

## Specification Mini-LAS 11-C



### Measurement Data

<b>Size channels:</b>	31 channels 0.25/0.28/0.3/0.35/0.4/0.45/0.5/0.58/0.65/0.7/0.8/1.0/ 1.3/1.6/2/2.5/3/3.5/4/5/6.5/7.5/8.5/10/12.5/15/17.5/20/25/30/32 [μm]
<b>Count range:</b>	1 to 3,000,000 particles/liter
<b>Particle mass:</b>	From 0.1 μg/m <sup>3</sup> to 100 mg/m <sup>3</sup>
<b>Occupational classification:</b>	Inhalable, thoracic and alveolic in accordance to EN 481 continuously and simultaneously
<b>Environmental data:</b>	PM10 and PM2.5, PM1 continuously and simultaneously

### Instrument Data

<b>Reproducibility:</b>	±3 % over the total measuring range
<b>Sample flow:</b>	Measurement volume of 1.2 l/min ±5 % automatically regulated
<b>Rinsing flow:</b>	0.3 l/min, self-controlled, automatically optical cleaning on start-up and in stand-by mode
<b>Return air supply:</b>	With integrated valve for pressure compensation
<b>Sample collection:</b>	47 mm PTFE-filter, removable
<b>Laser wavelength:</b>	660 nm
<b>Power:</b>	Pmax = 60 mW, Pnom = 0.5/32 mW CW (multiplex)
<b>Operation:</b>	Via foil-keyboard or PC (Software or HyperTerminal)
<b>LCD-display:</b>	2 x 16 alphanumerical characters
<b>Self-test:</b>	Automatically after each start-up
<b>Measurement intervals:</b>	From 6 seconds upwards (for 31 channels)
<b>Storage intervals:</b>	Adjustable: from 6 seconds to 1 hour in preset intervals
<b>Data storage:</b>	Internal 80 kB standard, expandable on removable SD-card and USB flash drive
<b>Communication:</b>	Via PC, USB, Bluetooth, Ethernet and RS-232-interface
<b>Data output:</b>	LCD-display: particle count as moving average over 1 minute or average value with associated sample air volume, alarm level, battery capacity, measuring location no., date and time, sensor values available optional
<b>Analog input:</b>	3 (0-10 V) signals, resolution 10 bits (ca. 10 mV)
<b>Power supply:</b>	Battery 12 V/2.3 Ah for continuous operation up to 8 hours; with internal charger
<b>Power adapter:</b>	18 VDC, maximum current 2.5 A
<b>Dimensions:</b>	24 x 13 x 7 cm

- Weight and color: 2.5 kg blue housing
- Max. operation altitude: Up to 2,000 m
- Operating temperature: +4 to +40 °Celsius (39 to 104 °F), RH < 95 % (non-condensing), non-corrosive or explosive gases
- Storage and transport: -20 to +50 °Celsius (-4 to 122 °F), RH < 95 % (non-condensing)
- Sample air pressure range: 1013 hPa - 50 hPa
- Software** Version 1.178, LabView® for Windows XP upwards (see next page)

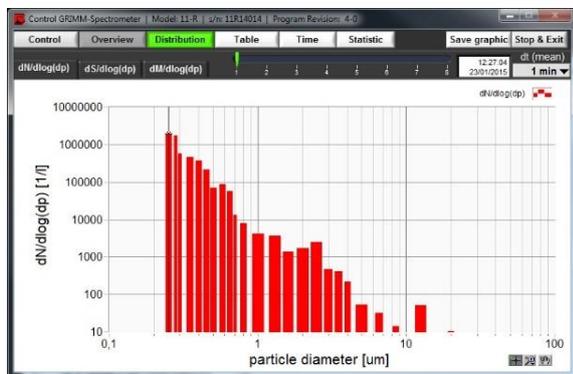
## LabView® Software 1.178

With the new **software 1.178** GRIMM programmed an excellent, user-friendly application software based on LabView®, which is compatible to all 32-/64-bit Windows operating systems from XP and upwards.

Data is displayed numerically or graphically as follows on the attached PC/tablets:

- Mass fraction in all channels as  $\mu\text{g}/\text{m}^3$  and at the same time the occupational health data in  $\mu\text{g}/\text{m}^3$  (in conformity with EN 481)
- Particle count concentration in all channels as particle/liter
- Presentation of immission as PM10, PM2.5, PM1 (not mass specific)

In addition to that, values of external climate sensors and service data of GRIMM devices can be displayed. The presentation and output of the measurement data happens in real-time (6 second intervals) and is therefore suitable not only for data recording and data evaluation, but also for data presentation.



Particle size distribution by number



Particle counts (selectable size channels) over time

date & time	PM10 [ $\mu\text{g}/\text{m}^3$ ]	PM2.5 [ $\mu\text{g}/\text{m}^3$ ]	PM1 [ $\mu\text{g}/\text{m}^3$ ]	Inhaable [ $\mu\text{g}/\text{m}^3$ ]	Thoracic [ $\mu\text{g}/\text{m}^3$ ]	Alveolar [ $\mu\text{g}/\text{m}^3$ ]
23.01.2015 12:27:04	32.2	25.5	18.9	59.8	35.1	27.6
23.01.2015 12:28:04	37.0	26.6	19.9	48.8	39.2	29.0
23.01.2015 12:29:04	36.7	26.6	20.9	43.5	38.3	29.0
23.01.2015 12:30:04	40.7	27.2	19.9	48.1	41.8	39.3
23.01.2015 12:31:04	35.5	26.7	20.4	44.1	37.0	29.1
23.01.2015 12:32:04	37.3	28.2	21.0	47.0	39.4	30.5
23.01.2015 12:33:04	42.0	30.3	21.4	43.1	40.9	32.9
23.01.2015 12:34:04	40.6	29.8	21.7	58.2	41.3	32.3

Particulate Matter and Occupational Safety values

date & time	0.25 um	0.30 um	0.35 um	0.40 um	0.45 um	0.50 um	0.58 um	0.65 um
23.01.2015 12:27:04	1.55	1.14	1.14	1.22	1.27	0.93	0.91	0.86
23.01.2015 12:28:04	1.61	1.19	1.16	1.28	1.31	0.91	0.82	1.00
23.01.2015 12:29:04	1.67	1.23	1.20	1.35	1.37	1.02	0.89	0.98
23.01.2015 12:30:04	1.68	1.19	1.16	1.28	1.33	0.94	0.85	0.99
23.01.2015 12:31:04	1.63	1.21	1.18	1.29	1.38	0.97	0.88	1.01
23.01.2015 12:32:04	1.66	1.23	1.19	1.33	1.39	1.01	0.88	1.07
23.01.2015 12:33:04	1.67	1.24	1.22	1.37	1.43	1.02	0.89	1.02
23.01.2015 12:34:04	1.70	1.28	1.24	1.38	1.41	0.98	0.74	1.15

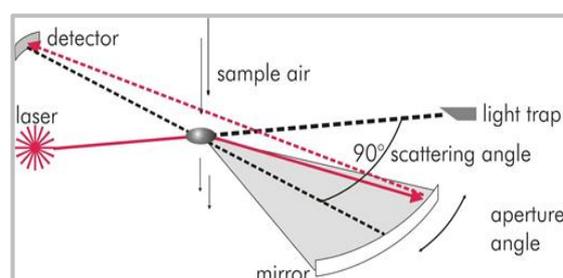
Differential mass distribution of the particles

## Some of our accessories

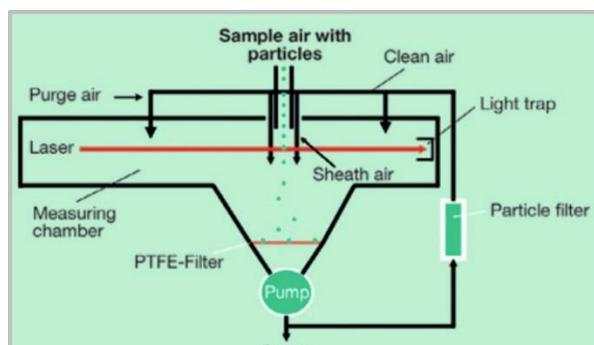
- 1111 Radial symmetric sampling head
- 1113A PTFE-filter (25 pcs.)
- 1141A Special GRIMM communication cable RS-232 to USB (with lager buffer)
- 1144A PVC carrying case with rigid foamed plastic insert
- 1148 Mini filter for zero test
- 1152 Isokinetic sampling set
- 1158-EE Sensor for temperature and rel. humidity, temperature range -40 to +60 °C
- 1154 Sensor for temperature, rel. humidity and velocity, temperature range 0 to +80 °C

## Instrument operation

GRIMM's more than 30 years of experience in manufacturing aerosol spectrometers are reflected in the **patented scattered light** measurement cell and its electronic signal output for every particle size. This know-how combined with high-quality material ensure precision and high data quality.



Measurement principle



## Device concept

The pneumatic scheme shown on the left demonstrates that the sample air enters the measuring chamber from the top in such a way, so that **only one particle at a time** is measured (this is the difference to any Nephelometer method). The outlet after the

## Gravimetric filter

Additionally, in the patented **11-C** device the measured dust sample is always **collected** on an integrated **PTFE-filter**, so that a subsequent analysis is possible at any time.

**For fine dust analysis in highest precision** ranging from 0.25 to 32  $\mu\text{m}$  in 31 size channels, this top of the line device is unique and has no equal! The areas of use range from fine dust monitoring in industrial and manufacturing facilities to workplace measurements. With the advanced data communication interfaces, the **11-C** offers its users utmost flexibility and mobility.

