage fluctuation of ±10%. The temperature data is determined in accordance to factory standard following DIN 12880, respecting the recommended wall clearances of 10% of the height, width and depth of the inner chamber. All figures are typical average values for series devices. We reserve the right to alter technical specifications at any time.

# Heating Ovens

## FP series:

### High precision temperature test chamber for thermal cycling

FP series chambers are designed for the most demanding test applications and are particularly effective thanks to their extensive programming abilities. Forced convection provides extra efficiency and reliably facilitates increased drying performance as well as extra rapid heating-up, even with fully loaded chamber.



#### Features / Equipment:

- Electronically controlled APT.line™ preheating chamber assuring temperature accuracy and reproducible results
- Temperature range from 5 °C above ambient temperature to 300 °C
- MP controller with 2 programs with 10 sections each, or alternatively 1 program with 20 sections
- The time of an individual program step can be set to max. 99.59 hours or 999.59 hours. This adjustment applies to all program sections
  - \* Integrated weekly program timer with real-time function
  - \* Adjustable ramp function via program editor
- Digital temperature setting with an accuracy of one degree
- Adjustable fan speed
- Adjustable ventilation by means of front ventilation flap slide and rear exhaust 50 mm
- Elapsed time indicator
- Independent adjustable temperature safety device class 2 (DIN 12880), with visual temperature alarm
- RS 422 interface for use with APT-COM™ DataControlSystem communication software or switch over to printer output with RS 232 / RS 422 interface converter
- Units up to 115 liters are stackable
- 2 chrome-plated racks included



## Technical data:

	FP 53	FP 115	FP 240	FP 400	FP 720
<b>Exterior dimensions</b>					
Width (mm)	634	834	1034	1234	1234
Height (inclusive feet/castors) (mm)	617	702	822	1022	1528
Depth (mm)	575	645	745	765	865
plus door handle, I-panel and exhaust duct (mm)	105	105	105	105	105
Wall clearance rear (mm)	100	100	100	100	100
Wall clearance side (mm)	160	160	160	160	160
Exhaust duct outer- Ø (mm)	52	52	52	52	52
Steam space volume (l)	77	158	308	498	869
<b>Interior dimensions</b>					
Width (mm)	400	600	800	1000	1000
Height (mm)	400	480	600	800	1200
Depth (mm)	330	400	500	500	600
Interior volume (l)	53	115	240	400	720
Shelves, chrome-plated (number standard/max.)	2/5	2/6	2/7	2/10	2/15
Load per shelf (kg)	15	20	30	35	45
Permitted total load (kg)	40	50	70	90	120
Weight (empty) (kg)	45	62	98	145	184
<b>Temperature data</b>					
Temperature range, 5°C above ambient up to °C	300	300	300	300	300
Temperature variation <sup>1)</sup> at 70 °C (± K)	0,8	0,7	0,8	1	1
Temperature variation <sup>1)</sup> at 150 °C (± K)	2	1,8	2	2,5	2
Temperature variation <sup>1)</sup> at 300 °C (± K)	3,7	3,9	4,3	4,8	5,5
Temperature fluctuation (± K)	0,3	0,3	0,3	0,3	0,3
Heating-up time <sup>2)</sup> to 70 °C (Min.)	6	7	12	18	25
Heating-up time <sup>2)</sup> to 150 °C (Min.)	24	30	27	35	39
Heating-up time <sup>2)</sup> to 250 °C (Min.)	45	49	50	60	65
Recov. time after door was opened for 30 sec. <sup>2)</sup> at 70 °C (Min.)	2	2	2	2	2
Recov. time after door was opened for 30 sec. <sup>2)</sup> at 150 °C (Min.)	5	8	10	17	20
Recov. time after door was opened for 30 sec. <sup>2)</sup> at 300 °C (Min.)	10	15	16	21	24
Air change at 150 °C (x/h)	64	32	20	18	12
<b>Electrical data</b>					
Housing protection acc. to EN 60529	IP 20	IP 20	IP 20	IP 20	IP 20
Nominal voltage (± 10%) 50/60 Hz (V)	230	230	230	400	400
Nominal power (W)	1200	1600	2700	3400	5000
Energy consumption at 70 °C (W)	145	230	370	520	570
Energy consumption at 150 °C (W)	300	544	850	1200	1320
Energy consumption at 300 °C (W)	720	1100	1400	2340	2600
Number of doors	1	1	2	2	2

1) value without window

2) to 98 % of the set value

All technical data are specified for units with standard equipment at an ambient temperature of 20 °C and a line voltage fluctuation of ±10%. The temperature data is determined in accordance to factory standard following DIN 12880, respecting the recommended wall clearances of 10% of the height, width and depth of the inner chamber. All figures are typical average values for series devices. We reserve the right to alter technical specifications at any time.

# Safety Drying Ovens

## FDL 115 series: Drying lacquer safely

The FDL series meets all requirements and standards for working with solvent-based materials pursuant to EN 1539. It is also fully compliant with ISO 3215. Symmetrical airflow with defined flow velocities provide reproducible results and exact definition of non-volatile components. In short: The perfect environment for painted surfaces, provided by a silicone and dust-free interior and a replaceable filter cartridge with significantly increased removal efficiency.

### Features / Equipment:

- Electronically controlled APT.line™ preheating chamber assuring temperature accuracy and reproducible results
- All safety features met according to EN 1539
- Temperature range from 5 °C above ambient temperature to 300 °C
- MP controller with 2 programs with 10 sections each, or alternatively one program with 20 sections
- The time of an individual program step can be set to max. 99.59 hours or 999.59 hours. This adjustment applies to all program sections.
  - \* Integrated weekly program timer with real-time function
  - \* Adjustable ramp function via program editor
  - \* Digital temperature setting with an accuracy of one degree
- Adjustable fan speed
- Adjustable ventilation by means of front ventilation flap slide and rear exhaust 50 mm
- Elapsed time indicator
- Independent adjustable temperature safety device class 2 (DIN 12880), with visual temperature alarm
- RS 422 interface for use with APT-COM™ DataControlSystem communication software or switch over to printer output with RS 232 / RS 422 interface converter
- Units up to 115 liters are stackable
- 2 chrome-plated racks included



## Technical data:

	FDL115
<b>Exterior dimensions</b>	
Width (mm)	834
Height (inclusive feet/castors) (mm)	800
Depth (mm)	685
plus door handle (mm)	50
Wall clearance rear (mm)	100
Wall clearance side (mm)	100
Exhaust duct outer- Ø (mm)	100
Steam space volume (l)	156
<b>Interior dimensions</b>	
Width (mm)	600
Height (mm)	435
Depth (mm)	435
Interior volume (l)	115
Shelves, chrome-plated (number standard/max.)	2/5
Load per shelf (kg)	20
Permitted total load (kg)	50
Weight (empty) (kg)	90
<b>Temperature data</b>	
Temperature range, 5°C above ambient up to °C	300
Temperature variation at 70 °C (± K)	1,5
Temperature variation at 150 °C (± K)	2,5
Temperature variation at 300 °C (± K)	4
Temperature fluctuation (± K)	0,3
Heating-up time <sup>2)</sup> at 70 °C (Min.)	7
Heating-up time <sup>2)</sup> at 150 °C (Min.)	17
Heating-up time <sup>2)</sup> at 300 °C (Min.)	44
Recov. time after door was opened for 30 sec. <sup>2)</sup> at 70 °C (Min)	1
Recov. time after door was opened for 30 sec. <sup>2)</sup> at 150 °C (Min)	3
Recov. time after door was opened for 30 sec. <sup>2)</sup> at 300 °C (Min)	6
Air change (approx. x/min.)	3
Air circulation (approx. x/min.)	40
Exhaust air volume flow (approx. L/Min., m <sup>3</sup> /h)	400 (24,0)
Air flow velocity (m/sec)	0,8-1,2
Highest permitted solvent quantity (g) <sup>1)</sup> (at T-180°C, M-100g/mol, U-40g/m <sup>3</sup> , K=0,5)	6,65
<b>Electrical data</b>	
Housing protection acc. to EN 60529	IP 33
Nominal voltage (+10 %) 50/60 Hz (V)	230
Nominal power (W)	2900
Energy consumption at 150 °C (W)	1098

1) T = drying temperature, M = molecular mass, U = lower explosion limit, K = solvent vapor concentration as percentage of lower explosion limit  
2) to 98 % of the set value

# Heating-/Ageing Ovens

## M series: Precise and programmable temperature tests

Chambers of this series are ideal for applications related to materials testing and aging tests up to 300 °C. An extra heavy-duty air turbine and the programmable exhaust ventilation flap provide rapid heating-up times and ensure that the required test temperature is maintained absolutely accurate, as never before, with minimal spatial fluctuations.



### Features / Equipment:

- Electronically controlled APT.line™ preheating chamber assuring temperature accuracy and reproducible results
- Temperature range from 5 °C above ambient temperature to 300 °C
- MCS controller with 25 storable programs of 100 sections each for a maximum of 500 program segments
- User-friendly LCD screen
  - \* Easy-to-read menu guide
  - \* Integrated electronic chart recorder
  - \* Variety of options for the graphic display of process parameters
  - \* Real-time clock
- Adjustable ramp function via program editor
- Program-controlled ventilation flap
- High air-exchange rate through high-performance fan
- Adjustable fan speed
- Exhaust duct Ø 50 mm
- Independent adjustable temperature safety device class 2 (DIN 12880), with visual temperature alarm
- RS 422 interface for communication software APT-COM™ DataControlSystem
- Units up to 115 liters are stackable
- 2 chrome-plated racks included



# Heating-/Ageing Ovens

## Technical data:

	M 53	M 115	M 240	M 400	M 720
<b>Exterior dimensions</b>					
Width (mm)	634	834	1034	1234	1234
Height (inclusive feet/castors) (mm)	779	863	984	1184	1692
Depth (mm)	575	645	745	765	865
plus door handle and exhaust duct (mm)	150	150	150	150	150
Wall clearance rear (mm)	100	100	100	100	100
Wall clearance side (mm)	160	160	160	160	160
Exhaust duct outer- Ø (mm)	52	52	52	52	52
Steam space volume (l)	77	158	308	498	869
<b>Interior dimensions</b>					
Width (mm)	400	600	800	1000	1000
Height (mm)	400	480	600	800	1200
Depth (mm)	330	400	500	500	600
Interior volume (l)	53	115	240	400	720
Shelves, chrome-plated (number standard/max.)	2/5	2/6	2/7	2/10	2/15
Load per shelf (kg)	15	20	30	35	45
Permitted total load (kg)	40	50	70	90	120
Weight (empty) (kg)	61	89	131	173	203
<b>Temperature data</b>					
Temperature range, 5°C above ambient up to °C	300	300	300	300	300
Temperature variation <sup>1)</sup> at 70 °C (± K)	0,5	0,6	0,8	0,7	0,7
Temperature variation <sup>1)</sup> at 150 °C (± K)	1,3	1,5	1,5	1,5	1,9
Temperature variation <sup>1)</sup> at 300 °C (± K)	2,8	2,8	2,8	5	4,6
Temperature fluctuation (± K)	0,3	0,3	0,3	0,3	0,3
Heating-up time <sup>2)</sup> to 70 °C (Min.)	5	5	6	6	7
Heating-up time <sup>2)</sup> to 150 °C (Min.)	15	16	19	18	21
Heating-up time <sup>2)</sup> to 250 °C (Min.)	35	36	42	44	51
Recov. time after door was opened for 30 sec. <sup>2)</sup> at 70 °C (Min.)	1	1	1	1	1
Recov. time after door was opened for 30 sec. <sup>2)</sup> at 150 °C (Min.)	3	3	3	3	3
Recov. time after door was opened for 30 sec. <sup>2)</sup> at 300 °C (Min.)	5	5	5	5	5
<b>Electrical data</b>					
Housing protection acc. to EN 60529	IP 20	IP 20	IP 20	IP 20	IP 20
Nominal voltage (± 10 %) 50/60 Hz (V)	230	230	230	400	400
Nominal power (W)	1200	1600	2700	3400	5000
Energy consumption at 70 °C (W)	145	230	370	520	570
Energy consumption at 150 °C (W)	300	544	850	1200	1320
Energy consumption at 300 °C (W)	720	1100	1400	2340	2600
Number of doors	1	1	2	2	2

1) value without window

2) to 98 % of the set value

All technical data are specified for units with standard equipment at an ambient temperature of 20 °C and a line voltage fluctuation of ±10%. The temperature data is determined in accordance to factory standard following DIN 12880, respecting the recommended wall clearances of 10% of the height, width and depth of the inner chamber. All figures are typical average values for series devices. We reserve the right to alter technical specifications at any time.

# Heating-/Ageing Ovens

## MDL series: High-efficiency, drying oven, incorporating high-precision temperature control and programming

The MDL series operates at temperatures up to 350 °C at a flow of 400 l/min, ideal conditions for high temperature testing, e.g. in coil coating applications. The preheating chamber with the special Airflow Design feature simulates evenly distributed baking processes on specimens within extremely short periods, and the program control system offers 25 different programs with a variety of options.



### Features / Equipment:

- Electronically controlled APT.line™ preheating chamber assuring temperature accuracy and reproducible results
- Temperature range from 5 °C above ambient temperature to 350 °C
- All safety features met according to EN 1539
- Heating output 9.0 kW
- Door gasket made of of high temperature resistant silicone
- Rear exhaust connector Ø 100 mm
- MCS controller with 25 storable programs of 100 sections each for a maximum of 500 program segments
- User-friendly LCD screen
  - \* Easy-to-read menu guide
  - \* Integrated electronic chart recorder
  - \* Variety of options for the graphic display of process parameters
  - \* Real-time clock
- Replaceable fresh-air filter cartridge, class F6 (EU6-fine particle filter for particle sizes between 1 ... 10 µm)
- Independent adjustable temperature safety device class 2 (DIN 12880), with acoustic and visual temperature alarm
- Fresh-air monitoring with audible and visual alarm and automatic deactivation of heating
- RS 422 interface for communication software APT-COM™ DataControlSystem
- 2 chrome-plated racks included



## Technical data:

	MDL 115
<b>Exterior dimensions</b>	
Width (mm)	834
Height (inclusive feet/castors) (mm)	800
Depth (mm)	685
plus door handle (mm)	50
Wall clearance rear (mm)	100
Wall clearance side (mm)	100
Exhaust duct outer- Ø (mm)	100
Steam space volume (l)	156
<b>Interior dimensions</b>	
Width (mm)	600
Height (mm)	435
Depth (mm)	435
Interior volume (l)	115
Shelves, chrome-plated (number standard/max.)	2/5
Load per shelf (kg)	20
Permitted total load (kg)	50
Weight (empty) (kg)	90
<b>Temperature data</b>	
Temperature range, 5°C above ambient up to (°C)	350
Temperature variation at 70 °C (± K)	2
Temperature variation at 150 °C (± K)	3,4
Temperature variation at 300 °C (± K)	7
Temperature variation with door flap at 70 °C (± K)	2
Temperature variation with door flap at 150 °C (± K)	3
Temperature variation with door flap at 300 °C (± K)	8
Temperature fluctuation (± K)	0,5
Heating-up time <sup>2)</sup> at 70 °C (Min.)	3,5
Heating-up time <sup>2)</sup> at 150 °C (Min.)	6
Heating-up time <sup>2)</sup> at 300 °C (Min.)	10
Recov. time after door was opened for 30 sec. <sup>2)</sup> at 70 °C (Min)	0,5
Recov. time after door was opened for 30 sec. <sup>2)</sup> at 150 °C (Min)	2
Recov. time after door was opened for 30 sec. <sup>2)</sup> at 300 °C (Min.)	4
Recov. time after door was opened for 30 sec. <sup>2)</sup> with door flap at 70 °C (Min.)	0,5
Recov. time after door was opened for 30 sec. <sup>2)</sup> with door flap at 150 °C (Min.)	1
Recov. time after door was opened for 30 sec. <sup>2)</sup> with door flap at 300 °C (Min.)	2
Air change (approx. x/min.)	3
Air circulation (approx. x/min.)	40
Exhaust air volume flow (approx. L/Min. m <sup>3</sup> /h)	400 (24,0)
Air flow velocity (m/sec)	0,8-1,2
Highest permitted solvent quantity (g) <sup>1)</sup> (at T-180°C, M-100g/mol, U-40g/m <sup>3</sup> , K=0,5)	6,65
<b>Electrical data</b>	
Housing protection acc. to EN 60529	IP 33
Nominal voltage (+10 %) 50/60 Hz (V)	(400 3/N)
Nominal power (W)	9000
Energy consumption at 150 °C (W)	1130

1) T = drying temperature, M = molecular mass, U = lower explosion limit, K = solvent vapor concentration as percentage of lower explosion limit  
 2) to 98 % of the set value

All technical data are specified for units with standard equipment at an ambient temperature of 20 °C and a line voltage fluctuation of ±10%. The temperature data is determined in accordance to factory standard following DIN 12880, respecting the recommended wall clearances of 10% of the height, width and depth of the inner chamber. All figures are typical average values for series devices. We reserve the right to alter technical specifications at any time.

# Heating-/Cooling Chambers

KB series:

Heating- / Cooling chambers with forced air convection

For demanding tasks and variable-temperature profiles in a wide range of temperatures.



## Features / Equipment:

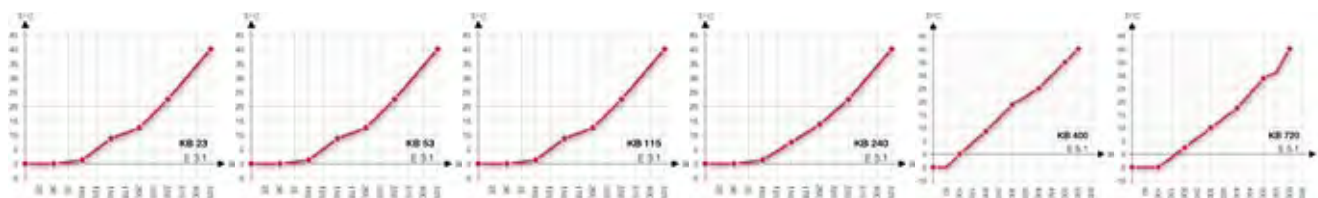
- Electronically controlled APT.line™ preheating chamber with DCT™ cooling system assuring temperature accuracy and reproducible results
- Temperature range -5 (0) °C to 100 °C
- MP controller with 2 programs with 10 sections each, alternatively switchable to 1 program with 20 sections
- Adjustable ramp function via program editor
  - \* Integrated weekly program timer with real-time function
  - \* Digital temperature setting with an accuracy of a tenth of a degree
  - \* Adjustable fan speed
  - \* Elapsed time indicator
- Independent temperature safety device class 3.1 (DIN 12880) with optical and audible temperature alarm
- Inner glass door
- RS 422 interface for use with APT-COM™ DataControlSystem communication software or switch over to printer output with RS 232 / RS 422 interface converter
- Adjustable intervals for printer
- Units up to 115 liters are stackable
- 2 shelves, stainless steel



## Technical data:

	KB 23	KB 53	KB 115	KB 240	KB 400	KB 720
<b>Exterior dimensions</b>						
Width (mm)	433	634	834	925	925	1250
Height (inclusive feet/castors) (mm)	618	837	1022	1460	1945	1925
Depth (mm)	520	580	650	800	800	887
inkl. door handle, I-panel and exhaust duct (mm)	100	100	100	100	100	100
Wall clearance rear side (mm)	100	100	100	100	100	100
Wall clearance left and right side (mm)	100	100	100	100	100	100
Steam space volume (l)	36	77	158	348	564	918
<b>Interior dimensions</b>						
Width (mm)	222	400	600	650	650	970
Height (mm)	330	400	480	785	1270	1250
Depth (mm)	277	330	400	485	485	576
Interior volume (l)	20	53	115	247	400	698
Shelves (number standard/max.)	2/3	2/4	2/5	2/9	2/15	2/15
Load per shelf (kg)	10	15	20	30	30	45
Permitted total load (kg)	25	40	50	100	100	150
Weight (empty) (kg)	44	72	105	170	220	309
<b>Temperature data</b>						
Temperature range (°C) <sup>1)</sup>	0-100	-5 - 100	-5 - 100	-5 - 100	-5 - 100	-5 - 100
Temperature variation max. (± K)				0,5	0,6	0,5
Temperature variation at 4 °C (± K)	0,7	0,6	0,4	0,2	0,4	0,2
Temperature variation at 25 °C (± K)	0,3	0,2	0,1	0,2	0,2	0,2
Temperature variation at 37 °C (± K)	0,3	0,3	0,2	0,2	0,3	0,2
Temperature fluctuation max. (± K)	0,2	0,1	0,1	0,1	0,1	0,1
Recov. time after door was open for 30 sec <sup>2)</sup> at 4 °C (min)	5	4	5	16	14	12
Recov. time after door was open for 30 sec <sup>2)</sup> at 37°C (min)	2	1	1	1	3	2
<b>Electrical Data</b>						
Housing protection acc. to EN 60529	IP 20	IP 20	IP 20	IP 20	IP 20	IP 20
Nominal voltage (±10 %) 50/60 Hz (V)	230	230	230	230	230	230
Nominal power (W)	340	460	460	1200	1400	2300
Energy consumption <sup>3)</sup> at 37 °C (Wh/h)	60	215	115	260	420	510
Number of doors	1	1	1	1	1	2
Number of inner glass doors	1	1	1	1	1	2

## Heat Compensation:



- 1) Lower values are valid up to an ambient temperature of max. 25 °C
- 2) to 98 % of the set value
- 3) These values can be used for dimensioning air condition systems

All technical data are specified for units with standard equipment at an ambient temperature of 25 °C and a line voltage fluctuation of ±10%. The temperature data is determined in accordance to factory standard following DIN 12880, respecting the recommended wall clearances of 10% of the height, width and depth of the inner chamber. All figures are typical average values for series devices. We reserve the right to alter technical specifications at any time.

# Heating-/Cooling Chambers

## MK series:

### The classic temperature test for natural simulation

This series covers the classic temperature range between  $-40\text{ °C}$  and  $180\text{ °C}$  for heat and refrigeration tests – with the added benefit of the unique natural simulation, incorporating preheating chamber technology and the horizontal air flow design. These features mean that the MK series meets the highest precision and performance requirements, while offering an intelligent alternative to expensive individual solutions for stability or durability testing, along with comprehensive standard features.

#### Features / Equipment:

- Electronically controlled APT.line™ preheating chamber assuring temperature accuracy and reproducible results
- Temperature range of  $-40\text{ °C}$  to  $180\text{ °C}$  (at an ambient temperature of  $25\text{ °C}$ )
- MCS controller with 25 storable programs of 100 sections each for a maximum of 500 program segments
- User-friendly LCD screen
  - \* Easy-to-read menu guide
  - \* Integrated electronic chart recorder
  - \* Variety of options for the graphic display of process parameters
  - \* Real-time clock
- Programmable condensation protection for test material
- Powerful adjustable fan
- Adjustable ramp function via program editor
- Access port(s)
- Independent adjustable temperature safety device class 2 (DIN 12880), with visual and audible temperature alarm
- Heated viewing window with LED interior lighting
- Environmentally friendly refrigerant R 404a
- RS 422 interface for communication software APT-COM™ DataControlSystem
- 1 shelf, stainless steel

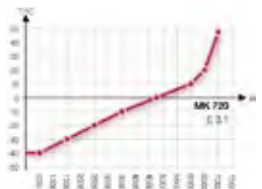
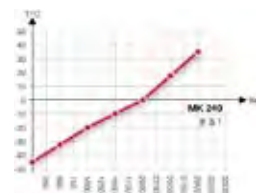
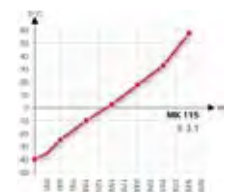
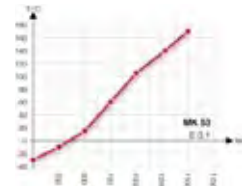


# Heating-/Cooling Chambers

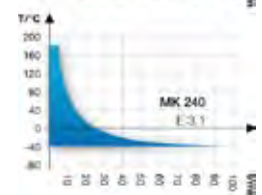
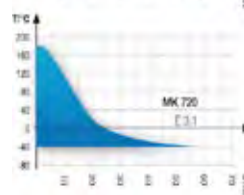
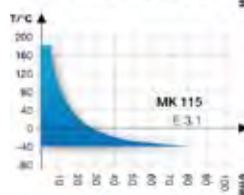
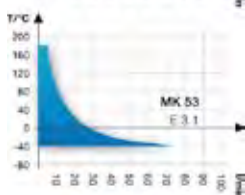
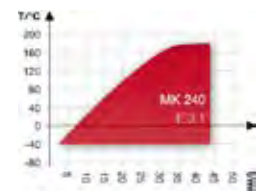
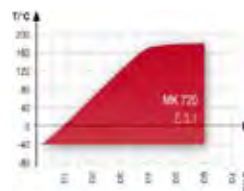
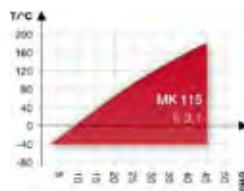
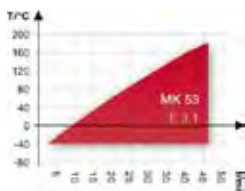
## Technical data:

	MK 53	MK 115	MK 240	MK 720
<b>Exterior dimensions</b>				
Width (incl. access port with plug) (mm)	740	995	1130	1613
Height (incl. feet/castors) (mm)	1242	1718	1713	2005
Depth (incl. I-triangle and door handle) (mm)	794	855	946	1175
Wall clearance (mm)	160	160	160	300
Viewing window width (mm)	280	290	508	508
Viewing window height (mm)	280	220	300	300
Number of doors	1	1	1	1
<b>Interior dimensions</b>				
Width (mm)	402	600	735	1200
Height (mm)	402	480	700	1020
Depth (mm)	330	400	443	600
Interior volume (l)	53	115	228	734
Shelves (number standard/max.)	1/5	1/4	1/6	1/11
Load per shelf (kg)	15	30	30	40
Permitted total load (kg)	40	60	70	160
Weight (empty) (kg)	150	260	360	570
<b>Temperature data</b>				
Temperature range (°C)	-40 .. +180	-40 .. +180	-40 .. +180	-40 .. +180
Temperature variation (+/- K)	0,4 - 2,0	0,1 - 2,0	0,1 - 1,2	0,3 - 2,0
Temperature fluctuation (± K)	0,1 - 0,5	0,1 - 0,5	0,1 - 0,5	0,1 - 0,5
Rec.Time after 30 sec door open at -10 °C (Min.)	5	n. l.	8	n. l.
Rec.Time after 30 sec door open at 70 °C (Min.)	1	n. l.	2	n. l.
Rec.Time after 30 sec door open at 150 °C (Min.)	5	n. l.	7	n. l.
Heating up time from -40°C up to 180°C (Min)	47	45	50	58
Cooling down time from 180°C up to -40°C (Min)	93	90	110	75
Mean heating rate acc. to factory standard (K/min.)	4,6	5,5	5,0	4,0
Mean cooling rate acc. to factory standard (K/min.)	4,1	5,2	4,5	4,5
Heat compensation, max. (W)	500	2000	2000	6500
<b>Electrical Data</b>				
Housing protection acc. to EN 60529	IP 20	IP 20	IP 20	IP 20
Nominal voltage (+ 10%) 50/60 Hz (V)	230 (1N)	400 (3N)	400 (3N)	400 (3N)
Nominal power (W)	2600	3000	4200	7200
Energy consumption <sup>1)</sup> at 20°C (W)	1020	600	1300	1900
Noise level (ca. dB(A))	59	62	62	65

### Heat Compensation:



### Heating up / Cooling down times:



1) These values can be used for dimensioning air condition systems.

All technical data are specified for units with standard equipment at an ambient temperature of 25 °C and a line voltage fluctuation of ±10%. The temperature data is determined in accordance to factory standard following DIN 12880, respecting the recommended wall clearances of 10% of the height, width and depth of the inner chamber. All figures are typical average values for series devices. We reserve the right to alter technical specifications at any time.

# Heating-/Cooling Chambers

## MKT series:

### Precise simulation at extremely low temperatures

MKT series low-temperature test chambers meet all requirements for testing under extreme temperature conditions between -70 °C and 180°C. Outstanding cooling and heating performance permit rapid temperature changes at any time and an unparalleled ease of operation. The MKT series is equipped with automatic process control, color display, documentation software, and comprehensive standard features.

#### Features / Equipment:

- Electronically controlled APT.line™ preheating chamber assuring temperature accuracy and reproducible results
- Temperature range -70 °C to 180 °C
- MCS controller with 25 storable programs of 100 sections each for a maximum of 500 program segments
- User-friendly LCD color screen
  - \* Easy-to-read menu guide
  - \* Integrated electronic chart recorder
  - \* Variety of options for the graphic display of process parameters
  - \* Real-time clock
- Heated viewing window with interior lighting
- Programmable condensation protection for test material
- 230 V power socket on the right-side operating panel
- Adjustable ramp function via program editor
- Access port Ø 50 mm, left side
- Independent adjustable temperature safety device Class 2 (DIN 12880)
- 4 potential-free relay outputs that can be activated via MCS controller
- Ethernet interface for communication software APT-COM™ DataControlSystem
- 1 rack, stainless steel
- 4 castors (with 2 brakes)



## Technical data:

### Exterior dimensions

Width (including access port 80 mm with plug) (mm)	1130
Height (incl. feet/castors) (mm)	1938
Depth, excl. 54 mm for door handle (mm)	946
Wall clearance (mm)	160
Viewing window width (mm)	508
Viewing window height (mm)	300
Number of doors	1

### Interior dimensions

Width (mm)	735
Height (mm)	500
Depth (mm)	443
Interior volume (l)	228
Shelves (number standard/max.)	1/6
Load per shelf (kg)	30
Permitted total load (kg)	70
Weight (empty) (kg)	380

### Temperature data

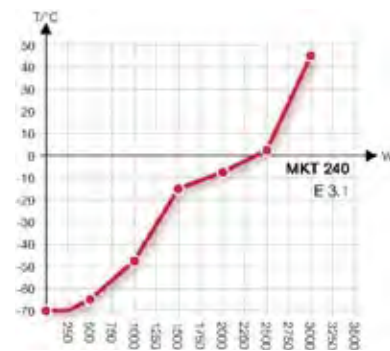
Temperature range (°C)	-70 ... +180
Temperature fluctuation (± K)	0,1 ... 0,4
Temperature variation (± K)	0,1 ... 1,0
Mean heating rate acc. to factory standard (K/min.)	5,4
Mean cooling rate acc. to factory standard (K/min.)	4,2
Heating up time from -70°C up to 180°C (Min)	50
Cooling down time from 180°C up to -70°C (Min)	95
Heating compensation, max. up to 25°C (W)	3000

### Electrical Data

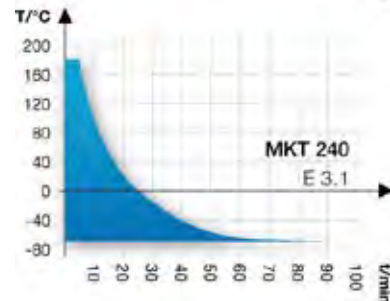
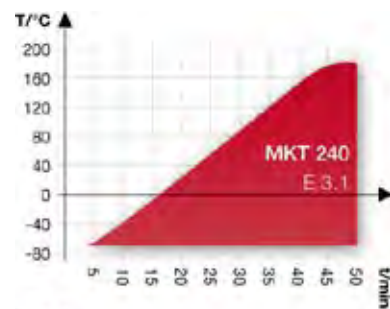
Housing protection acc. to EN 60529	IP 20
Nominal voltage (±10 %) 50/60 Hz (V)	400 (3N)
Nominal power (W)	6500
Energy consumption <sup>1)</sup> at 20°C (W)	1400
Noise level (ca. dB(A))	64

### MKT 240

### Heat Compensation:



### Heating up / Cooling down time:



1) These values can be used for dimensioning air condition systems.

All technical data are specified for units with standard equipment at an ambient temperature of 25 °C and a line voltage fluctuation of ±10%. The temperature data is determined in accordance to factory standard following DIN 12880, respecting the recommended wall clearances of 10% of the height, width and depth of the inner chamber. All figures are typical average values for series devices. We reserve the right to alter technical specifications at any time.

# Constant Climatic Chambers



## KBF series:

### Constant climatic chambers with forced air convection

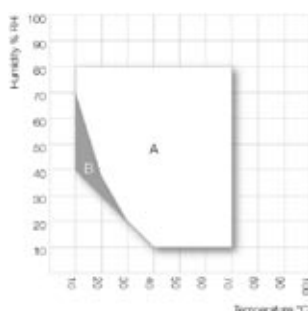
Test chambers for constant climate conditions. The series meets all prerequisites for short and long-term conditioning tests, from programming to documentation of your projects in compliance with standards.

#### Features / Equipment:

- Electronically controlled APT.line™ preheating chamber with cooling system assuring temperature accuracy and reproducible results
- MCS controller with 25 storable programs of 100 sections each for a maximum of 500 program segments
- User-friendly LCD screen
  - \* Easy-to-read menu guide
  - \* Integrated electronic chart recorder
  - \* Variety of options for the graphic display of process parameters
  - \* Real-time clock
- Electronically controlled humidification and dehumidification system with capacitive humidity sensor
- Suitable for stability tests according to ICH guideline Q1A (R2)
- Inner glass door with seal
- Independent temperature safety device class 3.1 (DIN 12880) with optical and audible temperature alarm
- Access port with silicone plug
- Complete safety connection kit for water supply and drainage, including water hose, (total length 6 m)
- Ethernet interface for communication software APT-COM™ DataControlSystem
- 2 shelves, stainless steel



#### Temperature-humidity chart



A: Standard Climate range  
B: Discontinuous range



KBF 240 (open)

## Technical data:

### Exterior dimensions

Width (mm)	
Height (incl. feet/roller) (mm)	
Depth (plus door handle, I-panel, connection, 80 mm) (mm)	
Wall clearance rear (mm)	
Wall clearance side (mm)	
Steam space volume (l)	

### Interior dimensions

Width (mm)	
Height (mm)	
Depth (mm)	
Interior volume (l)	
Shelves (number standard/max.)	
Load per shelf (kg)	
Permitted total load (kg)	
Weight (empty) (kg)	

### Temperature / Climatic Data

without humidity / without lighting (°C)	
with humidity / without lighting (°C)	
Temp. variation without humidity at 25°C (± K)	
Temp. variation without humidity at 40 °C (± K)	
Temp. fluctuation without humidity (+/- K)	
Max. heat compensation up to 40°C (W)	
Temp. variation with humidity at 25°C / 60% rH (± K)	
Temp. variation with humidity at 40°C / 75% rH (± K)	
Temp. fluctuation with humidity at 25°C / 60% rH (± K)	
Temp. fluctuation with humidity at 40°C / 75% rH (± K)	
Humidity range (% rH)	
Humidity variation at 25°C / 60% rH (± % rH)	
Humidity variation at 40°C / 75% rH (± % rH)	
Recovery time after doors were open for 30 sec 25 °C / 60% rH (Min.)	
Recovery time after doors were open for 30 sec 40°C / 75% rH (Min.)	

### Electrical Data

Nominal voltage (±10 %) 50/60 Hz (V)	
Nominal power (W)	
Energy consumption at 40 °C / 75% rH (W) <sup>1)</sup>	
Number of doors	
Number of inner glass doors	

	KBF 115	KBF 240	KBF 720
Width (mm)	880	925	1249
Height (incl. feet/roller) (mm)	1048	1460	1924
Depth (plus door handle, I-panel, connection, 80 mm) (mm)	699	850	939
Wall clearance rear (mm)	100	100	100
Wall clearance side (mm)	100	100	160
Steam space volume (l)	155	348	918
Interior width (mm)	600	650	970
Interior height (mm)	482	785	1250
Interior depth (mm)	351	485	576
Interior volume (l)	101	247	698
Shelves (number standard/max.)	2/5	2/9	2/15
Load per shelf (kg)	30	30	45
Permitted total load (kg)	100	100	150
Weight (empty) (kg)	129	184	309

without humidity / without lighting (°C)	0-70,0	0-70,0	0-70,0
with humidity / without lighting (°C)	10-70	10-70	10-70
Temp. variation without humidity at 25°C (± K)	0,2	0,2	0,2
Temp. variation without humidity at 40 °C (± K)	0,2	0,3	0,2
Temp. fluctuation without humidity (+/- K)	0,2	0,1	0,1
Max. heat compensation up to 40°C (W)	200	300	600
Temp. variation with humidity at 25°C / 60% rH (± K)	0,2	0,3	0,2
Temp. variation with humidity at 40°C / 75% rH (± K)	0,2	0,3	0,2
Temp. fluctuation with humidity at 25°C / 60% rH (± K)	0,1	0,1	0,1
Temp. fluctuation with humidity at 40°C / 75% rH (± K)	0,1	0,1	0,1
Humidity range (% rH)	10-80	10-80	10-80
Humidity variation at 25°C / 60% rH (± % rH)	2	1,5	1,5
Humidity variation at 40°C / 75% rH (± % rH)	2	1,5	1,5
Recovery time after doors were open for 30 sec 25 °C / 60% rH (Min.)	15	4	2
Recovery time after doors were open for 30 sec 40°C / 75% rH (Min.)	8	5	6

Nominal voltage (±10 %) 50/60 Hz (V)	200 - 240	200 - 240	200 - 240
Nominal power (W)	2000	2100	3100
Energy consumption at 40 °C / 75% rH (W) <sup>1)</sup>	470	650	620
Number of doors	1	1	2
Number of inner glass doors	1	1	2

### Heat Compensation:



1) These values can be used for dimensioning air condition systems.

All technical data are specified for units with standard equipment at an ambient temperature of 25 °C and a line voltage fluctuation of ±10%. The temperature data is determined in accordance to factory standard following DIN 12880, respecting the recommended wall clearances of 10% of the height, width and depth of the inner chamber. All figures are typical average values for series devices. We reserve the right to alter technical specifications at any time.

# Constant Climatic Chambers

## KMF series:

### Constant climatic chambers for stress testing from -10 - 100°C

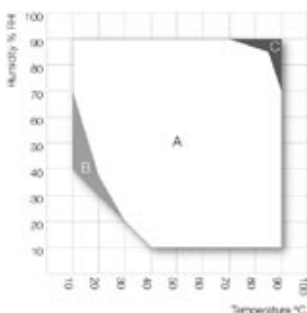
The KMF ensures absolutely constant test conditions throughout the testing area. Its advantage is the low space requirement and flexibility in terms of water supply. The wide temperature and humidity range make it ideally suited for stress testing series.

#### Features / Equipment:

- Electronically controlled APT.line™ preheating chamber with cooling system assuring temperature accuracy and reproducible results
- MCS controller with 25 storable programs of 100 sections each for a maximum of 500 program segments
- User-friendly LCD screen
  - \* Easy-to-read menu guide
  - \* Integrated electronic chart recorder
  - \* Variety of options for the graphic display of process parameters
  - \* Real-time clock
- Electronically controlled humidification and dehumidification system with capacitive humidity sensor
- Inner glass door
- Independent temperature safety device class 3.1 (DIN 12880) with optical and audible temperature alarm
- Access port with silicone plug
- Complete safety connection kit for water supply and drainage, including water hose, (total length 6 m)
- Ethernet interface for communication software APT-COM™ DataControlSystem
- 1 shelf, stainless steel



#### Temperature-humidity chart



A: Standard Climate range  
 B: Discontinuous range  
 C: In this range, condensation in the inner chamber is possible

**KMF 240 (open)**



# Constant Climatic Chambers

## Technical data:

### Exterior dimensions

Width (mm)	880	925	1250
Height (incl. feet/roller) (mm)	1048	1460	1925
Depth incl. door handle, I-panel, connection (mm)	699	850	939
Wall clearance rear (mm)	100	100	100
Wall clearance side (mm)	100	100	100
Steam space volume (l)	155	348	918

### Interior dimensions

Width (mm)	600	650	973
Height (mm)	483	785	1250
Depth (mm)	351	485	576
Interior volume (l)	102	247	700
Shelves (number standard/max.)	1/5	1/9	1/15
Load per shelf (kg)	30	30	45
Permitted total load (kg)	100	100	150
Weight (empty) (kg)	127	185	309

### Temperature range

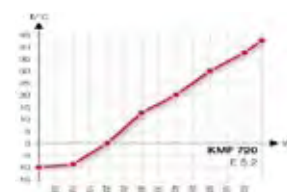
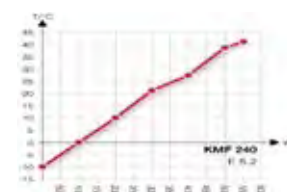
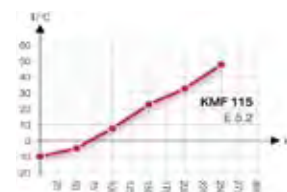
without humidity / without lighting (°C)	-10 - 100	-10 - 100	-10 - 100
with humidity / without lighting (°C)	10 - 90	10 - 90	10 - 90
Mean warm-up rate acc. to IEC 60068-3-5 (K/min.)	1,3	1,1	1,0
Mean cooling rate acc. to IEC 60068-3-5 (K/min.)	0,5	0,6	0,4
Warm-up time from -10°C up to 100°C (Min.)	85	100	110
Cooling down time from 100°C up to -10°C (Min.)	240	285	350
Max. heat compensation up to 25°C (W)	150	350	400
Temp. variation with humidity (± K)	0,3 - 1,0	0,3 - 1,5	0,2 - 1,0
Temp. fluctuation with humidity (± K)	0,1 - 0,2	0,1 - 0,5	0,1 - 0,5
Humidity range (% rH)	10 - 90	10 - 90	10 - 90
Humidity fluctuation (± % rH)	2	2	2
Dew point temperature range (°C)	5 - 80	5 - 80	5 - 80
Max. heat compensation at 25°C / 90% rH (W)	30	100	≤ 2

### Electrical Data

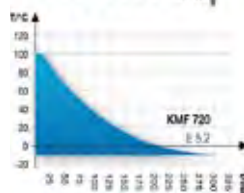
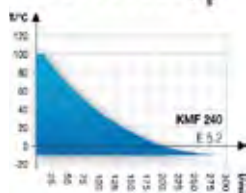
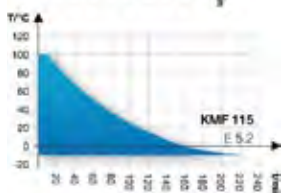
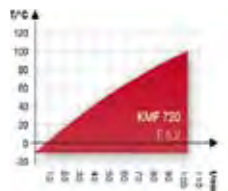
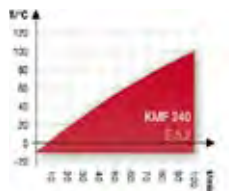
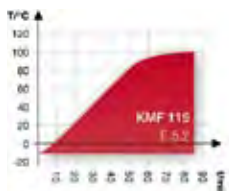
Nominal voltage (±10 %) 50/60 Hz (V)	200 - 240	200 - 240	200 - 240
Nominal power (W)	2000	2100	3100
Energy consumption at 85 °C / 85% rH (kW) <sup>1)</sup>	0,57	0,5	1,05
Number of doors	1	1	2
Number of inner glass doors	1	1	2

	KMF 115	KMF 240	KMF 720
Width (mm)	880	925	1250
Height (incl. feet/roller) (mm)	1048	1460	1925
Depth incl. door handle, I-panel, connection (mm)	699	850	939
Wall clearance rear (mm)	100	100	100
Wall clearance side (mm)	100	100	100
Steam space volume (l)	155	348	918
Interior volume (l)	102	247	700
Temp. range (°C)	-10 - 100	-10 - 100	-10 - 100
Nominal voltage (V)	200 - 240	200 - 240	200 - 240
Nominal power (W)	2000	2100	3100
Energy consumption (kW)	0,57	0,5	1,05
Number of doors	1	1	2
Number of inner glass doors	1	1	2

### Heat Compensation:



### Heating up / Cooling down times:



1) These values can be used for dimensioning air condition systems.

All technical data are specified for units with standard equipment at an ambient temperature of 25 °C and a line voltage fluctuation of ±10%. The temperature data is determined in accordance to factory standard following DIN 12880, respecting the recommended wall clearances of 10% of the height, width and depth of the inner chamber. All figures are typical average values for series devices. We reserve the right to alter technical specifications at any time.

# Climatic Test Chambers

## MKF series:

For dynamic climatic tests according with current standards

MKF series test chambers are ideally suited for all tests in accordance with current temperature climatic test standards based on DIN and IEC standards.

### Features / Equipment:

- Electronically controlled APT.line™ preheating chamber assuring temperature accuracy and reproducible results
- Temperature range -40 °C to 180 °C
- Humidity range 10% to 98% RH
- MCS controller with 25 storable programs of 100 sections each for a maximum of 500 program segments
- User-friendly LCD screen
  - \* Easy-to-read menu guide
  - \* Integrated electronic chart recorder
  - \* Variety of options for the graphic display of process parameters
  - \* Real-time clock
- Electronically controlled humidification and dehumidification system with capacitive humidity sensor and vapor pressure humidification
- Integrated water storage tank
- Heated viewing window with interior lighting
- Programmable condensation protection for test material
- Adjustable ramp function via program editor
- 230 V power socket on the right-side operating panel
- Independent adjustable temperature safety device Class 2 (DIN 12880)
- 4 potential-free relay outputs that can be activated via MCS controller
- Ethernet interface for communication software APT-COM™ DataControlSystem
- Access port(s)
- 4 castors (2 with brakes)
- 1 shelf, stainless steel



## Technical data:

### Exterior dimensions

Width (mm/inch) (including access with plug)
Height (incl. castors) (mm)
Depth, excl. door handle (mm)
Wall clearance (mm)
Viewing window width (mm)
Viewing window height (mm)
Number of doors

MKF 115	MKF 240	MKF 720
995	1130	1613
1718	1713	2005
850	946	1173
160	160	300
290	508	508
220	300	300
1	1	1

### Interior dimensions

Width (mm)
Height (mm)
Depth (mm)
Interior volume (l)
Shelves (number standard/max.)
Load per shelf (kg)
Permitted total load (kg)
Weight (empty) (kg)

MKF 115	MKF 240	MKF 720
600	735	1200
480	700	1020
400	443	600
115	228	734
1/4	1/6	1/11
30	30	40
60	70	160
280	360	590

### Temperature data

Temperature range (°C)
Temperature fluctuation (± K)
Temperature variation (± K)
Mean warm-up rate acc. to IEC 60068-3-5 (K/min.)
Mean cooling rate acc. to IEC 60068-3-5 (K/min.)
Warm-up time from -40°C up to 180°C (Min.)
Cooling down time from 180°C up to -40°C (Min.)
Heating compensation, max. (kW)

MKF 115	MKF 240	MKF 720
-40 - +180	-40 ... +180	-40 ... +180
0,1 - 1,0	0,1 ... 0,5	0,1 ... 0,5
0,1 - 1,3	0,5 ... 2,0	0,1 ... 1,8
5,5	5,0	4,8
4,5	5,0	4,8
45	45	74
120	98	118
2,5	2800	6500

### Climatic data

Temperature range (°C)
Humidity range (% r.H.)
Temperature fluctuation (± K)
Humidity fluctuation (± r.H.%)
Dew point temperature range (°C)
Heating compensation to 25°C / 90% rH (kW)

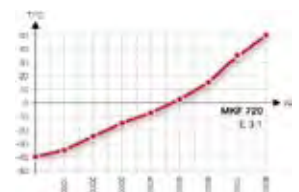
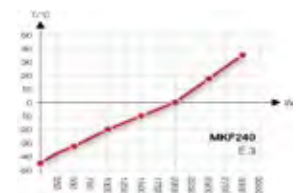
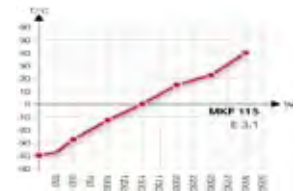
MKF 115	MKF 240	MKF 720
+10 - +95	+10 ... +95	+10 ... +95
10 ... 98	10 ... 98	10 ... 98
0,1 - 1,3	-	-
≤ 2,5	0,5 ... 3,0	≤ 2,5
+5 ... +94	+5 ... +94	+5 ... +94
0,4	0,3	1000

### Electrical Data

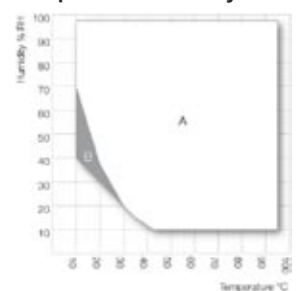
Housing protection acc. to EN 60529
Nominal voltage (±10 %) 50/60 Hz (V)
Nominal power (kW)
Noise level (ca. dB(A))

MKF 115	MKF 240	MKF 720
IP 20	IP 20	IP 20
400 (3N)	400 (3N)	400 (3N)
4,2	5,1	11,0
62	62	65

### Heat Compensation:

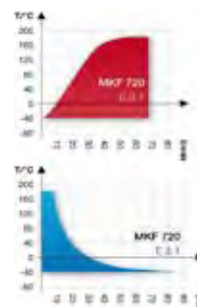
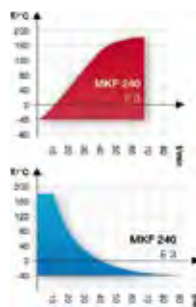
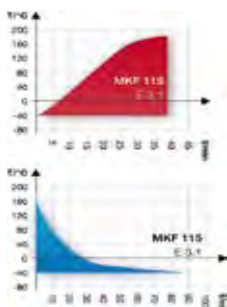


### Temperature humidity chart:



A: Standard Climate range  
B: Discontinuous range

### Auf- und Abkühlzeit:



All technical data are specified for units with standard equipment at an ambient temperature of 25 °C and a line voltage fluctuation of ±10%. The temperature data is determined in accordance to factory standard following DIN 12880, respecting the recommended wall clearances of 10% of the height, width and depth of the inner chamber. All figures are typical average values for series devices. We reserve the right to alter technical specifications at any time.

# Deep Freezers

## TT and KBT series: Freezers for low temperature tests/storage

Deep Freezer TT and Mini Deep Freezer KBT are especially designed for decentralized freezing and for storage of materials directly at the working place. With quiet refrigeration system (comparable to home freezers, no noise pollution at the workplace), these types are optimized being placed directly in the laboratory.

The freezers are fitted with hermetically sealed, intrinsically safe, air-cooled refrigeration systems and are maintenance-free.



Deep freezer type TT



Mini Deep freezer type KBT

### Features / Equipment:

- All TT models are equipped with a electronic controller with keyboard, integrated alarm (optical and acoustic, alarm output can be connected to an external alarm signal), temperature recorder output 10 mV/K, RS 485 output port
- All models are made of stainless steel
- All KBT models are fitted with a blue protective ring around the top and bottom to avoid risk of injury by corners and edges
- The fastener of the lid of all TT types are lockable

## Options:

- Ventilation for a better temperature accuracy available (only -50°C models)
- Roller frame with four rolls for TT models
- Stainless steel shelves TS 100 RS for all 55 liter models (9 single shelves for 9 standard cryoboxes 135 x 135 x 52 mm available)
- Temperature recorder for all TT models
- Access ports (different diameter) with silicon plug available

## Technical data:

	KBT 02-51	KBT 04-51	KBT 08-51	TT 50-55	TT 80-55
<b>Exterior dimensions</b>					
Width (mm)	260	330	350	820	820
Height (inclusive feet/castors) (mm)	470	490	470	890	890
Depth (mm)	390	390	430	600	600
Wall clearance rear (mm)	100	100	100	100	100
Wall clearance side (mm)	160	160	160	160	160
<b>Interior dimensions</b>					
Width (mm)	Ø 130	Ø 170	150	560	560
Height (mm)	170	185	200	270	270
Depth (mm)	-	-	300	360	360
Interior volume (l)	2	4	8	55	55
Weight (empty) (kg)	22	26	32	100	100
<b>Temperature data</b>					
Temperature range (°C)	-30...-50	-30...-50	-30...-50	-10...-50	-50...-80
Control precision (± K)	1				
Ambient Temperature (°C)	+12 ... +30				
<b>Electrical data</b>					
Nominal voltage (± 10 %) 50 Hz (V)	230				
Power (A)	1,5	1,8	2,0	2,5	3,0

All technical data are specified for units with standard equipment at an ambient temperature of 25 °C and a line voltage fluctuation of ±10%. The temperature data is determined in accordance to factory standard following DIN 12880, respecting the recommended wall clearances of 10% of the height, width and depth of the inner chamber. All figures are typical average values for series devices. We reserve the right to alter technical specifications at any time.

# Deep Freezers

## TS and TUS series: Upright and underbench freezers

Small Freezers TS and Underbench Freezers TUS are designed for decentralized freezing and for storage of materials directly at the workplace. With their compact, space saving construction and the quiet refrigeration system (comparable to home freezers, no noise pollution at the workplace) these types are optimized to being placed directly in the laboratory. The freezers are fitted with hermetically sealed, intrinsically safe, air-cooled refrigeration systems and are maintenance free.



Deep freezer type TS



Deep freezer type TUS

### Features / Equipment:

- All TS/TUS models are equipped with a electronic controller with keyboard, integrated alarm (optical and acoustic, alarm output can be connected to an external alarm signal), temperature recorder output 10 mV/K, RS 485 output port
- All models are made of stainless steel
- All models with 100 liter volume
- The fastener of the door of all TS and TUS models are lockable

## Technical data:

	TS 50-100	TUS 50-100	TS 80-100	TUS 80-100
<b>Exterior dimensions</b>				
Width (mm)	680	930	680	930
Height (inclusive feet/castors) (mm)	1160	745	1160	745
Depth (mm)	730	630	730	630
Wall clearance rear (mm)	100	100	100	100
Wall clearance side (mm)	160	160	160	160
<b>Interior dimensions</b>				
Width (mm)	450	450	450	450
Height (mm)	500	500	500	500
Depth (mm)	450	4500	450	450
Interior volume (l)	100	100	100	100
Weight (empty) (kg)	105	105	120	120
<b>Temperature data</b>				
Temperature range (°C)	-10...-50	-10...-50	-50...-80	-50...-80
Control precision (± K)	1			
Ambient temperature (°C)	+12 ... +30			
<b>Electrical data</b>				
Nominal voltage (± 10 %) 50 Hz (V)	230			
Power (A)	3,0		6,5	

## Options:

- Roller frame with four rolls for type TS
- Drawer shelves TS 100 RS for all 100 liter models (9 single shelves for 9 standard cryoboxes 135 x 135 x 52 mm available)
- Temperature recorder for all models
- Access ports (different diameter) with silicon plug available

All technical data are specified for units with standard equipment at an ambient temperature of 25 °C and a line voltage fluctuation of ±10%. The temperature data is determined in accordance to factory standard following DIN 12880, respecting the recommended wall clearances of 10% of the height, width and depth of the inner chamber. All figures are typical average values for series devices. We reserve the right to alter technical specifications at any time.

# Cold Boxes

## B series: Cold boxes

The cold- and freezing box B 30-20 as well as the series B are desk-freezer units and can be placed directly at the workplace.

The type B 30-20 is stackable. Up to three units can be stacked on top of each other.

The version B 30-20 (-20°C/30 liters) is equipped with a thermo pane window in the door that enables the observation of frozen materials. All casing parts are made from stainless steel.

The cold box B 30 is fitted with a quiet, hermetically sealed cooling compressor. The intrinsically safe, aircooled refrigeration system is maintenance-free.

The cold boxes series B3 are small desktop devices for cooling and freezing and therefore suitable for the use in laboratories as well as in research and industry facilities. It is suitable for the use directly at the workplace, especially because of its compact and space saving design and a low noise cooling aggregate.

### Features / Equipment:

#### Type B 30-20:

- The model B 30-20 is fitted with an electronic controller with PT 100 sensor and LED temperature display
- Stainless steel housing
- Blue protective ring around top and bottom to avoid risk of injury
- Large window in the door

#### B 35 series:

- All B 35 models are equipped with a electronic controller with keyboard, integrated alarm (optical and acoustic, alarm output can be connected to an external alarm signal), temperature recorder output 10 mV/K, RS 485 output port
- Stainless steel housing
- Foamed door with double door sealing
- Vacuum insulation - better insulation, therefore less power consumption
- Ventilation grid on the left and right side - the box can be placed directly to a wall
- Lockable door



Cold boxe type B 30-20



Cold boxes series B 35

## Technical data:

	B 30-20	B 35-50	B 35-85
<b>Exterior dimensions</b>			
Width (mm)	470	580	580
Height (inclusive feet/castors) (mm)	400	540	540
Length (mm)	580	765	765
<b>Interior dimensions</b>			
Width (mm)	360	425	425
Height (mm)	230	280	280
Depth (mm)	350	300	300
Interior volume (l)	30	35	35
Weight (empty) (kg)	42	81	81
<b>Temperature data</b>			
Temperature range (°C)	+10...-20	-10...-50	-50...-85
Control precision (± K)	1		
Ambient temperature (°C)	+12 ... +30		
<b>Electrical data</b>			
Nominal voltage (± 10 %) 50 Hz (V)	230		
Power (A)	1,5	5,0	5,0

## Options:

### B 30-20:

- Drawer shelves B 30-RS

### Serie B 35:

- Drawer shelves B 35-RS
- Temperature recorder

# Cold Bathes / Thermostats

## KB and KT series: Cold bathes / cooling thermostats

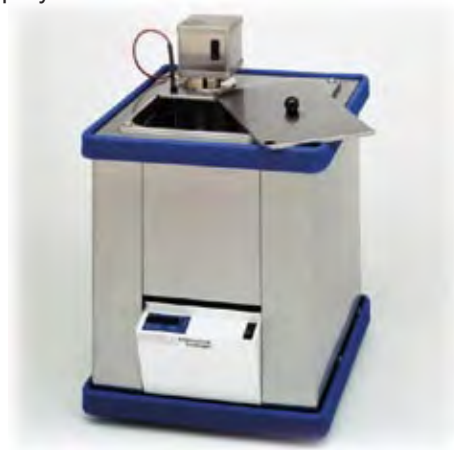
The cold bathes KB and cooling thermostats KT are suitable for the cooling and maintaining temperature of liquids.

The product series is available in two different versions:

- **Cold bath KB:** For existing attachment thermostats  
Bath size from 6 to 18 liters  
Different temperature ranges  
No control unit - cooling works non-stop
  
- **Cooling thermostat KT:** With circulation pump or magnet stirrer  
Bath size from 6 to 18 liters  
Temperature control with LED display  
Different temperature ranges



Cold bath type KB



Cooling thermostat type KT

### Features / Equipment:

- No fixtures like radiator coils etc.
- No ECU above the bath exposed to vapours
- Exchangeable circulating pump mounted in the KT models
- Casing fitted with edge protection
- 4 attachment bolts with M8 inside thread in the corners of the bath to attach tripod bars
- Electrical temperature control with LED display and built-in PT100-Sensor
- Switches and control unit are fitted into a flap in the front, which can be opened for operation
- Housing is made of stainless steel sheet metal
- Bath reservoir is made of stainless steel 18/10
- Low-noise, fully hermetically closed and air-cooled compressor
- EP20 pump provides a maximum pressure of 0.15 bar and a circulation power of max. 5 l/min.

## Technical data:

	KB 06-40	KB 8-40	KB 10-40	KB 12-20	KB 12-40	KB 18-40
<b>Exterior dimensions</b>						
Width (mm)	350	350	410	410	410	410
Height (inclusive feet/castors) (mm)	420	450	460	460	460	460
Length (mm)	430	430	450	450	450	450
Wall clearance rear (mm)	100	100	100	100	100	100
Wall clearance side (mm)	160	160	160	160	160	160
<b>Interior dimensions</b>						
Width (mm)	150	150	240	240	240	300
Height (mm)	150	200	150	200	200	200
Length (mm)	300	300	300	300	300	327
Interior volume (l)	6	8	10	12	12	18
Weight (empty) (kg)	24	26	34	36	36	39
<b>Temperature data</b>						
Temperature range (°C)	+20...-40		+20...-20		+20...-40	
Control precision (± K)	0,5					
Ambient temperature (°C)	+12 ... +30					
<b>Electrical data</b>						
Nominal voltage (± 10 %) 50 Hz (V)	230					
Power (A)	2,0	2,5	2,8	3,0	3,2	3,6

	KT 06-22	KT 06-42	KT 06-43	KT 08-22	KT 08-42	KT 10-42	KT 10-43	KT 12-22	KT 12-42	KT 18-42
<b>Exterior dimensions</b>										
Width (mm)	350	350	350	350	350	410	410	410	410	410
Height (inclusive feet/castors) (mm)	420	420	420	450	450	460	460	460	460	460
Length (mm)	430	430	430	430	430	450	450	450	450	450
Wall clearance rear (mm)	100	100	100	100	100	100	100	100	100	100
Wall clearance side (mm)	160	160	160	160	160	160	160	160	160	160
<b>Interior dimensions</b>										
Width (mm)	150	150	150	150	150	240	240	240	240	300
Height (mm)	150	150	150	200	200	150	150	200	200	200
Length (mm)	300	300	300	300	300	300	300	300	300	327
Interior volume (l)	6	6	6	8	8	10	10	12	12	18
Weight (empty) (kg)	26	26	25	28	28	36	35	38	38	41
<b>Temperature data</b>										
Temperature range (°C)	+20...-20°C	+20...-40°C	+20...-40°C	+20...-20°C	+20...-40°C	+20...-40°C	+20...-40°C	+20...-20°C	+20...-40°C	+20...-40°C
Control precision (± K)	0,5									
Ambient temperature (°C)	+12 ... +30									
<b>Electrical data</b>										
Nominal voltage (± 10 %) 50 Hz (V)	230									
Power (A)	2,0	2,2	2,2	2,5	2,7	3,0	3,0	3,2	3,4	3,8

All technical data are specified for units with standard equipment at an ambient temperature of 25 °C and a line voltage fluctuation of ±10%. The temperature data is determined in accordance to factory standard following DIN 12880, respecting the recommended wall clearances of 10% of the height, width and depth of the inner chamber. All figures are typical average values for series devices. We reserve the right to alter technical specifications at any time.

# Vacuum Drying Ovens

## VD series: Vacuum drying ovens

Safe and gentle drying under vacuum. The APT.line® vacuum drying ovens are simply without equal in terms of features. That makes them the professional, versatile choice for a multitude of tasks.

### Features / Equipment:

- Electronically controlled APT.line™ preheating chamber with 2 expansion racks assuring temperature accuracy and reproducible results
- Temperature range from 15 °C above ambient temperature to 200 °C
- MP controller with 2 programs with 10 sections each or switchable to 1 program with 20 sections
- Integrated weekly program timer with real-time function
  - \* Digital temperature setting with an accuracy of one degree
  - \* Elapsed time indicator
- Precision-adjustable ventilation valve (for VD 23, the standard inert gas connection is also used as the ventilation valve)
- Precision-adjustable inert gas valve with Cross-Flow-Technology
- All electrical components are decoupled from the inner chamber
- Spring-mounted safety glass panel with shatter protection
- Independent adjustable temperature safety device class 2 (DIN 12880), with visual temperature alarm
- Measuring port DN 16 in rear panel
- Analog pressure gauge (displays pressure difference between the inner chamber and ambient pressure)
- Electro polished inner chamber, suction and ventilation tubes, pressure container, expansion racks, and ball valve are made of stainless steel
- Door gasket made of tempered silicone
- 2 x 24 V DC (max 0.4 A) switching outputs, switched via 2 control contacts in the program editor
- RS 422 interface for communication software APT-COM™ DataControlSystem
- 2 patented, flexible aluminum expansion racks
- Also available as complete system with module and vacuum pump



## Technical data:

	VD 23	VD 53	VD 115
<b>Exterior dimensions</b>			
Width (mm)	515	634	740
Height (inclusive feet/castors) (mm)	655	775	900
Height option "vacuum module" (mm)	624	624	622
Total height with option „vacuum module“ (mm)	1279	1400	1522
Depth (mm)	500	550	670
plus door handle, connection (mm)	100	100	100
Wall clearance, rear (mm)	100	100	100
Wall clearance, side (mm)	135	135	135
<b>Interior dimensions</b>			
Width (mm)	285	400	506
Height (mm)	285	400	506
Depth (mm)	285	330	450
Interior volume (l)	23	53	115
Expansion shelves (Aluminium) (number standard/max.)	2/4	2/5	2/6
Distance between the shelves (width x depth) (mm)	53	62	68
Usable space per shelf (width x depth) (mm)	234x280	349x320	455x440
Load per shelf (kg)	20	20	20
Permitted total load (kg)	35	45	65
Weight of the empty unit (kg)	63	95	153
<b>Temperature data</b>			
Temperature range from 15°C above ambient to °C	200	200	200
Temperature variation <sup>1)</sup> at 100 °C (± K)	1,5	2	3,5
Temperature variation <sup>1)</sup> at 200 °C (± K)	3	4,5	9
Temperature fluctuation <sup>1)</sup> (± K)	0,1	0,1	0,1
Heating up time <sup>1);2)</sup> to 100 °C (Min.)	50	80	80
Heating up time <sup>1);2)</sup> to 200 °C (Min.)	100	130	190
Vacuum connection with small flange (DN mm)	16	16	16
Measuring access port with small flange (DN mm)	16	16	16
Inert gas connection with flow limiter (RP <sup>4)</sup> )	3/8	3/8	3/8
Permitted end vacuum (mbar)	0,01	0,01	0,01
Leak rate (max.bar 1/h)	0,01	0,01	0,01
<b>Electrical data</b>			
Housing protection acc. to EN 60529	IP 20	IP 20	IP 20
Nominal voltage (+10 %) 50/60 Hz (V)	230	230	230
Nominal power (W)	800	1200	1700
Energy consumption at 100 °C (W)	105	150	250
Energy consumption at 200 °C (W)	280	445	785

1) value with aluminium racks 2) to 98 % of the set value

All technical data are specified for units with standard equipment at an ambient temperature of 25 °C and a line voltage fluctuation of ±10%. These average values have been determined according to the BINDER factory standard, respecting the recommended wall clearances of 10% of the height, width and depth of the inner chamber. Differing ambient temperatures and production-related device-specific variances can lead to varying technical data.



# Vacuum Drying Ovens

## VDL series: Vacuum drying ovens with special safety concept

Safe drying in presence of combustable solvents. The extended safety package makes it extremely safe to dry substances with combustable solvent components. The VDL series carries the TÜV/GS mark as standard; the inner chamber is designed in compliance with the ATEX Directive for Zone 2. Optionally, the ovens can be upgraded in accordance with the European Directive 94/9/EC (ATEX Directive) for installation in a Zone 2 explosion hazard area. Inert gas can also be used for flushing the electrical installation space.

### Features / Equipment:

- Electronically controlled APT.line™ preheating chamber with 2 expansion racks assuring temperature accuracy and reproducible results
- Temperature range from 15 °C above ambient temperature to 200 °C
- MP controller with 2 programs with 10 sections each or switchable to 1 program with 20 sections
- Integrated weekly program timer with real-time function
  - \* Digital temperature setting with an accuracy of one degree
  - \* Elapsed time indicator
- Spring-mounted safety glass panel with shatter protection
- Precision-adjustable ventilation valve
- Precision-adjustable inert gas valve with Cross-Flow-Technology
- Safety concept:
  - \* Pressure control device for heating activated < 125 mbar
  - \* Over pressure capsuled instrument panel with compressed air connection and maintenance unit
  - \* Flame protection gasket
- Analog pressure gauge (displays pressure difference between the inner chamber and ambient pressure)
- Electro-polished inner chamber, suction and ventilation tubes, pressure container, expansion racks, and ball valve are made of stainless steel
- Independent adjustable temperature safety device class 2 (DIN 12880), with visual temperature alarm
- Measuring port DN 16 in rear panel
- Printer and communication interface RS 422 for APT-COM™ DataControlSystem communication software
- 2 patented, flexible aluminum expansion racks
- All electrical components are decoupled from the inner chamber



## Technical data:

	VDL 23	VDL 53	VDL 115
<b>Exterior dimensions</b>			
Width (mm)	515	634	740
Height (inclusive feet/castors) (mm)	655	775	900
Height option "vacuum module" (mm)	624	624	622
Total height with option „vacuum module“ (mm)	1279	1400	1522
Depth (mm)	500	550	670
plus door handle, connection (mm)	100	100	100
Wall clearance, rear (mm)	100	100	100
Wall clearance, side (mm)	135	135	135
<b>Interior dimensions</b>			
Width (mm)	285	400	506
Height (mm)	285	400	506
Depth (mm)	285	330	450
Interior volume (l)	23	53	115
Expansion shelves (Aluminium) (number standard/max.)	2/4	2/5	2/6
Distance between the shelves (width x depth) (mm)	53	62	68
Usable space per shelf (width x depth) (mm)	234x280	349x320	455x440
Load per shelf (kg)	20	20	20
Permitted total load (kg)	35	45	65
Weight of the empty unit (kg)	63	95	153
<b>Temperature data</b>			
Temperature range from 15°C above ambient to °C	200	200	200
Temperature variation <sup>1)</sup> at 100 °C (± K)	1,5	2	3,5
Temperature variation <sup>1)</sup> at 200 °C (± K)	3	4,5	9
Temperature fluctuation <sup>1)</sup> (± K)	0,1	0,1	0,1
Heating up time <sup>1); 2)</sup> to 100 °C (Min.)	50	80	155
Heating up time <sup>1); 2)</sup> to 200 °C (Min.)	100	130	200
Vacuum connection with small flange (DN mm)	16	16	16
Measuring access port with small flange (DN mm)	16	16	16
Inert gas connection with flow limiter (RP“)	3/8	3/8	3/8
Permitted end vacuum (mbar)	0,01	0,01	0,01
Leak rate (max.bar 1/h)	0,01	0,01	0,01
Pressure air connection for pressure-encapsulation (Ø mm)	8	8	8
<b>Electrical data</b>			
housing protection acc. to EN 60529	IP 54	IP 54	IP 54
Nominal voltage (+10 %) 50/60 Hz (V)	230	230	230
Nominal power (W)	800	1200	1900
Energy consumption at 100 °C (W)	105	150	250
Energy consumption at 200 °C (W)	280	445	785

1) value with aluminium racks 2) to 98 % of the set value

All technical data are specified for units with standard equipment at an ambient temperature of 25 °C and a line voltage fluctuation of ±10%. These average values have been determined according to the BINDER factory standard, respecting the recommended wall clearances of 10% of the height, width and depth of the inner chamber. Differing ambient temperatures and production-related device-specific variances can lead to varying technical data.

# Vacuum Pumps

## N 860.3 series: Self drying vacuum pump

The chemically-resistant series ND 860.3 FT.40.18 diaphragm pump is a twin-head unit with an integrated self-drying system. There is a wide range of applications for this pump in laboratories, especially whenever clean vacuum is required and moist gases must be pumped down.

Examples include vacuum-drying of vacuum drying chambers (for drying or heat-treating substances and components) or steam sterilizers for sterilizing instruments, vessels, filters and textiles. Due to its high resistance to aggressive media, this pump can be used universally. The heart of these very compact pumps are structured diaphragms (PTFE-coated). These patented diaphragms were stress-optimized using the Finite Elements method. As a result, we were able to make the pumps smaller while increasing the service life of the diaphragm. The self-drying system allows condensed liquid to be blown out of the pump heads at high speed during evacuation. The vacuum in the recipient remains constant. The drying cycle can be adjusted to the requirements of the individual process using three variables. After drying, the pump reaches a better vacuum and is able to evacuate significantly faster compared with pumps without a drying system.

### Features / Equipment:

- Pure transfer and evacuation
- Highly compatible with vapors and condensation
- Chemically-resistant
- Therefore suitable for highly aggressive or corrosive gases and vapours
- Maintenance-free
- Environmentally friendly
- Gastight, leakage rate approx.  $6 \times 10^{-3}$  mbar x l/s,- not tested in serial production



### Technical data:

	N 860.3
<b>Characteristics</b>	
Delivery (L/min.)	60
Ultimate vacuum (mbar abs.)	4
Operating pressure (bar g)	1
Connectors for tube (mm)	ID 12
Permissible gas and ambient temperature	+5...+40
<b>Electrical data</b>	
Mains (V/Hz)	230/50
Motor protection	IP 54
Power P (W)	220
Overall dimensions, L x H x W (mm)	331 x 278,5 x 291
Net weight approx. (kg)	14,8

With thermal switch and power fuse

Motors with other voltages and frequencies on request

## MZ\_C\_ex series: Vacuum pump with ATEX admission

Diaphragm pumps offer low ultimate vacuum down to 12 mbar (two-stage pumps), 3 mbar (three-stage pumps) or 2 mbar (four-stage pumps). Optimized kinetics for minimum work and wear of the diaphragm result in high reliability, low scuffing, long life and low noise level of the diaphragm. Only selected resistant materials such as FPM (e.g. Viton® fluoroelastomers) and aluminium or PTFE compounds - depending on the version - are used for the gas and vapour contacted parts.

Chemistry version „C“: All gas and vapour contacted parts are made using only the most appropriate chemically resistant fluorinated plastics, e.g. PTFE/ETFE cylinder head and perfluoroelastomer valves (e.g. Kalrez® perfluoroelastomers parts).

Viton®, Kalrez® are trademarks or registered trademarks of DuPont Dow Elastomers

ATEX-Conformity: Scoop-area: II 2G IIC T3 X / Outer area\*: II 2G IIB T4 X (Motor: II 2G EEx d IIB T4)

\* with intergas overlay of the curbol area. Without inertgas overlay: II 3G IIB T4 X

### Features / Equipment:

- Pressure capsuled motor with integrated over-temperature and over-current protection for direct 230 V / 50 Hz single phase connection
- Membrane heads made of antistatic, reinforced flour polymer
- Connection parts made with metallic inserts
- Gas ballast with inert gas supply
- Over pressure valves internal and at the outlet
- Safe membrane technology with inert gas flushing



### Technical data:

	MZ 2C Ex	MZ 4C Ex	MZ 10C Ex
<b>Characteristics</b>			
Stages	2	3	4
Volume flow rate (m <sup>3</sup> /h) at 230V/50 Hz	1,9	3,7	8,1
Ultimate vacuum (mbar abs.)	12	3	2
Connection for vacuum (suction/pressure)	DN 16 / DN 16	DN 25 / DN 16	DN / 25 / DN 16
<b>Electrical data</b>			
Mains (V/Hz)	230/50	230/50	230/50
Power P (W)	150	250	2 x 250
Overall dimensions, L x W x H (mm)	335 x 287 x 253	440 x 260 x 300	560 x 430 x 410
Net weight approx. (kg)	21,6	29,3	63,2

Motors with other voltages and frequencies on request

# Vacuum Pumps

## VP series: Chemistry vacuum pumping unit

The generate totally oil free vacuum with manual vacuum control and efficient exhaust vapour emission condensor. Solvent recovery is the ruling factor for the choice of vacuum systems in chemistry. The variable and flexible chemistry vacuum system offers a practical solution as regards in technology, economy, pollution control and performance for many applications in chemistry laboratories. The pumping unit components are made of chemically resistant materials. The laboratory pumping unit VP3, designed specially for chemistry laboratories, generate totally oil free vacuum, maintain predetermined vacuum and control exhaust vapour emission. Solvent recovery is the ruling factor for the choice of vacuum systems in chemistry.

### Features / Equipment:

- Oil free vacuum
- Low maintenance
- Chemically resistant materials
- High performance at low vacuum
- Solvent recovery next to 100%
- Vacuum gauge
- Flow/vacuum control valve



VP1 and VP2

VP3

### Technical data:

	VP1	VP2	VP3
<b>Characteristics</b>			
Volume flow rate (m <sup>3</sup> /h) at 230V/50 Hz	1,9	3,0	3,8
Ultimate vacuum (mbar) without gas bal.	9	2	2
Connection inlet	hose nozzle NW10/6	hose nozzle NW10/6	hose nozzle NW10/6
Connection outlet	hose nozzle NW10	hose nozzle NW10	hose nozzle NW10
<b>Electrical data</b>			
Mains (V/Hz)	230/50	230/50	230/50
Overall dimensions, L x W x H (mm)	325 x 260 x 475	320 x 260 x 500	406 x 275 x 535
Net weight approx. (kg)	12,1	17,7	26,8

Motors with other voltages and frequencies on request

## MDL with CPCU: High-efficiency debinding oven, incorporating an efficient catalytic post combustion unit

The technology of the powder injection moulding (Powder Injection Moulding - PIM) finds ever more largely becoming acceptance with the production of precise and complex construction units one. In the following ranges increasingly PIM-parts are used:

- Ceramic(s) and porcellain industry
- Textile mechanical engineering
- Watch-and-clock-making industry
- Eyeglass industry
- Tool industry

Basis materials for the injection moulding of metal and ceramic(s) powders are sinterable powders which a suitable grain size possess, in addition belong among other things: Carbides, silicate -, oxide and nitride ceramic(s) products. During the production of PIM-parts the process does not end after the injection moulding, but further processing steps follow like the debinding process (remove the plastic from the "green") as well as the sintering of the "brown". The MDL with CPCU (catalytic post combustion unit) operates at temperatures up to 350 °C at a flow of 400 l/min, ideal conditions for debinding processes. The oven with catalytic post combustion unit was developed for catalytical debinding of ceramic and/or metallic injection molding parts (PIM/MIM) \*).

### Features / Equipment:

- Temperature range of 5 °C (9 °F) above ambient temperature up to 350 °C
- MCS controller with 25 storable programs of 100 sections each for a maximum of 500 program segments
- User-friendly LCD screen
- Easy-to-read menu guide
- Integrated electronic chart recorder
- Variety of options for the graphic display of process parameter
- Real-time clock
- Heat output: 9.0 kW
- Silicone door gasket, resistant to high operating temp.
- Adjustable ramp function via program editor
- Replaceable fresh-air filter cartridge, Class F6 (EU6 fine-particle filter for particle sizes between 1 µm and 10 µm)
- Independent adjustable temperature safety device, Class 2 (DIN 12880) with optical and acoustic alarm
- Fresh-air monitoring with acoustic alarm and automatic shut-off of heating
- RS 422 interface for communication software APT-COM® DataControlSystem
- 2 chrome-plated shelves



\*) it cannot be used for debinding processes according to the BASF method



# Debinding Ovens

## Technical data:

	<b>MDL 115 with CPCU</b>
<b>Exterior dimensions</b>	
Width (mm)	834
Height (inclusive feet/castors/CPCU) (mm)	1700
Depth (mm)	685
plus door handle (mm)	50
Wall clearance rear (mm)	100
Wall clearance side (mm)	100
Exhaust duct outer- Ø (mm) connected with the CPCU	100
Steam space volume (l)	156
<b>Interior dimensions</b>	
Width (mm)	602
Height (mm)	435
Depth (mm)	435
Interior volume (l)	115
Shelves, chrome-plated (number standard/max.)	2/5
Load per shelf (kg)	20
Permitted total load (kg)	50
Weight (empty) (kg)	180
<b>Temperature data</b>	
Temperature range MDL, from 5°C above ambient to (°C)	350
Operating temperature CPCU (°C)	500
Temperature variation MDL at 70 °C (± K)	2
Temperature variation MDL at 150 °C (± K)	3,4
Temperature variation MDL at 300 °C (± K)	7
Temperature fluctuation MDL (± K)	0,5
Heating-up time MDL <sup>1)</sup> at 70 °C (Min.)	3,5
Heating-up time MDL <sup>1)</sup> at 150 °C (Min.)	6
Heating-up time MDL <sup>1)</sup> at 300 °C (Min.)	10
Recov. time after door was opened for 30 sec. <sup>1)</sup> at 70 °C (Min)	0,5
Recov. time after door was opened for 30 sec. <sup>1)</sup> at 150 °C (Min)	2
Recov. time after door was opened for 30 sec. <sup>1)</sup> at 300 °C (Min.)	4
Air change (approx. x/min.)	3
Air circulation (approx. x/min.)	40
Exhaust air volume flow (approx. L/Min. m <sup>3</sup> /h)	400 (24,0)
Air flow velocity (m/sec)	0,8-1,2
<b>Electrical data MDL</b>	
Housing protection acc. to EN 50529	IP 33
Nominal voltage (+10 %) 50/60 Hz (V)	(400 3/N)
Nominal power (W)	9000
Energy consumption at 150 °C (W)	1130
<b>Electrical data CPCU</b>	
Nominal voltage (+10 %) 50 Hz (V)	240
Nominal power (W)	3000

1) to 98 % of the set value

All technical data are specified for units with standard equipment at an ambient temperature of 25 °C and a line voltage fluctuation of ±10%. These average values have been determined according to factory standard, respecting the recommended wall clearances of 10% of the height, width and depth of the inner chamber. Differing ambient temperatures and production-related device-specific variances can lead to varying technical data.

## AAF series: High-efficiency ashing and burning off furnaces

A furnace designed for ashing and burning with protected elements and preheated air giving a high level of uniformity.

These models are heated by wire heating elements protected from chemical and mechanical damage by a high quality, hard wearing alumina based liner. The graded winding and powerful double sided heating elements compensate for the heat loss, as well as preheating the air prior to it entering the chamber. Temperature uniformity within the chamber is therefore excellent, despite the higher airflow through the chamber. The AAF 11/3 and AAF 11/7 have a large floor area which allows many samples to be accommodated and because of the low chamber height the airflow is held close over the samples to promote burning. High airflow of between 4-5 changes per minute is ensured by use of an air inlet and a tall chimney, however it is not too high to disturb the samples in the crucibles, or chill them, as the incoming air is preheated.

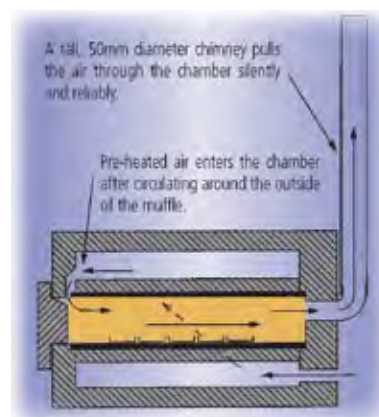
The AAF range is ideal for ashing materials such as food, plastics, coal and other hydrocarbons. The AAF 11/7 furnace complies with the following industry standards BS 1016 part 4, ISO 344 and 1171, ASTM D 2361, D 2795 and D 3174.

The AAF 11/18 has high grade heating wire mounted behind silicon carbide tiles to protect against carbon or corrosive atmospheres. A two tier shelf is supplied as standard, which doubles the furnace capacity.



### Features / Equipment:

- Maximum operating temperature 1100°C
  - Chamber capacities of 3, 7 or 18 liters
  - Robust muffle design of 3 & 7 liters models and silicon carbide tiles of 18 liters model offer strong resistance to carbon build up and chemical attack
  - Constant airflow of 4-5 volume changes per minute ensures rapid combustion
  - Pre-heated airflow to maintain excellent temperature uniformity
  - 3 & 7 liters models supplied with inconel tray & handle for easy loading/unloading
  - Tall chimney for fume exhaust by convection
  - Vertical counter-balanced door keeps hot door insulation away from operator
  - Positive break door safety switch isolates chamber from power supply, when the door is opened
  - Double skinned construction allows convection air flow to cool the outer case, to conform to EN61010 safety standard
  - Choice of PID controller or programmers
- Pictured left are 3 & 7 liters models





# Muffle Furnaces



## Technical data:

	AAF 11/3	AAF 11/7	AAF 11/18
<b>Exterior dimensions</b>			
Width (mm)	290	430	505
Height (inclusive feet/castors) (mm)	480	650	705
Depth (mm)	340	740	675
Height to top of chimney (mm)	780	1060	1015
<b>Interior dimensions</b>			
Width (mm)	150	170	190
Height (mm)	85	90	235
Depth (mm)	250	455	400
Interior volume (l)	3	7	18
Weight (empty) (kg)	22	63	70
<b>Temperature data</b>			
Max. Temperature (°C)	1100	1100	1100
Continuous temperature (°C)	1000	1000	1000
Heat up time (min.)	140	155	70
<b>Electrical data</b>			
Nominal voltage (+10 %) 50 Hz (V)	230	400 (3N)	400 (3N)
Holding power (W)	1270	2300	3500
Max. Power (W)	2100	4000	3500

- 1) Holding power is measured at 1000°C below max. temperature, based on 240V supply, with an empty chamber.
- 2) Uniformity graphs are available on request, for most models.
- 3) All external dimensions are taken with the door closed and include a chimney.
- 4) Heat up time is measured at 1000°C below max. temperature with an empty chamber.
- 5)\* Sample rack and tray system consists of hearth tray, two-tier rack, two sample trays and loading handle.

## Phoenix series: Microwave ashing and burning off furnaces

The new PhoenixT line of microwave-powered muffle furnaces offers unmatched versatility and speed in a rugged, easy-to-use system.

The Phoenix Muffle Furnaces enable companies in many diverse industries to improve their process control, allowing them to make rapid adjustments to reduce „out-of-specification“ product. These systems can perform many high temperature applications up to 97% faster than traditional muffle furnaces.

The Phoenix is available with your choice of either a High Temperature or High Capacity furnace. The High Temperature furnaces reach 1,200 °C and can process up to eight 25-ml crucibles. For laboratories needing greater throughput, the High Capacity furnaces reach 900°C and hold up to fifteen 25-ml crucibles. Any crucible that can be used in a conventional muffle furnace (including platinum) can also be used in the Phoenix Ashing Systems.

The Phoenix Systems are rugged, easy-to-use and engineered to be dependable. Temperature verification and temperature calibration for ISO and GLP practices are quickly and easily performed with optional accessories including NIST traceable dual thermocouples and calibration source instruments.

Phoenix satisfies the equipment requirements for „electrically heated“ furnaces in the following methods:

- ASTM, USP (281 - ROI & 733-LOI), AOAC, FDA, ISO & DIN

Phoenix also meets the requirements for applications listing a "microwave-heated" furnace

- ASTM D5630-94, ASTM D1506-94b

### Features / Equipment:

- Programmable temperature control
- Auto-Start/Auto-Shutdown software
- Built-in exhaust system
- Entry and storage of up to 20 methods
- Built-in calibration software
- Over-temperature and thermocouple failure safeguards
- Built-in system diagnostics
- Use any type of crucible normally used in a conventional muffle furnace, incl. platinum!



### Options:

#### Quartz Fiber Crucibles

These unique quartz fiber crucibles dramatically reduce ashing times and cool in seconds. The quartz fiber material allows oxygen to circulate around the sample speeding combustion.



# Muffle Furnaces

## Options:

### Self-Sealing Quartz Crucibles

For oxygen-free ashing, self-sealing quartz crucibles are available. These crucibles can be used for Carbon Black determination in polyethylene and polypropylene and eliminate the need for slow, fragile tube furnaces.

### Workstation

The Phoenix Workstation option transforms your microwave muffle furnace into a complete center for accurate ashing and data compilation. The system utilizes the furnace's built-in serial and parallel ports to connect to a balance for weighing and a printer for complete documentation of the ashing process to assist you in complying with ISO and other QC requirements.



### Materials being ashed

Butyl Rubber
Carbon Black
Graphite Powder
Kaolin
Polyester (filled)
Polyethylene (unfilled)
Polyethylene (% carbon black)
Polypropylene
TiO <sub>2</sub>

### Typical ashing times

Conventional (Minutes)	MicroWaves (Minutes)	Time savings (%)
90	20	78%
960	90	91%
240	35	85%
120	30	75%
480	15	97%
30	5	83%
30	7	77%
30	5	83%
60	10	83%

## Technical data:

### Exterior dimensions

Width (mm)
Height (mm)
Depth (mm)

### Interior dimensions

Width (mm)
Height (mm)
Depth (mm)
Interior volume (l)
Weight (empty) (kg)

### Temperature data

Max. Temperature (°C)
-----------------------

### Electrical data

Nominal voltage (+10 %) 50 Hz (V)
Power (W)
Magnetron frequency (MHz)

### Phoenix

462
498
654

210
76
116
1,8
44,2











1200
------

220-240
975 +/- 50
2450

## KB series: Precision balance

Convenience model at basic price

### Features / Equipment:

-  Adjusting program (CAL): for quick setting of the balance's accuracy. External adjusting weight required.
-  Piece counting: reference quantities selectable. Display can be switched from piece to weight.
-  Data interface: RS 232 C, bidirectional, for connection of printer or PC.
-  GLP/ISO record keeping of weighing data with date, time and ident.-no. Only with printer.
-  Net-total weighing: weight of tare-cup and weight of components memorized in two separate stores.
-  Percentage determination: Displays the deviation from the reference weight (100%) in % instead of grammes.
-  UNIT: Weighing units can be switched to e.g. non-metric units at the touch of a key. See balance model.
-  Underfloor weighing: load support with hook on the underside of the balance.
-  Accu-supply: rechargeable set (optional).
-  Mains adapter: 230 V / 50 Hz. Standard type D, if requested also available in standard GB, AUS or USA.



### Technical data:











	KB 120-3N	KB 200-3N	KB 240-3N	KB 360-3N	KB 1200-2N	KB 2000-2N	KB 2400-2N	KB 3600-2N	KB 10K0.05N	KB 10000-1N
<b>Measurement data</b>										
Readout (g)	0,001	0,001	0,001	0,001	0,01	0,01	0,01	0,01	0,05	0,1
Weighing range max (g)	121	201	241	361	1210	2010	2410	3610	10100	10100
Reproducibility (g)	0,001	0,001	0,001	0,001	0,01	0,01	0,01	0,01	0,05	0,1
Linearity (+/- g)	0,003	0,003	0,003	0,005	0,03	0,03	0,03	0,05	0,15	0,3
<b>Common characteristics</b>										
Permissible ambient temperature (°C)	+10 ... +40°C									
Mains adapter (V)	230									
Pan, stainless steel (mm)	Ø 81	Ø 81	Ø 81	Ø 81	130 x 130	130 x 130	130 x 130	130 x 130	150 x 170	150 x 170
Overall dimensions, W x D x H (mm)	167x250x123	165x230x123	165x230x123	167x250x85	238x357x180	238x357x180	165x230x80	167x250x85	238x357x180	360x230x180
Net weight approx. (kg)	1,1	1,1	1,1	1	1	1,2	1,2	1,5	1,5	1,7
Data interface	RS 232									

# Precision Balances

## 572 series: Precision balance

Top quality in weighing range and equipment

### Features / Equipment:

-  Adjusting program (CAL): for quick setting of the balance's accuracy. Non verified models only.
-  Piece counting: reference quantities selectable. Display can be switched from piece to weight.
-  Data interface: RS 232 C, bidirectional, for connection of printer or PC.
-  GLP/ISO record keeping of weighing data with date, time and ident.-no. Only with printer.
-  Net-total weighing: weight of tare-cup and weight of components memorized in two separate stores.
-  Percentage determination: Displays the deviation from the reference weight (100%) in % instead of grammes.
-  UNIT: Weighing units can be switched to e.g. non-metric units at the touch of a key. See balance model.
-  Underfloor weighing: load support with hook on the underside of the balance.
-  Accu-supply: rechargeable set (optional).
-  Mains adapter: 230 V / 50 Hz. Standard type D, if requested also available in GB, AUS or USA (only 572)












### Technical data:

	572-30	572-31	572-32	572-33	572-35	572-37	572-39	572-45	572-43	572-49	572-55	572-57
<b>Measurement data</b>												
Readout (g)	0,001	0,001	0,001	0,01	0,01	0,01	0,01	0,05	0,1	0,1	0,05	0,1
Weighing range max (g)	241	301	421	1610	2410	3010	4210	12100	10100	16100	20100	24100
Reproducibility (g)	0,001	0,001	0,001	0,01	0,01	0,01	0,01	0,05	0,1	0,1	0,05	0,1
Linearity (+/- g)	0,003	0,003	0,003	0,03	0,03	0,03	0,03	0,15	0,3	0,3	0,15	0,3
<b>Common characteristics</b>												
Permissible ambient temperature (°C)								+10 ... +40°C				
Mains adapter (V)								230				
Pan, stainless steel (mm)	Ø 105			Ø 150			160 x 200					
Overall dimensions, W x D x H (mm)								180 x 310 x 90				
Net weight approx. (kg)	2,3							2,7				
Data interface								RS 232				

## 440 series: Precision balance

The economical solution for the intelligent smart shopper

### Leistungsmerkmale / Ausstattung:

-  Adjusting program (CAL): for quick setting of the balance's accuracy. Non verified models only.
-  Piece counting: reference quantities selectable. Display can be switched from piece to weight.
-  Data interface: RS 232 C, bidirectional, for connection of printer or PC.
-  GLP/ISO record keeping of weighing data with date, time and ident.-no. Only with printer.
-  Net-total weighing: weight of tare-cup and weight of components memorized in two separate stores.
-  Percentage determination: Displays the deviation from the reference weight (100%) in % instead of grams.
-  UNIT: Weighing units can be switched to e.g. non-metric units at the touch of a key. See balance model.
-  Accu-supply: rechargeable set (optional).
-  Mains adapter: 230 V / 50 Hz. Standard type D, if requested also available in GB, AUS or USA



### Technical data:

	440-21N	440-21A	440-33N	440-35N	440-35A	440-43N	440-45N	440-47N	440-49N	440-49A	440-55N
Readout (g)	0,001	0,001	0,01	0,01	0,01	0,1	0,1	0,1	0,1	0,1	0,2
Weighing range max (g)	40	60	200	400	600	400	1000	2000	4000	6000	6000
Reproducibility (g)	0,001	0,001	0,01	0,01	0,01	0,1	0,1	0,1	0,1	0,1	0,2
Linearity (+/- g)	0,003	0,003	0,02	0,03	0,03	0,2	0,2	0,2	0,3	0,3	0,6

#### Common characteristics









Permissible ambient temperature (°C)	+5 ... +35°C											
Mains adapter (V)	230											
Pan, stainless steel (mm)	Ø 81	Ø 81	Ø 105	Ø 105	Ø 105	130 x 130				150 x 170		
Weighing space, W x D x H (mm)						200 x 300 x 100			165 x 230 x 123 (80)			
Net weight approx. (kg)						1,3						
Data interface	RS 232											

# Analytical Balances

## ABS/ABJ series: Analytical balance

High standard for small budgets

### Features / Equipment:

-  Internal adjusting (CAL): quick setting of the balance's accuracy with internal adjusting weight (ABJ only).
-  Adjusting program (CAL): for quick setting of the balance's accuracy (ABS only).
-  Piece counting: reference quantities selectable. Display can be switched from piece to weight.
-  Data interface: RS 232 C, bidirectional, for connection of printer or PC.
-  GLP/ISO record keeping of weighing data with date, time and ident.-no. Only with printer.
-  Percentage determination: Displays the deviation from the reference weight (100%) in % instead of grammes.
-  UNIT: Weighing units can be switched to e.g. non-metric units at the touch of a key. ABS only.
-  Mains adapter: 230 V / 50 Hz. Standard type D, if requested also available in standard GB, AUS or USA.



### Technical data:

	ABS 80-4	ABS 120-4	ABS 220-4	ABJ 80-4M	ABJ 120-4M	ABJ 220-4M
Readout (mg)	0,1	0,1	0,1	0,1	0,1	0,1
Weighing range max (g)	83	120	220	83	120	220
Reproducibility (mg)	0,1	0,1	0,1	0,1	0,1	0,1
Linearity (+/- mg)	0,2	0,2	0,2	0,2	0,2	0,2

#### Common characteristics

Permissible ambient temperature (°C)	+10 ... +30°C					
Pan, stainless steel (mm)	Ø 80	Ø 80	Ø 80	Ø 80	Ø 80	Ø 80
Overall dimensions, W x D x H (mm)	225 x 315 x 330					
Net weight approx. (kg), approx.	7					
Data interface	RS 232					
Electric power supply (V/Hz)	230 / 50					

ABJ- Series verifiable

## EW series: Analytical balance

Semi-Analytical balance

### Features / Equipment:



Adjusting program (CAL): for quick setting of the balance's accuracy.



Mains adapter: 230 V / 50 Hz. Standard type D, if requested also available in standard GB, AUS or USA.



Data interface: The type of interface is shown by the pictogram (optional).



Rechargeable battery pack: rechargeable set.



### Technical data:

	EW 150-3M	EW 600-2M	EW 1500-2M	EW 3000-2M	EW 6000-1M
Readout (g)	0,001	0,01	0,01	0,01	0,1
Weighing range max (g)	150	600	1500	3000	6000
Reproducibility (g)	0,002	0,01	0,01	0,01	0,1
Verification value (g)	0,01	0,1	0,1	0,1	1
Min. load (g)	0,02	0,5	0,5	0,5	5
Taring range (g)	150	600	1500	3000	6000
Linearity (+/- g)	0,003	0,02	0,02	0,02	0,2

#### Common characteristics

Permissible ambient temperature (°C)

+10 ... +30°C

Pan, stainless steel (mm)

Ø 110

Ø 140

Ø 140

Ø 140

172 x 1420

Overall dimensions, W x D x H (mm)

177 x 230 x 88

Net weight approx. (kg)

1,7

Data interface

RS 232 (optional)

Mains adapter

230 V, 50/60 Hz, balance 9V V DC, 400 mA

**Other balances, e. g. industry balances, platform balances, pocket balances, etc. on request!**

#### Further informations about standards:

[www.iso.ch](http://www.iso.ch)  
[www.din.de](http://www.din.de)  
[www.astm.org](http://www.astm.org)  
[www.jsa.or.jp](http://www.jsa.or.jp)  
[www.webstore.jsa](http://www.webstore.jsa)  
[www.boutique.afnor.fr](http://www.boutique.afnor.fr)  
[www.bsi-global.com](http://www.bsi-global.com)  
[www.cenorm.be](http://www.cenorm.be)

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