

# Product Data

## 1/2" Condenser Microphone Cartridge Type 4130 Microphone Preamplifier Type 2642 Microphone Power Supply Type 2810

### USES:

- Noise measurements to IEC 651, Type 2 and ANSI S 1.4–1983, Type 2
- Noise monitoring
- Sound insulation, sound transmission and sound power measurements
- Quality control measurements
- General sound measurements

### FEATURES:

#### Microphone Type 4130:

- Conforms to: IEC 651, Type 2 and ANSI S 1.4–1983, Type 2
- Sensitivity 10 mV/Pa (–40 dB re 1 V/Pa) with 28 V polarization voltage
- Frequency range from 5 Hz to 12.5 kHz  $\pm 3$  dB

- Dynamic range from 13.5 to 142 dB (A-weighted noise floor to 3% distortion limit)
- Rugged construction with high resistance to humidity

#### Preamplifier Type 2642:

- Frequency range from 20 Hz to 20 kHz  $\pm 1$  dB
- Wide dynamic range
- Low noise
- High input impedance
- Small size and robust construction

#### Power Supply Type 2810:

- Two identical channels with separately adjustable gain controls with 0 to +40 dB range
- Built-in amplifiers with frequency range from 10 Hz to 15 kHz  $\pm 1$  dB
- Battery powered with long battery lifetime
- Lightweight, compact construction

Types 4130, 2642 and 2810 constitute a completely self-contained, low-cost microphone system for general monitoring purposes. This combination is compatible with the wide variety of portable instruments available from B & K for measuring, recording and analyzing sound, and may also be used as part of a multichannel data acquisition system.

The 1/2" Condenser Microphone Type 4130 is a robust, quality transducer which is primarily intended for use with Brüel & Kjær dosimeters and with the 1/2" Microphone Preamplifier Type 2642. The 4130/2642 combination yields a compact, rugged assembly for operation in the harsh environment of industry. The Microphone Power Supply Type 2810 is a battery-operated unit with two independent channels. It supplies the necessary operating voltages for driving two Type 2642/4130 assemblies.



## Description

### Microphone Type 4130

The 1/2" Condenser Microphone Type 4130, shown in Fig. 1, is a low cost, robust microphone which connects directly to Microphone Preamplifier Type 2642 and is well suited for use in the environments of factories and workshops. It has a wide temperature range, very low variation in sensitivity with ambient temperature and good resistance to humidity, as well as the high long-term stability normally associated with this type of condenser microphone.



Fig.1 1/2" Condenser Microphone Type 4130 and Random Incidence Corrector DZ 9566

The microphone is equipped with a robust, non-removable protection grid which is finished in wear resistant, matt black chrome. The grid is fitted with an internal gauze-filter which affords excellent protection from dust and particle penetration to the diaphragm. In addition, the diaphragm is coated with a very thin, corrosive-resistant polymer film.

The 4130 has a linear 0°-incidence free-field frequency response, compensating for the pressure increase in front of the microphone which occurs at high frequencies due to the presence of the microphone itself in the sound field. In addition, Type 4130 is supplied with a Random Incidence Corrector DZ 9566. This corrector, which is fitted over the normal protection grid of the microphone, results in a linear frequency response under diffuse field conditions. Fig. 2 shows the free-field response curve for the 4130 together with random incidence responses both with and without the Corrector DZ 9566.

The microphone conforms to IEC 651, Type 2 and ANSIS1.4-1983, Type 2, the latter when fitted with Random Incidence Corrector DZ 9566. Each microphone is delivered with a calibration chart giving the individually measured open-cir-

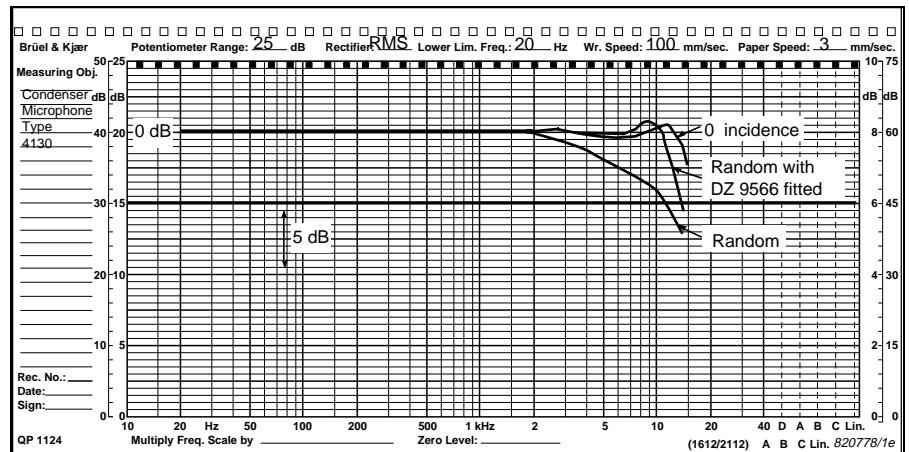


Fig. 2 Typical frequency response characteristics of Type 4130

cuit sensitivity and typical frequency response curves.

The lower frequency limit of a microphone is determined by the time constant of the static pressure equalization vent, which in the 4130 is adjusted to lie in the range 0.032 to 0.32 s, giving a lower limiting frequency (-3 dB) between 0.5 and 5 Hz.

The pressure equalization vent of the 4130 leads to the rear of the cartridge, permitting the use of the 1/2" Dehumidifier UA 0308. The UA 0308 dries the air inside the microphone, enabling the 4130 to be used for measurements in very humid environments.

The microphone is designed for use with low polarization voltages (nominally 28 V), but may be used with up to 120 V polarization to give an increase in sensitivity if the corresponding changes in the microphone response are acceptable. When used in conjunction with Types 2642 and 2810 a polarization voltage of 28 V is used, thereby maintaining nominal sensitivity of 10 mV/Pa (-40 dB re 1 V/Pa).

### Preamplifier Type 2642

The Microphone Preamplifier Type 2642 (Fig. 3) may be used with 1/2" Condenser Microphone Type 4130 and other Brüel & Kjær 1/2" Condenser Microphones, which are fitted di-

rectly to the 2642. For full information of the range of Brüel & Kjær condenser microphones, see separate Product Data sheets.

The preamplifier operates as an impedance converter for driving long cables and has a linear frequency response from 20 Hz to 20 kHz  $\pm 1$  dB with a capacitance of 15 pF connected to the input (approximately equivalent to the capacitance of Brüel & Kjær 1/2" condenser microphones).

The power for the preamplifier and polarization voltage for the microphone are supplied via a 2 m screened cable terminated with a 5-pin plug JP 0510, which connects directly to the battery operated Microphone Power Supply Type 2810.

Extension Cables AO 0175, AO 0176 and AO 0177 (3, 10 and 30 m length respectively) are available for connection between the 2642 and the 2810. The capacitances of these cables are 0.36 nF, 1.6 nF and 3.6 nF respectively and the influence of load capacitance (cable length) on the frequency range of the preamplifier can be seen in Fig. 6.

The preamplifier can also be powered via the standard 7-pin preamplifier input socket of Brüel & Kjær spectrometers, analyzers and measuring amplifiers using the 7-pin Adaptor JP 0713. As supplied, the

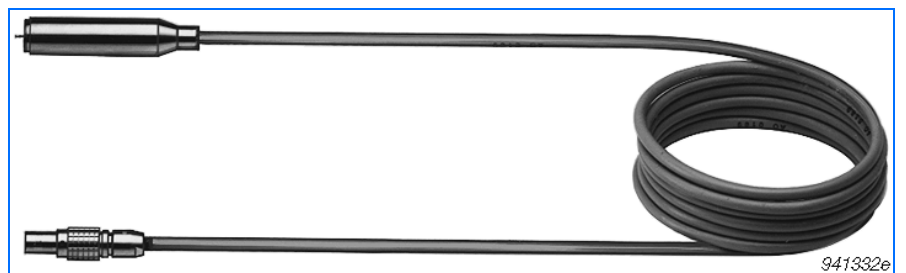


Fig. 3 1/2" Microphone Preamplifier Type 2642

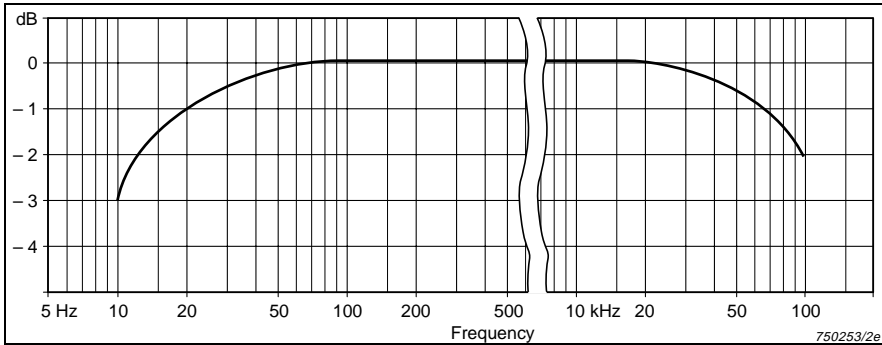


Fig. 4 Typical frequency response of Type 2642 with capacitance of 15 pF connected to the preamplifier input

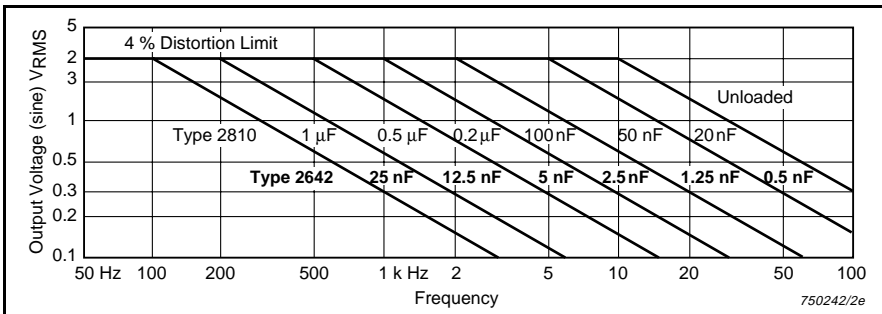


Fig. 6 Upper limit of dynamic range as a function of capacitive loading on the output for 2810 (upper line of values) and 2642 (lower line of values)

adaptor also modifies the 200 VDC polarization voltage to the 28 VDC required for Type 4130.

**Power Supply Type 2810**

The Microphone Power Supply Type 2810, shown in Fig. 5, is battery operated and has two channels with individual amplifiers providing a high level signal for further processing. It supplies the necessary powering and polarization voltages for two 2642/4130 combinations.

The built-in amplifiers have a frequency range from 10 Hz to 15 kHz  $\pm 1$  dB with individually adjustable gain over a range from 0 to 40 dB. The output impedance is low, allowing the use of long cables between the 2810 and following measuring equipment. Fig. 6 shows the upper limit of

the dynamic range of the 2810 as a function of cable capacitive load (cable length) on the output to any following measuring equipment.

The 2810 is equipped with standard BNC output sockets for easy connection to other measuring equipment.

The polarization voltage supplied from the 2810 is 28 V, allowing the use of 1/2" Condenser Microphone Type 4130 while maintaining its nominal sensitivity. When the 2810/2642 combination is used with other 1/2" microphones normally requiring 200 V polarization voltage, the sensitivity of these microphones is reduced by approximately 17 dB and the frequency response is changed.

The 2810 is powered from four 9 V alkaline batteries (IEC type 6LF22,

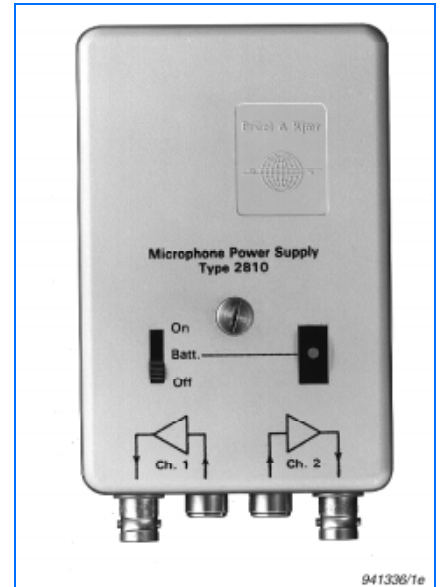


Fig. 5 Microphone Power Supply Type 2810

order no. QB0016). A three-position switch with "On", "Off" and "Batt." (battery check) positions is situated on the front plate together with an LED indicator for checking the supply voltage. The power supply will operate continuously for approximately 200 hours on one set of alkaline batteries when powering two 4130/2642 assemblies.

**Calibration**

For calibration of the 4130, 2642 and 2810 combination and following measuring equipment, the Sound Level Calibrator Type 4231 or Pistonphone Type 4228 are available. The 4231 calibrates at 1 kHz (and is therefore independent of any frequency weighting) with a sound pressure level of 94 dB  $\pm 0.2$  dB, while the 4228 supplies an SPL of 124  $\pm 0.2$  dB at 250 Hz. Both calibrators are battery operated and easy to use.

**Ordering Information**

- Type 4130** 1/2" Condenser Microphone Cartridge
- Includes the following accessories:**  
DZ 9566 Random Incidence Corrector
- Type 2642** 1/2" Microphone Preamplifier
- Includes the following accessories:**  
UA 0459 Windscreen
- Type 2810** Microphone Power Supply

- Includes the following accessories:**  
 QA 0027: 1 Screwdriver  
 QA 0001: 1 Screwdriver  
 4 x QB 0016: Non-rechargeable Alkaline Batteries, Type 6LF22

**Optional Accessories**

- Type 4130**
- Type 4231:** Sound Level Calibrator

- Type 4228:** Pistonphone
- UA 0308:** 1/2" Dehumidifier
- UA 0469:** Set of 6 Windscreens (UA 0459)
- Type 2642**
- Type 2810:** Microphone Power Supply
- JP 0713:** 7-pin Adaptor
- AO 0175:** Extension Cable (3m)
- AO 0176:** Extension Cable (10m)
- AO 0177:** Extension Cable (30m)

# Specifications 4130, 2642, 2810

## Microphone Type 4130

### OPEN-CIRCUIT SENSITIVITY:

10 mV/Pa (-40 ±1.5 dB re 1 V/Pa) at 250 Hz, 28 V DC polarization

### FREQUENCY RESPONSE:

0° Incidence Free-field Response: 6.5 Hz to 8 kHz ±2 dB

5 Hz to 12.5 kHz ±3 dB

In accordance with IEC 651, Type 2

### Random Incidence Response:

In accordance with ANSIS1.4-1983, Type 2 when fitted with Random Incidence Corrector DZ 9566

### LOWER LIMITING FREQUENCY (-3 dB):

0.5 to 5 Hz

CARTRIDGE THERMAL NOISE: 13.5 dB(A)

OPEN CIRCUIT DISTORTION LIMIT (3%):

142 dB SPL

SAFETY LIMIT: 156 dB peak

DIAPHRAGM RESONANCE FREQUENCY (90° phase shift): 12.5 kHz

MAXIMUM POLARIZATION VOLTAGE:

120 V DC

POLARIZED CARTRIDGE CAPACITANCE:

14 pF at 250 Hz, 28 V polarization

OPERATING TEMPERATURE:

-0 to +100°C (-32 to +212°F)

-20 to +70°C (-4 to +158°F) with Random Incidence Corrector DZ 9566

AMBIENT TEMPERATURE COEFFICIENT:

-0.007 dB/°C at 250 Hz

Average for the range -10 to +50°C (+14 to 122°F)

LONG TERM STABILITY AT 20°C (68°F):

>250 years/dB

EQUIVALENT AIR VOLUME:

50 mm<sup>3</sup> at 250 Hz, 1013 hPa

INFLUENCE OF STATIC PRESSURE:

-0.002 dB/hPa at 250 Hz, 1013 hPa

INFLUENCE OF 1 m/s<sup>2</sup> AXIAL VIBRATION:

60 dB equivalent SPL

INFLUENCE OF MAGNETIC FIELD (80 A/m):

Max. 30 dB equivalent SPL

INFLUENCE OF RELATIVE HUMIDITY:

<0.1 dB (non-condensing)

DIMENSIONS AND WEIGHT:

Diameter with Protection Grid: 13.2 mm

Cartridge Housing Diameter: 12.7 mm

Height: 14.9 mm

Diameter with Corrector DZ 9566: 14.35 mm

Height with Corrector DZ 9566: 16.7 mm

## Preamplifier Type 2642

Valid for 20 pF mic. capacitance

FREQUENCY RESPONSE:

20 Hz to 20 kHz ±1 dB

INPUT IMPEDANCE: 1 GΩ||3 pF

MAXIMUM INPUT VOLTAGE:

100 V RMS at 50 Hz

OUTPUT IMPEDANCE: 1.6 kΩ

DISTORTION: See Fig. 6

MAXIMUM OUTPUT VOLTAGE: 4.5 V peak

MAXIMUM OUTPUT CURRENT: 100 μA peak

ATTENUATION: <3.2 dB

NOISE (output):

A-weighted: 3.5 μV, max. 5 μV (See EMC Immunity Note 1)

Lin. 22.5 Hz to 22.5 kHz: 12 μV, max. 20 μV

OPERATING VOLTAGE: 30 to 36 V

DIMENSIONS AND WEIGHT:

Diameter: 12.7 mm (0.5")

Length: 55 mm (2.1")

Integral Cable Length: 2 m (6.6 ft) terminated

with 5-pin Plug JP 0510

Weight: 80 g (2.8 oz)

## Microphone Power Supply Type 2810

FREQUENCY RESPONSE:

10 Hz to 15 kHz ±1 dB

AMPLIFIER GAIN:

Adjustable from 0 to +40 dB ±0.5 dB

INPUT SOCKETS:

5-pin socket supplying preamplifier power and microphone polarization voltage (28 V). Accepts plug JP 0510

INPUT IMPEDANCE: >40 kΩ

MAXIMUM INPUT VOLTAGE:

100 V peak to peak

OUTPUT IMPEDANCE:

100 Ω in series with 6.8 μF

DISTORTION: See Fig. 6

MAXIMUM OUTPUT VOLTAGE: 4.5 V peak

MAXIMUM OUTPUT CURRENT: 3 mA

CHANNEL SEPARATION: >70 dB at 10 kHz

NOISE (Referred to input at max. gain):

A-weighted: 2.5 μV RMS

Lin. 22.5 Hz to 22.5 kHz: 4 μV RMS

(See EMC Immunity Note 1)

INFLUENCE OF MAGNETIC FIELD (100 A/m):

Max. 6 mV RMS, measured on output

POWER SUPPLY:

Four 9 V non-rechargeable alkaline batteries,

type 6LF22. Approximately 200 hours continuous

operation with two 2642s

DIMENSIONS AND WEIGHT:

Length: 127 mm (5"), incl. sockets


Width: 75 mm (3")

Height: 37 mm (1.4")

Weight: 350 g (12.5 oz), including batteries

Note: All values are typical at 25°C (77°F), unless measurement uncertainty is specified. All uncertainty values are specified at 2σ (i.e. expanded uncertainty using a coverage factor of 2)

## COMPLIANCE WITH STANDARDS:

	CE-mark indicates compliance with: EMC Directive.
<b>Safety</b>	EN 61010-1 and IEC 1010-1: Safety requirements for electrical equipment for measurement, control and laboratory use.
<b>EMC Emission</b>	EN 50081-1: Generic emission standard. Part 1: Residential, commercial and light industry. EN 50081-2: Generic emission standard. Part 2: Industrial environment. CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits. FCC Rules, Part 15: Class B limits.
<b>EMC Immunity</b>	EN 50082-1: Generic immunity standard. Part 1: Residential, commercial and light industry. EN 50082-2: Generic immunity standard. Part 2: Industrial environment. Note 1: Susceptibility (response measured on output when exposed to levels specified in EN 50082-2). RF (10 V conducted or 10 V/m field): max. 10 mV: Type 2810: Noise: max. 100 μς (A-ωειγτεδ αινδ Λιν. 22.5 Hz to 22.5 kHz), op 10 μς ον ουτπυτ Type 2642: Noise: max. 15 μς (A-ωειγτεδ)
<b>Temperature</b>	IEC 68-2-1 & IEC 68-2-2: Environmental Testing. Cold and Dry Heat. Operating Temperature: Type 2642 and 2810: -10 to +50°C (+14 to +122°F) Storage Temperature: Type 2642 and 2810 (without batteries): -20 to +70°C (-4 to +158°F)
<b>Humidity</b>	IEC 68-2-3: Damp Heat: 90% RH (non-condensing at 40°C (104°F))
<b>Mechanical</b>	Non-operating: IEC 68-2-6: Vibration: 0.3 mm, 20 m/s <sup>2</sup> , 10-500 Hz IEC 68-2-27: Shock: 1000 m/s <sup>2</sup> IEC 68-2-29: Bump: 3000 bumps at 250 m/s <sup>2</sup>
<b>Enclosure</b>	IEC 529: Protection Provided by Enclosures: Types 2642 and 2810: IP 20

Brüel & Kjær reserves the right to change specifications and accessories without notice

# Brüel & Kjær

WORLD HEADQUARTERS:

DK-2850 Naerum · Denmark · Telephone: +45 45 80 05 00 · Fax: +45 45 80 14 05 · Internet: <http://www.bk.dk> · e-mail: [info@bk.dk](mailto:info@bk.dk)

Australia (02) 9450-2066 · Austria 00 43-1-865 74 00 · Belgium 016/44 92 25 · Brazil (011) 246-8166 · Canada: (514) 695-8225 · China 10 6841 9625 / 10 6843 7426

Czech Republic 02-67 021100 · Finland 90-229 3021 · France (01) 69 90 69 00 · Germany 0610 3/908-5 · Holland (0)30 6039994 · Hong Kong 254 8 7486

Hungary (1) 215 83 05 · Italy (02) 57 60 4141 · Japan 03-3779-8671 · Republic of Korea (02) 3473-0605 · Norway 66 90 4410 · Poland (0-22) 40 93 92 · Portugal (1) 47114 53

Singapore (65) 275-8816 · Slovak Republic 07-37 6181 · Spain (91) 36810 00 · Sweden (08) 71127 30 · Switzerland 01/94 0 91 09 · Taiwan (02) 713 9303

United Kingdom and Ireland (0181) 954-236 6 · USA 1 - 800 - 332 - 2040

Local representatives and service organisations worldwide

BP 0020 - 15