

Experiment Sound power level

Crambo 5200-6200 direct



Client: Komptech Umwelttechnik GmbH

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Order and task

Sound measurements are conducted on the Crambo 5200 - 6200 Direct at different operating states to determine the resulting sound power.

The sound pressure measurements for determining the sound power are conducted in accordance with Directive 2000/14/EC on the basis of the noise emission basic standard EN ISO 3744:1995 (hemisphere method with at least 6 microphone positions).

The sound pressure level at the workplace with 2 microphones is captured in parallel.

The test takes place at the forecourt of the Komptech Research Center in St. Michael.

2

Measurement and evaluation criteria

[1] EN ISO 3744:1995

Acoustics - Determination of sound power levels of noise source using sound pressure; envelope engineering method of precision class 2 in an essentially free sound field over a reflecting plane.

[2] EN ISO 11201:1995

Acoustics; noise emitted by machinery and equipment

Measurement of emission sound pressure levels at a work station and at other specified positions;

Engineering method of precision class 2 in an essentially free field over a reflecting plane.

3 Performing the measurement

3.1 Date, location and responsible persons

The measurement took place on 06/11/2012 on the premises of the Komptech Research Center, 8770 St. Michael. The measurements were conducted by Andreas Seitingner.

3.2 Measuring equipment

High-precision sound level meter:	Dewetron 2502 (SN.: 21070055)
A/D converter card:	Dewetron ORION 1624 (SN.: 010100AD)
Measuring amplifier:	DAQP-ACC-A (SN.: 286537, 286515, 286414, 286513, 286512, 286511)
Microphones (6 pcs):	Microtech Gefell, type: M360, M370 (SN.: 1410, 1435, 1433, 1409, 0635, 1434)
Data recording and analysis system:	DeweSoft 7.0.4
Calibrator:	Microtech Gefell, type 4000 Test signal: 114 dB/1000 Hz

Table 2: Measuring equipment for measuring the sound power level of Crambo 5200 direct

All microphones are calibrated before and after the measurement.

3.3 Measuring points

Sound power level:

Hemispherical measurement surface according to [1]

Radius = 10 m

Microphone positions 02 – 12

A sketch of the measuring points is located in the Appendix.

Sound pressure level at the workplace:

Microphone positions according to [2] in the area of the control location at a height of approx. 1.6 m above the

ground at the left and right ear and at 100 cm distance from the control panel.

3.3

Set-up and operating conditions

The noise measuring location (paved hall forecourt) was salt-wet. Reflection from the hall wall at about 17 m distance to the measuring object could not be clearly demonstrated by measurements.

The weather conditions (cloudy, 3 °C, no precipitation, 80-85% RH, atmospheric pressure: 945 hPa) were acceptable for the measurement.

A sketch of the machinery set-up is located in the Appendix.

Measurements were taken in idle and in working operation at n_{\max} 0.7 engine fan speed. Working operation means that the machine is loaded with rootstock.

During measurements, the loading device was moved away and was not operated.

The measuring duration of each individual measurement is 30 seconds.

The measured average ambient noise level is **64.1 dB(A)**.

During measurements the extraneous noise was more than 25 dB below the noise emissions of the object to be measured. Therefore: Extraneous noise correction **K1 = 0 dB**.

The ambient correction is assumed **K2A = 0 dB** in accordance with [2].

4 Measurements

Measuring point	Operating noise		Idle noise	
	L_{Aeq}	L_{AFmax}	L_{Aeq}	L_{AFmax}
MP 02	81.4	83.9	80.7	82.5
MP 04	80.1	82.6	79.3	80.5
MP 06	77.3	81.6	75.7	77.3
MP 08	80.6	85.3	79.8	80.4
MP 10	82.6	85.1	82.0	84.6
MP 12	81.8	85.2	80.9	81.6
$L'_{p(ST)}$	80.9		80.1	

Table 3: Enveloping surface measurement points

Measuring point	Operating noise		Idle noise	
	L_{Aeq}	L_{AFmax}	L_{Aeq}	L_{AFmax}
L_{Aeq} workplace	87.8	89.9	87.6	88.2

Table 4: Sound power level in the working area

Sound power level:

The measuring surface sound pressure levels were measured according to EN ISO 3744:1995 and the sound power was determined.

The radius of the measuring hemisphere is **10 m**.

The following sound power levels were determined:

Sound power in the working operation:	$L_{WA} = 108.9 \text{ dB(A)}$
Sound power at idle:	$L_{WA} = 108.1 \text{ dB(A)}$

Table 5: Sound power levels

Sound pressure level in the working area:

The sound pressure levels at the workplace were measured according to EN ISO 11201 [2].

The following sound pressure levels were determined at the workplace:

during working operation	$L_{pA} = 87.7 \text{ dB(A)}$
	$L_{pC \text{ peak}} = 106.2 \text{ dB(C)}$
at idle:	$L_{pA} = 87.5 \text{ dB(A)}$
	$L_{pC \text{ peak}} = 104.1 \text{ dB(C)}$

Table 6: Sound pressure level in the working area:

Measurement of LAF in working operation:

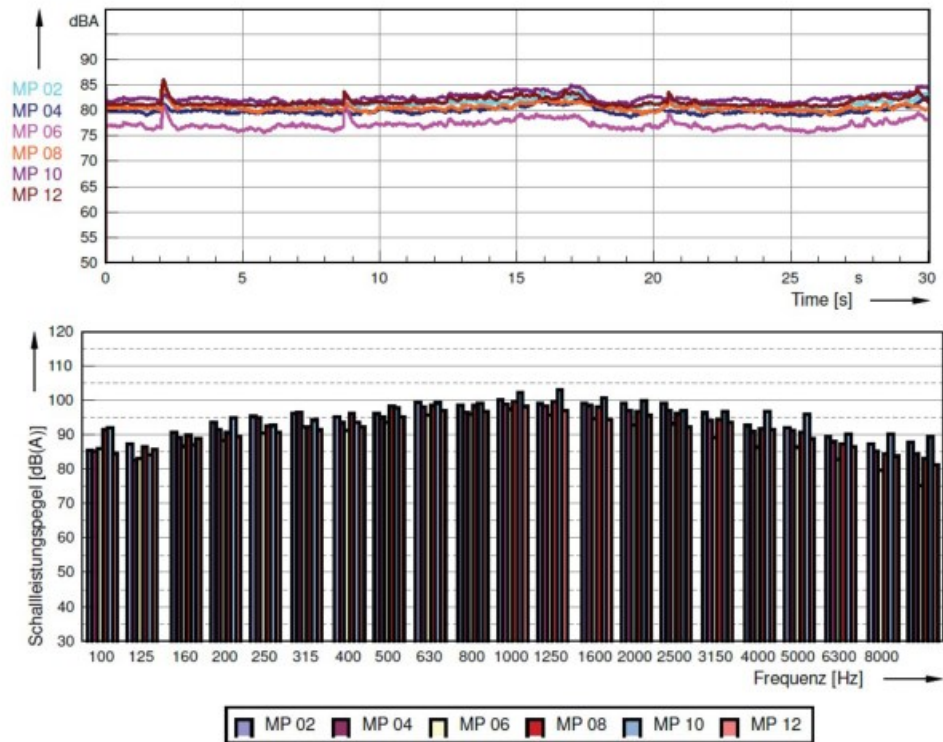


Figure 1: Measurement of LAF in working operation

Fre- quency	MP02	MP04	MP06	MP08	MP10	MP12
[Hz]	[dB(A)]					
100	85.4	85.2	86.0	91.6	92.1	84.6
125	87.3	82.6	83.2	86.6	84.2	85.8
160	90.7	89.2	86.7	89.8	87.0	89.0
200	93.6	91.6	88.4	90.6	94.8	89.5
250	95.4	94.8	90.5	92.6	92.6	90.7
315	96.3	96.5	92.3	92.4	94.2	91.3
400	95.1	93.5	91.2	96.2	93.7	92.4
500	96.2	95.0	93.6	98.4	97.9	95.1
630	99.5	98.0	95.8	98.5	99.3	97.1
800	98.6	96.4	96.0	98.5	99.1	96.7
1000	100.2	98.8	97.5	99.7	102.4	98.3
1250	99.0	98.4	95.8	99.7	103.0	97.1
1600	99.1	98.5	94.8	98.1	100.8	94.4
2000	99.1	97.1	92.8	96.9	99.8	95.6
2500	99.1	97.1	93.2	96.2	97.1	92.3
3150	96.4	94.1	89.2	94.5	96.8	93.7
4000	92.7	90.9	86.4	91.9	96.9	91.5
5000	92.1	91.2	86.4	90.8	95.9	88.8
6300	89.5	88.0	82.9	87.3	90.2	86.6
8000	87.2	85.2	79.6	84.3	90.3	83.8
10000	87.9	84.4	75.2	83.2	89.5	81.3

Table 7: Measurement of LAF in working operation

Measurement of LAF at idle:

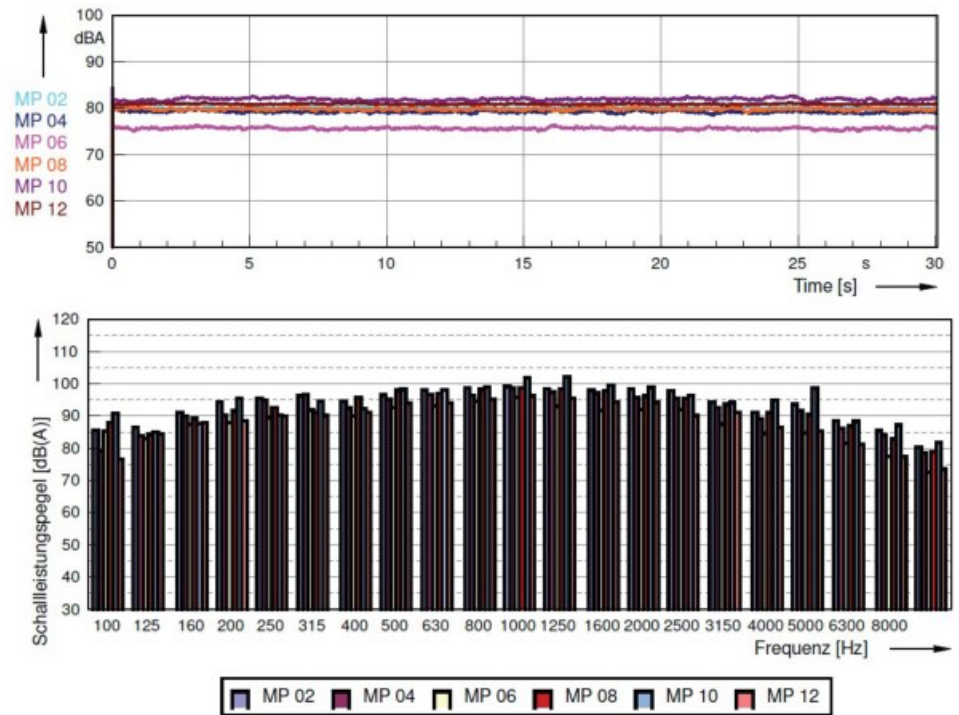


Figure 2: Measurement of LAF at idle

Fre- quency	MP02	MP04	MP06	MP08	MP10	MP12
[Hz]	[dB(A)]					
100	85.6	79.3	85.4	87.8	90.8	76.5
125	86.4	83.8	83.0	84.2	84.9	84.4
160	91.1	90.0	87.3	89.2	87.6	87.9
200	94.3	90.2	87.8	91.5	95.5	88.5
250	95.5	95.0	89.5	92.6	90.4	89.8
315	96.1	96.7	91.8	91.3	94.7	90.1
400	94.5	92.4	89.9	95.7	92.2	91.0
500	96.5	95.1	92.7	97.9	98.2	93.9
630	98.2	96.7	93.1	96.9	98.2	94.1
800	98.6	96.4	94.6	98.2	98.9	95.2
1000	99.1	98.6	95.6	98.7	102.0	96.2
1250	98.4	97.4	92.9	98.4	102.2	95.4
1600	98.0	97.0	91.7	97.7	99.6	94.4
2000	98.3	95.8	92.0	96.2	98.8	94.2
2500	97.8	95.3	92.0	95.4	96.3	90.1
3150	94.3	92.6	87.5	93.6	94.2	91.2
4000	91.1	89.0	84.5	91.2	94.8	86.5
5000	93.6	91.6	84.8	90.4	98.6	85.3
6300	88.5	86.2	81.6	86.9	88.3	81.2
8000	85.5	84.0	77.4	82.8	87.2	77.5
10000	80.2	78.7	72.6	79.0	81.8	73.5

Table 8: Measurement of LAF at idle

5 Appendix

5.1 Microphone positions for sound power level determination

Arrangement of 6 measuring positions on a hemisphere-measuring surface with measuring radius $r = 10\text{ m}$ according to EN ISO 3744:1995.

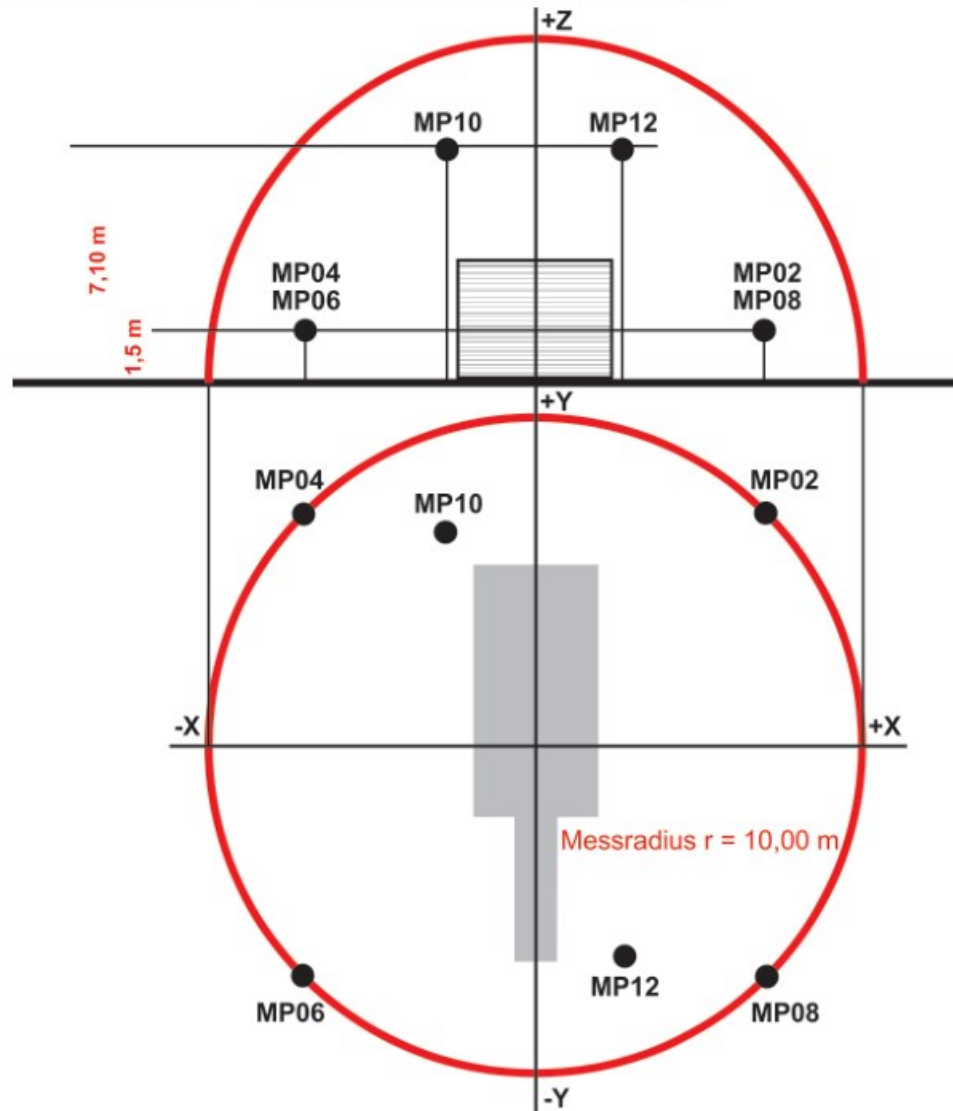
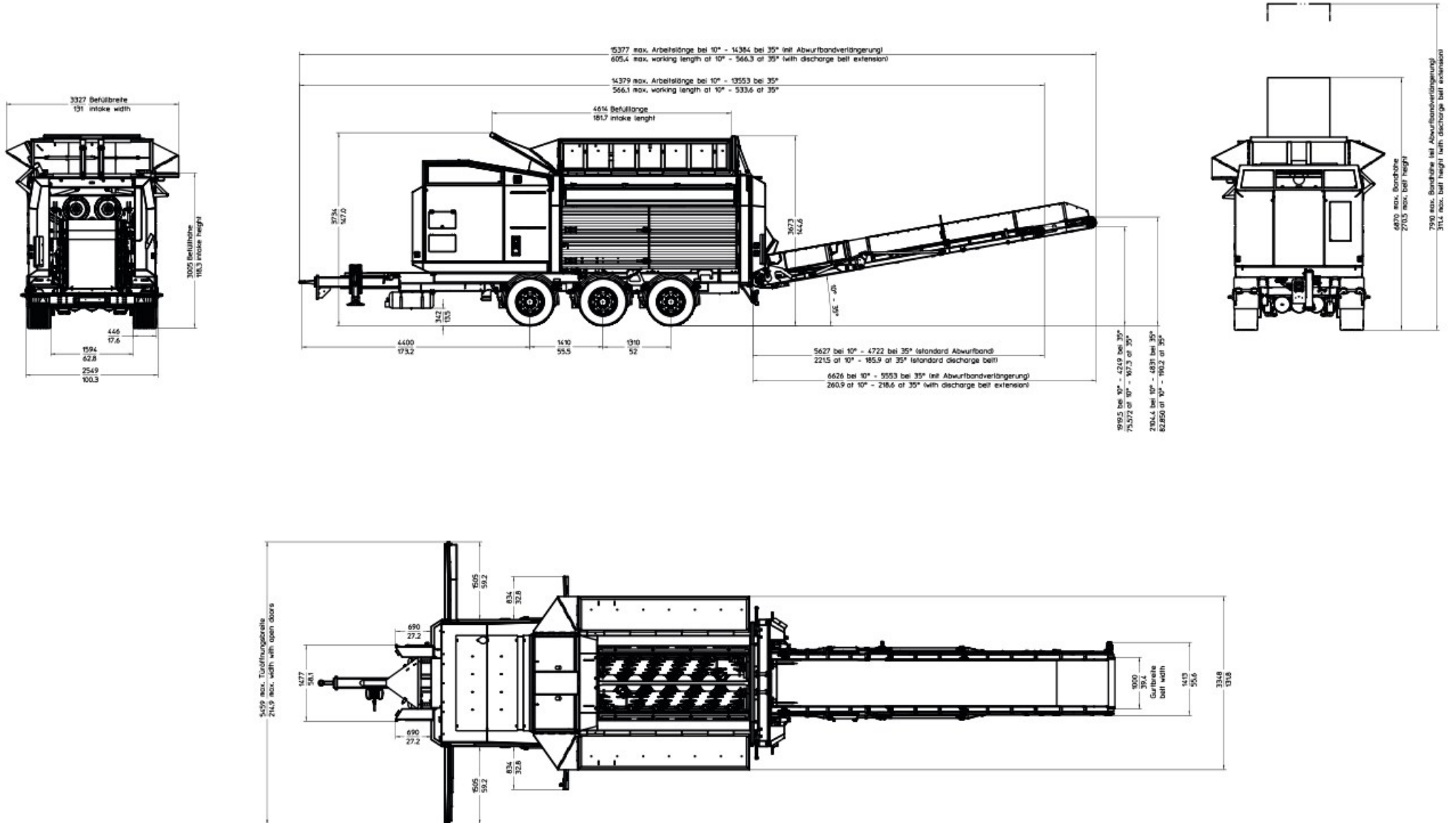
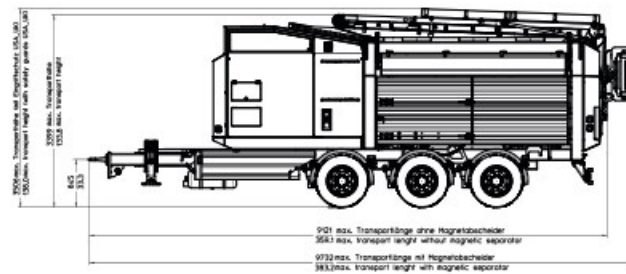
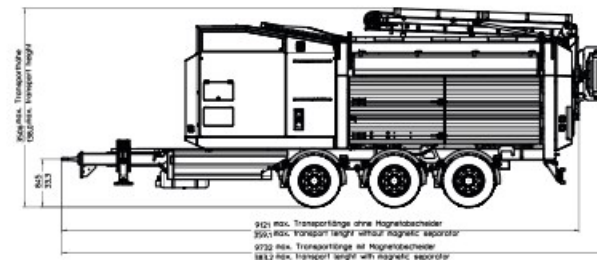
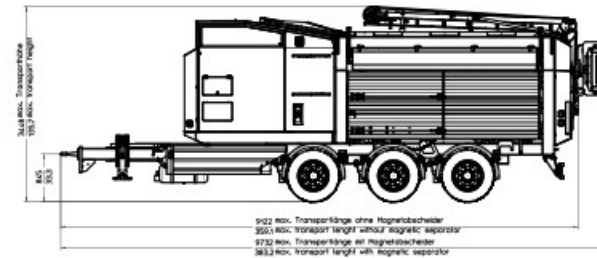
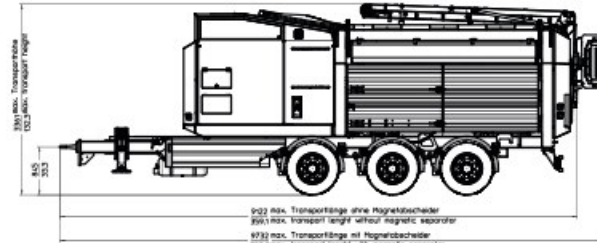


Figure 3: Microphone positions for sound power level determination

	X/r	Y/r	Z
MP02	+0.70	+0.70	1,5 m
MP04	-0.70	+0.70	1,5 m
MP06	- 0.70	-0.70	1,5 m
MP08	+0.70	-0.70	1,5 m
MP10	-0.27	+0.65	0.71 r
MP12	+0.27	-0.65	0.71 r

Table 9: Microphone positions

WORKING POSITION / ARBEITSSTELLUNG


TRANSPORT POSITION / TRANSPORTSTELLUNG




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