1 inch HIGH-FIDELITY DOME TWEETER

APPLICATION

For the reproduction of audio frequencies from 1500 Hz to 22000 Hz with very low distortion in multi-way high fidelity loudspeaker systems according to DIN 45500. Minimum recommended cross-over frequency 1600 Hz.

TECHNICAL DATA

	version T4	version T8	
Rated impedance	4	8	Ω
Voice coil resistance	3,4	6,7	Ω
Resonance frequency	1000	1000	Hz
Power handling capacity, (mounted on baffle)			
cross-over frequency 1600 Hz - 12 dB/oct.	20	20	W
cross-over frequency 4500 Hz - 12 dB/oct.	40	40	W
Operating power	4	4	W
Sweep voltage	3	4,5	V
Energy in airgap	110	110	mJ
Flux density	1,2	1,2	T
Airgap height	3	3	mm
Voice coil height	3	3	mm
Core diameter	25	25	mm
Magnet material	Fxd	Fxd	
diameter	72	72	mm
weight	0,25	0,25	kg
Weight of loudspeaker	0,55	0,55	kg

Material of dome and surround is polycarbonate.

Dimensions (mm)

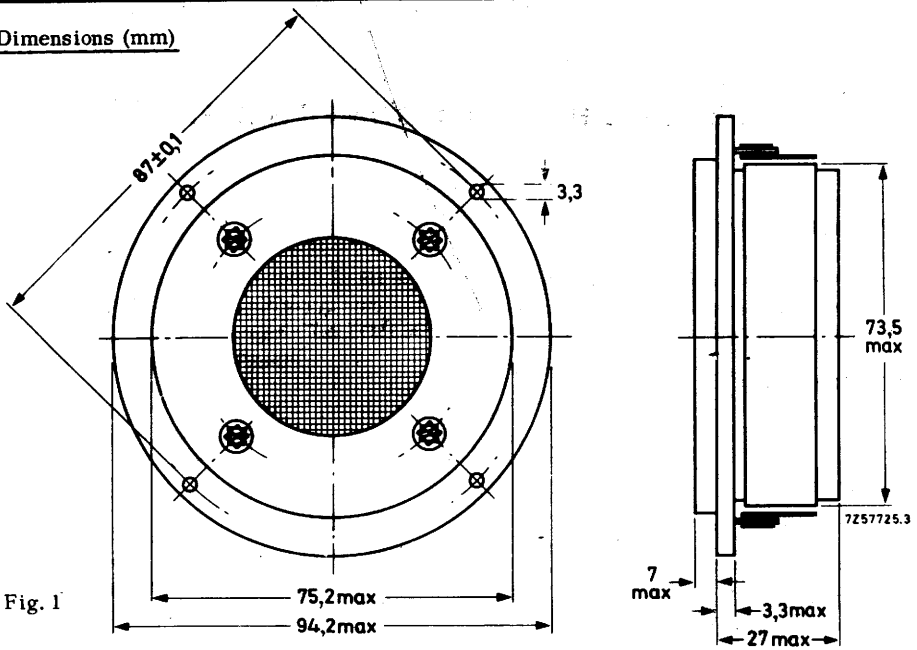

Fig. 1

One tag is indicated by a red mark for in-phase connection.

Face of loudspeaker should not lie behind plane of baffle.

AVAILABLE VERSIONS

AD 0160/T4, catalogue number 2422 257 331.1

AD 0160/T8, catalogue number 2422 257 331.2

- 0 = stamped on loudspeaker magnet (not to be used for ordering)
- 2 for bulk packing*)
- 6 for single unit packing

FREQUENCY RESPONSE CURVES

Fig. 2 Input power 4 W

Curve a: Sound pressure measured in anechoic room, loudspeaker unmounted. The characteristic may be, over the width of one octave, maximum 2 dB lower than indicated.

Curve c: Total non-linear distortion, measured at the operating power in anechoic room, loudspeaker mounted on baffle.

*) Minimum packing quantity 9 per unit.

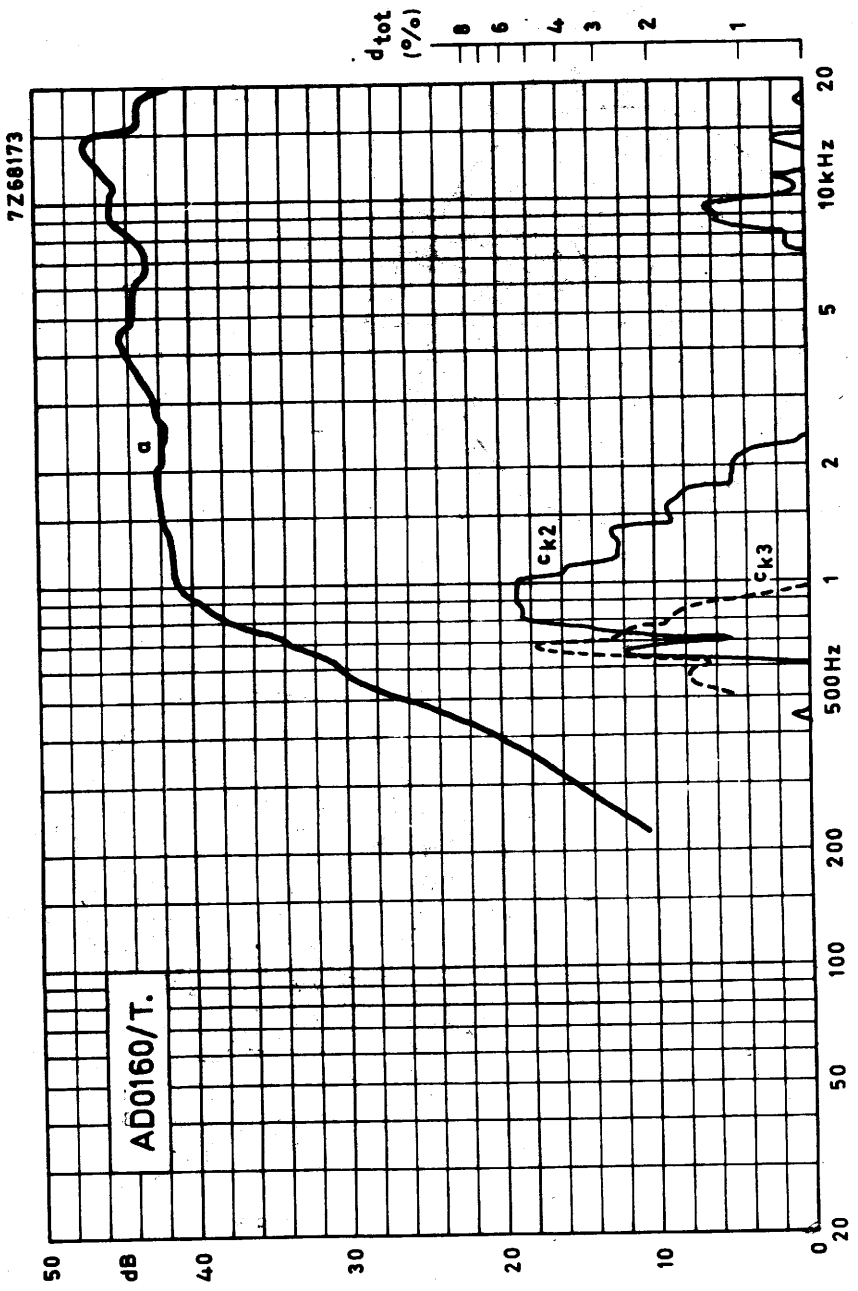
7Z68173
dtot (%)
8
6
4
3
2
1
a
ck2
ck3
AD0160/T.
dB
50
40
30
20
10
0
20
50
100
200
500Hz
1
2
5
10kHz
20

Fig.2

Directional curves at different frequencies

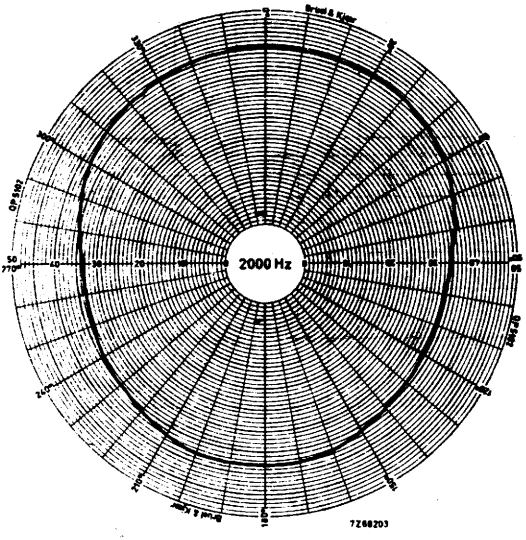

Fig. 3

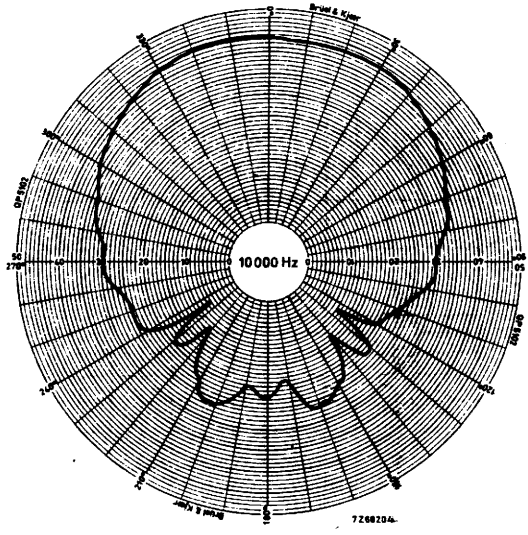

Fig. 4

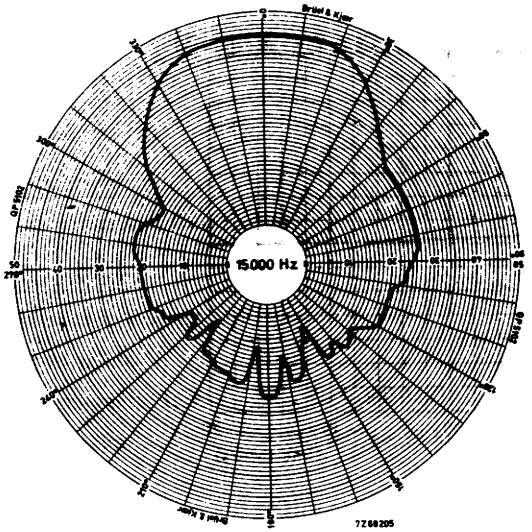

Fig. 5

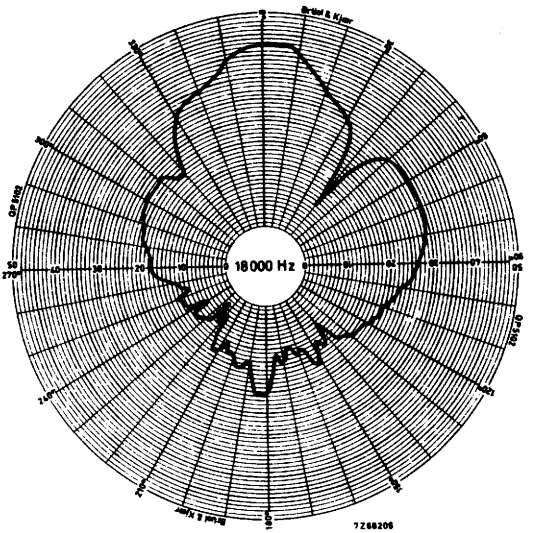

Fig. 6

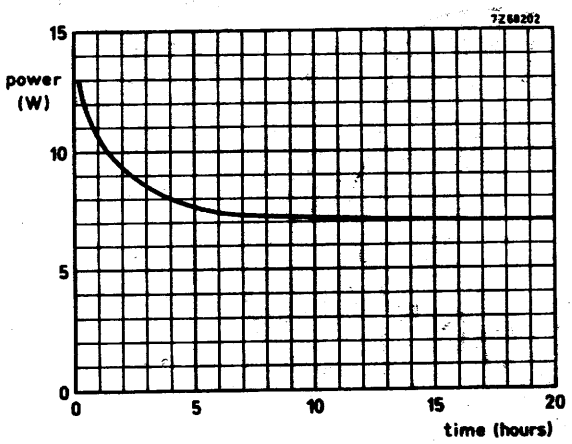

Fig. 7 Maximum permissible power characteristic for unmounted tweeter only, valid for frequencies from 2 kHz onwards. White noise. High-pass network 2000 Hz, 12 dB/oct.

RESPONSE CURVES

For the standard range one curve (a), showing the sound pressure as a function of the frequency is given in the Data sheets.

For the High quality range two additional curves b and c can be found in the Data sheets concerned, showing the sound pressure and the distortion as a function of the frequency.

For the High fidelity range the curves a, b and c are given, and for the squawkers and tweeters besides a directional response curve (d).

Measuring conditions concerning mounting of the loudspeaker:

		sound pressure			distortion
		curve a	curve b	curve d	curve c
measured in →		anechoic room	half free field	anechoic room	anechoic room
Standard range		unmounted			
High quality range	woofers	unmounted	enclosure		enclosure
	full range	unmounted	baffle		baffle
	tweeters	unmounted	baffle	unmounted	baffle
High fidelity range	woofers	unmounted	enclosure		enclosure
	squawkers	unmounted	baffle or enclosure	unmounted	baffle or enclosure
	tweeters	unmounted	baffle	unmounted	baffle

TERMS AND DEFINITIONS

"Unmounted": The loudspeaker is placed in a clamping set-up which does not influence its radiation characteristics.

"Mounted in enclosure" : The loudspeaker with the gasket outside the enclosure of dimensions specified on the data sheet (flush mounted or front mounted as specified).

"Baffle" : The loudspeaker is fitted to a baffle of dimensions specified on the data sheet (flush mounted or front mounted).

"Half free field" : The acoustical conditions on the forward side approach those of free space.

"Anechoic room" : The acoustical conditions approach those of free space.
(IEC Publication 200, para 3.1).

"Operating power" is the sine-wave power input to the loudspeaker which corresponds with a sound level of 96 dB with respect to 2 x 10^{-4} μbar at a microphone distance of 1 m, or 86 dB on a distance of 3 m respectively. This sound level is the average level over the frequency range of the loudspeaker.

ATMOSPHERIC CONDITIONS

The atmospheric conditions for measurement are :

Temperature	:	15	to	35	°C
Relative humidity	:	45	to	75	%
Pressure	:	860	to	1060	mbar

TEST METHODS AND MEASUREMENTS

1 Impedance

The impedance is the modulus of the lowest value of the electrical impedance in the frequency range above the resonance frequency of the loudspeaker as determined by the method specified in para.3 below.

1.1 Measuring apparatus

- Audio-frequency sinus-signal generator with a constant output voltage over the range 0 to 20000 Hz.
- Linear amplifier with an output impedance not greater than 1/3 of the rated loudspeaker impedance and a power output of approx. 0.1 x the power handling capacity of the loudspeaker.
- A 1 Ω resistor connected in series with the loudspeaker.
- An electronic voltmeter shunted across the 1 Ω resistor.

1.2 Conditions

- The loudspeaker is unmounted.
- The power input to the loudspeaker will not exceed 0.1 x the power handling capacity as determined in para. 4 below.

1.3 Measuring result

The mean value of the impedance measured on production samples is stated on the data sheets as rated impedance.

2 Voice coil resistance

The voice coil resistance is the (d.c.) resistance of the voice coil.

2.1 Measuring apparatus

Low d.c. Ohm-meter.

2.2 Conditions

The d.c. power input to the loudspeaker does not exceed 0.1 the power handling capacity.

2.3 Measuring result

The measured resistance, with its tolerance, is given on the data sheets.

3 Resonance frequency

The resonance frequency is that frequency where the modulus of the electrical impedance has its first principal maximum in an ascending scale, the electrical input being such as to have no significant effect on the resonant frequency.

3.1 Measuring apparatus

Same as for "Impedance". See para.1.

3.2 Conditions

- The loudspeaker is measured unmounted.
- The resonance frequency is determined after applying to the loudspeaker for a duration of 5 s a test signal equal to that required to test the power handling capacity.

3.3 Measuring result

The resonance frequency is that frequency at which the voltmeter indicates the first minimum deflection as the frequency is swept slowly from 0 Hz, the output voltage of the amplifier being such that the voltmeter reads for the resonance frequency :

40 to 60 mV for loudspeakers with a rated impedance less than 20 Ω;

15 to 25 mV for loudspeakers with a rated impedance between 20 Ω and 100 Ω;

4 to 6 mV for loudspeakers with a rated impedance greater than 100 Ω.

4 Power handling capacity

The power handling capacity is the nominal power which the loudspeaker will satisfactorily handle as checked by an accelerated life test.

4.1 Test apparatus

- White noise generator.
- Power amplifier with an output impedance not greater than 1/3 of the rated impedance of the loudspeaker.
- Filter(s) as specified below.
- Voltmeter indicating the r.m.s. value of the voltage.

4.2 Conditions

- A test voltage is applied to the loudspeaker for an uninterrupted period of 100 hrs. The r.m.s. value of this voltage corresponds with the specified power handling capacity of the loudspeaker.
- The test voltage has a frequency distribution corresponding with that of the output of a filter as specified in IEC Publication 200, para. 5.7, or DIN 45 573, when fed from a white noise source.
- If the loudspeaker is designed to operate in a restricted frequency range, the corresponding network (filter) which is connected to the loudspeaker during the test, is specified on the data sheet. The test voltage is measured at the input terminals of the network.
- The method of mounting is as specified on the data sheet.

4.3 Test result

To pass this test the loudspeaker has to function properly at the end of the test period. Deviation from the specified resonance frequency is allowed.

5 Total non-linear distortion

This is the ratio between the r.m.s. value of the harmonic content of the sound pressure to the average value of the sound pressure over the frequency range of the loudspeaker. The distortion is expressed as a percentage.

5.1 Conditions

- The loudspeaker is mounted as specified on the data sheet.
- The power input to the loudspeaker is the operating power.
- The microphone distance is as specified on the data sheet. (See also definition of "Operating power")

5.2 Measuring result

The distortion curve with its limits of High quality and High fidelity loudspeakers is given on the data sheet.

6 Sweep voltage

The sweep voltage test involves the loudspeaker to receive a sinusoidal test signal of specified constant amplitude. The frequency of this signal is swept through the specified frequency range.

6.1 Test apparatus

- Audio-frequency sinus-signal generator with a constant output voltage over the range from 0 to 20 000 Hz.
- Linear amplifier with an output power appropriate to the loudspeaker under test and an output impedance not greater than 1/3 x the rated loudspeaker impedance. For power see 6.2.
- An electronic voltmeter with high input impedance.

6.2 Conditions

- The loudspeaker is tested unmounted.
- The input voltage is
  a) for the Standard range such that the power input to the loudspeaker is 0.5 x the specified power handling capacity.
  b) for the High quality range and the High fidelity range as specified on the data sheets
- If the loudspeaker is designed to operate in a restricted frequency range, the corresponding network (filter) which is connected to the loudspeaker during the test, is specified on the data sheet. The test voltage is measured at the input terminals of the network.

6.3 Test result

To pass this test the loudspeaker has to function properly during the test.

7 Flux density

This is the magnetic flux density measured in the air gap.

7.1 Measuring apparatus

- Differential search coil pair.
- Galvanometer.

7.2 Conditions

- The distance between the centres of the two coils is equal to the air gap height minus 1 mm.
- The two coils are put into the air gap symmetrical with respect to the poleplate.

7.3 Measuring result

The minimum flux density as measured on production samples is stated on the data sheet.

8 Frequency response

The frequency response is the graph representing the sound pressure as a function of frequency applying to the loudspeaker a constant sine-wave signal V.

8.1 Measuring apparatus

- Microphone	Bruel & Kjaer, type 4131
- Microphone amplifier	Bruel & Kjaer, type 2605
- Cathode follower	Bruel & Kjaer, type 2613
- Sine /random generator	Bruel & Kjaer, type 1024
- Level recorder	Bruel & Kjaer, type 2305

The apparatus is set as follows :

- Writing speed	125	mm/s
- Paper speed	3	mm/s
- Range potentiometer	50	dB
- Lower limiting frequency	10	Hz
- Rectifier response	r.m.s.	
- Writing width	100	mm
- Compressor speed	300	dB/s

8.2 Conditions

- Sine-wave signal $V = \sqrt{W.Z_r}$
  where
- for anechoic room measurements W = 50 mW for loudspeakers up to 23 cm (9 in) nominal diameter, or 25 mW for all loudspeakers of greater diameter

  V = test voltage
  Z_r = rated impedance as specified on the data sheet

- Microphone position : in axis of loudspeaker on a distance of 50 cm for anechoic room measurements

- The reference level of 0 dB represents a sound pressure level of 52 dB with respect to 2×10^{-4} µbar (2×10^{-5} N/m^2), unless otherwise stated

- Curve a is measured in a anechoic room ; loudspeaker unmounted

- Curve b is measured in a half free field ; loudspeaker mounted as specified on the data sheet

- Curve d is measured in a anechoic room ; loudspeaker unmounted

8.3 Measuring result

A description of the sensitivity and the frequency response curve(s), together with the limits for curve a are given on the data sheet.

9 Direction of magnetisation

The magnet is so magnetised that the centrepole is south for systems with a ring magnet, and north for systems with a slug magnet.

10 Polarity

The cone of the loudspeaker will move outward when a d.c. voltage is applied to the terminals so that the red marked terminal is positive.
The voltage applied does not exceed the "sweep voltage".