



# COMBI PACKAGE *plus*

*For determination of the density index*

- VACUUM DENSITY TESTER  
3VT plus
- ELECTRONIC DENSITY  
INDEX BALANCE  
MK 3000

- USER FRIENDLY
- PROCESS RELIABLE
- FULLY ELECTRONIC



AL-SCHMELZE-MESSTECHNIK  
MELT MEASURING TECHNOLOGY



# COMBI PACKAGE *plus*

## APPLICATION

Metallic and non-metallic impurities, as well as hydrogen and oxides, may negatively affect the quality of an aluminium melt. By measuring the density index, it is possible to define, control and optimise the process of cleaning the melt, thereby improving the quality. In this way, the consistently high quality of the melt is assured and the reject rate effectively reduced.

**Alloy AISi7Mg0,3**  
**Transfer ladle 400 kg**



before impeller treatment  
vacuum sample 80 mbar, density index 13,64%



after impeller treatment 12 min.  
vacuum sample 80 mbar, density index 0,55%

Combi Package plus consists of 3VT plus and MK 3000. The stationary tabletop unit 3VT plus is used to cast two melt samples to compare the densities: one sample solidifies in a defined vacuum of 80 mbar and the other sample at atmospheric pressure. The Electronic Density Index Balance MK 3000 **automatically** determines the specific density of the two samples according to the Archimedean principle and then the density index. The density index represents the percentage difference in density of the produced samples. The lower the density index, the cleaner the melt.

### **Crucible pre-heating chamber**

Combi Package plus includes a crucible pre-heating chamber that allows density index samples to be always prepared under the same conditions:

- The sample crucibles are always heated to 200°C, to prevent the accumulation of humidity in the crucible coating, which could have a negative effect on the sample.
- The pre-heated crucible allows the atomically dissolved hydrogen in the melt to develop its full pore potential.

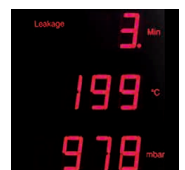
For more information, have a look at our website: [www.mk-gmbh.de](http://www.mk-gmbh.de)

## PC SOFTWARE

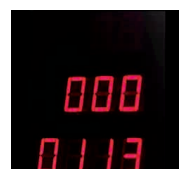
- Saving of measurements
- Use of statistical process control (SPC)
- Analysis and assessment of data by means of various filters for the density index results
- Printable reports, export of results to MS Excel

## SPECIAL FEATURES

- Long lifespan due to sturdy design
- Process reliability through fully electronic control:
  - Fully automatic control of vacuum to 80 mbar
  - Leakage indicator
  - Cycle counter
- High accuracy, through calculation of density to four decimal places (0,0000 g/cm<sup>3</sup>)
- Crucible pre-heating chamber: greater accuracy of measurement
- Capable of 100% calibration



Leakage indicator



Cycle counter

3VT plus

MK 3000

## PRODUCT EXTENSIONS

### DROSS TEST



- Additional process for visual assessment of Al samples
- Pressure step 80 mbar (density index)
- Pressure step 30 mbar (Straube-Pfeiffer test for the assessment of the sample interior regarding hydrogen pores and oxides)
- Pressure step final  $6 \pm 3$  mbar (dross test to assess the sample surface regarding oxides and other impurities)

### MEMORY BOX



- Sturdy and convenient storage medium
- Storage of up to 500 density index results directly at the workstation
- Transfer and analysis of data by supplied PC software
- Manual input of charge number and alloy type possible
- Automatic recording of date, time, density index and all intermediate results

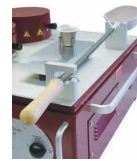
### DROSS TEST R&D



As Dross Test, but in total of 6 pressure steps:

- Pressure step 80/30/final mbar and
- 3 additional pressure steps in the range 140 - final mbar (to be defined by the customer when placing the order)
- Key switch for interlocking the pressure steps

### POURING LADLE SHELF



- Provides a fixed place and secure hold for the pouring ladle
- Consisting of: anodised aluminium holder and one pouring ladle (500 mm, coated)

### DUST PROTECTION CASE



- Protection of the balance from contamination in the foundry
- Sturdy powder-coated construction of steel sheet with cable lead-through
- Cover with gas-pressure damping
- Large impact-proof plexiglas window
- Aluminium handle

### SHOCK ABSORBING PLATE



- Protection of the balance by minimising external factors, such as shocks and vibrations
- Powder-coated steel swing plate with cut-out for cable routing
- 4 rubber feet
- Mounting holes for mk dust protection case

## TECHNICAL DATA

### 3VT plus

#### Design:

Stationary tabletop unit, sturdy powder-coated steel housing, with two carrying handles on the sides

**Dimensions:** W 590 x D 570 x H 480 mm

**Weight:** approx. 42 kg

#### Power connection:

Power cable with plug, 230 VAC, 1400 VA, 50-60 Hz, (115 VAC available on request)

**Power consumption:** 1400 VA

**Vacuum pump:** Oil-lubricated vacuum pump

#### Timer:

Electric short-period timer (1-99 min. or endless = 00) integrated in display

#### Vacuum chamber upper part:

Incl. safety inspection glass

**Heater:** Fixed temperature  $200^\circ\text{C} \pm 10^\circ\text{C}$

**Ambient temperature:**  $10-50^\circ\text{C}$

### MK 3000

#### Design:

Powder-coated Al die-cast housing incl. plastic set-up

**Dimensions:** W 230 x D 350 x H 230 mm (incl. plastic set-up)

**Weight:** approx. 5,5 kg

**Weighing range:** 3.000 g

**Resolution:** 0,01 g

**Stabilising time:** 3 sec.

**Power connection:** 100-240 VAC, 10 VA, 50-60 Hz

**Ambient temperature:**  $10-40^\circ\text{C}$

## PRODUCT LINE



**ALSP plus** incl. crucible pre-heating chamber for determination of the density index



**Thermal Analysis TA 12.13** for determination of grain refinement and modification for the evaluation of mechanical properties



**ALSP highline** incl. crucible pre-heating chamber for determination of grain refinement and modification for the evaluation of mechanical properties

## ABOUT US

We are a medium-sized, privately owned company established in 1984. We are located in the Westerwald region of Germany, about 100 km from Frankfurt, and design and build a range of high-quality aluminium melt test equipment for the foundry industry. Our products are the result of expertise and experience acquired over many years of close association with the aluminium industry. Besides manufacturing our equipment, we also provide customer services such as commissioning, maintenance and calibration of our test equipment, supported by our comprehensive spare parts inventory.

Our customers all over the world are served by us personally as well as by a team of representatives operating worldwide.

## SERVICES

- Device demonstration
- Provision of rental units
- Commissioning and device instructions
- Staff training
- Maintenance and calibration service
- Spare and wear parts
- IT support



**CERTIFIED ACCORDING TO**  
DIN EN ISO 9001 | DIN EN ISO 14001




## MANAGING DIRECTOR Nicolas Knoche

*"Our vision is to become the worldwide leader in the design and manufacture of aluminium melt testing technology and in service to our customers."*

Are you interested in technical consultancy and a demonstration on your premises? We look forward to your inquiry. Please check our website if a local representative is available in your country. Otherwise, please contact us directly for further support.

For more information, have a look at our website: [www.mk-gmbh.de](http://www.mk-gmbh.de)

## CONTACT DATA

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