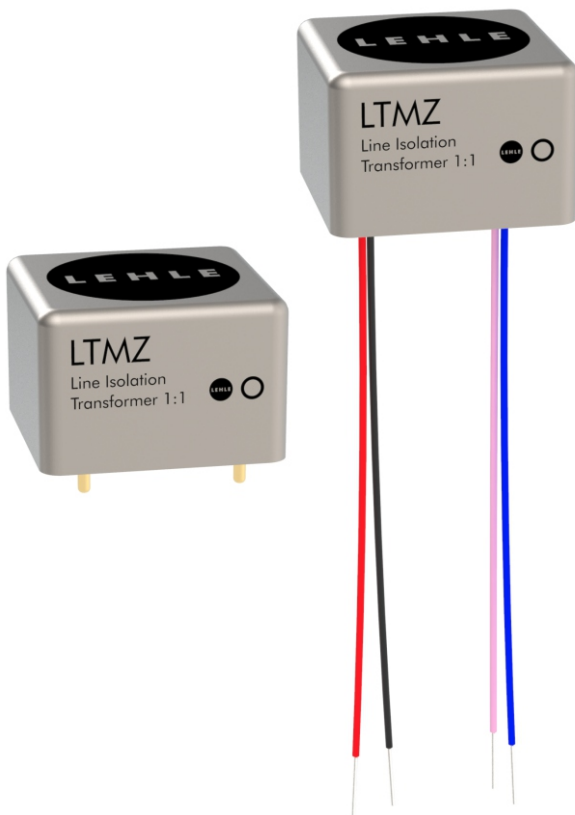




LEHLE TRANSFORMER MZ

GENERAL PURPOSE 1:1 LINE BRIDGING AUDIO TRANSFORMER



- Transforms balanced to unbalanced line signals or unbalanced to balanced line signals
- Toroidal ring core design for a extremely low loss, strong coupling and a very low noise
- Frequency response of 3 Hz to 250 kHz - 3 dB
- CMRR of 108 dB at 50 Hz
- Input levels of up to 3.9 V_{RMS} at 20 Hz and 9.8 V_{RMS} at 50 Hz
- Low distortion of 0.002 % at 1 kHz / 0 dBu
- Perfect for low to mid impedance signal sources
- Electrical isolation of 2 kV between secondary and primary winding or windings and shield
- Comes in a magnetic shield can
- Completely potted to avoid microphonic issues
- Available with leads MZ-L or as PCB version MZ-P

The Lehle Transformer MZ is an ideal component to achieve a galvanic isolation of low to mid impedance audio signals in order to avoid hum loops without degrading sound. It can be used as an input or output transformer, for balanced and unbalanced signals. Using the Lehle Transformer MZ as input or output transformer prevents your device and the user from electrical shocks through the dielectric withstanding voltage of 2 kV.

With the maximum level of 3.9 VRMS at 20Hz and the very low distortion it fits ideal into the pro audio

environments which run typically with 1.2 VRMS (+4 dBu) level. Of course high end audio devices for home use will work with the Lehle Transformer MZ perfectly together. In both situations the high headroom, low distortion and excellent bandwidth and the strong magnetic coupling guarantee that no detail of your sound gets lost. The toroidal core of the transformer is completely potted into the magnetic shield can, so there will be no microphonic issues. The MZ-L version with the colored leads comes with two M3 screws, which make it very easy to fix.



LEHLE TRANSFORMER MZ

TECHNICAL SPECIFICATIONS

Turns ratio	1:1	
Input impedance	10.2 kOhm	test circuit 1, 1 kHz, 0 dBu, $R_s = \infty$, $R_L = 10$ kOhm
Output impedance	240 Ohm	test circuit 1, 1 kHz, 0 dBu, $R_s = 50$ Ohm, $R_L = \infty$
Primary inductance	158 H	secondary winding open
Leakage inductance	2.7 mH	secondary winding shorted
Magnetic coupling	95 dB	
Voltage gain	-0.25 dB	test circuit 2, 1 kHz, 0 dBu
Frequency response total range	3 Hz 250 kHz	min, test circuit 3, -3 dB max, test circuit 3, -3 dB
Level audio range	-0.3 dBu -0.2 dBu	test circuit 2, 20 Hz, 0 dBu test circuit 2, 20 kHz, 0 dBu
Phase shift	0.3 deg -2 deg	test circuit 2, 20 Hz, 0 dBu test circuit 2, 20 kHz, 0 dBu
Maximum input level	14 dBu / 3.9 V _{RMS} 22 dBu / 9.8 V _{RMS}	test circuit 2, max 1% THD, 20 Hz test circuit 2, max 1% THD, 50 Hz
Distortion (THD)	0.002 %	test circuit 2, 1 kHz, 0 dBu
Self resonance point	170 kHz	test circuit 1, 0 dBu
Common mode rejection ratio	108 dB 88 dB	test circuit 4+5, 50 Hz, $U_1 = 0$ dBu, $U_1' = 10$ dBu, IEC 60268-3 test circuit 4+5, 1 kHz, $U_1 = 0$ dBu, $U_1' = 10$ dBu, IEC 60268-3
DC resistance	90 Ohm 98 Ohm	primary winding secondary winding
Capacitances	80 pF 148 pF	secondary winding to shield, 1 kHz, 0 dBu primary to secondary winding, 1 kHz, 0 dBu
Electrical isolation	2 kV	10 sec, between windings and between shield and windings
Temperature range	-20 °C [-4 °F] +125 °C [257 °F]	min max
Weight	65 g [2.3 oz]	
Compliance	RoHS II	according to Directive 2011/65/EU

ORDERING INFORMATION

Order code MZ-L	4015
EAN13 Barcode MZ-L	4260142210415
Order code MZ-P	4014
EAN13 Barcode MZ-P	4260142210422
Included in the package w MZ-L	2 pcs M3 x 5 screws DIN 84

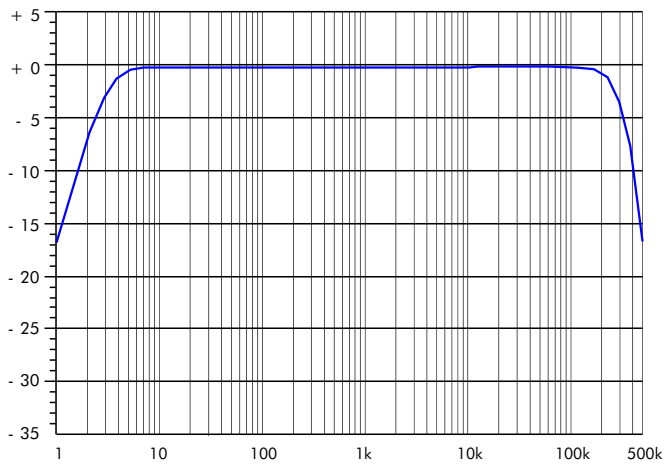


LEHLE TRANSFORMER MZ

MEASURING RESULTS

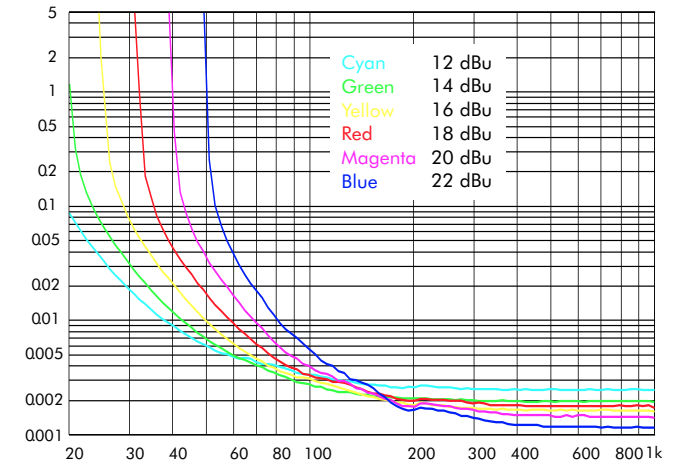
LEVEL FREQUENCY RESPONSE TOTAL RANGE

Level [dBu] vs Frequency [Hz], test circuit 3



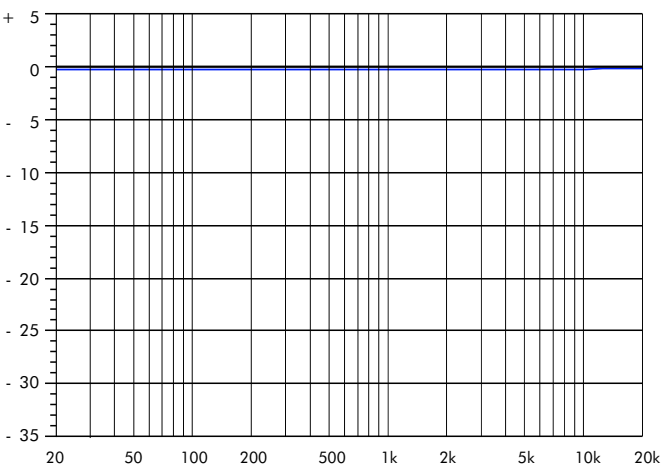
TOTAL HARMONIC DISTORTION PLUS NOISE

Distortion [%] vs Frequency [Hz], test circuit 2



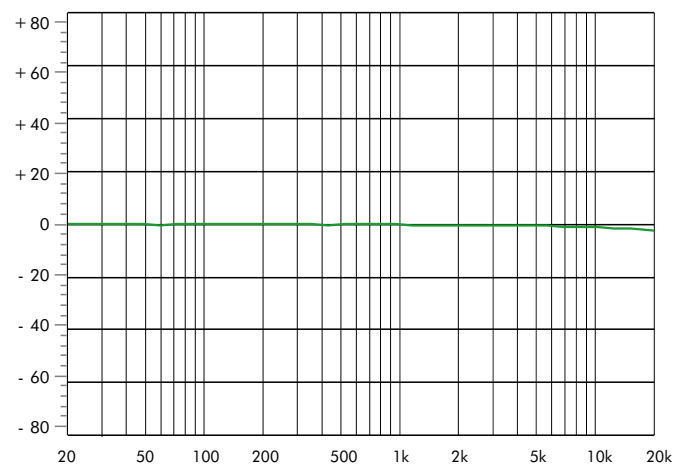
LEVEL FREQUENCY RESPONSE AUDIO RANGE

Level [dBu] vs Frequency [Hz], test circuit 2



PHASE FREQUENCY RESPONSE AUDIO RANGE

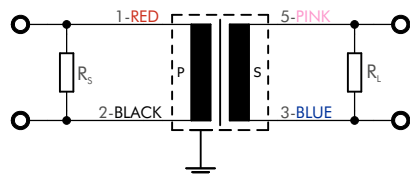
Phase [deg] vs Frequency [Hz], test circuit 2



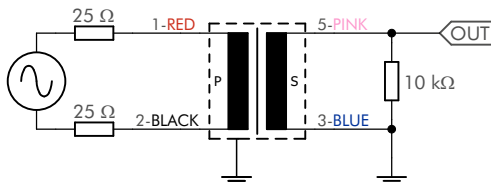
LEHLE TRANSFORMER MZ

TEST CIRCUITS

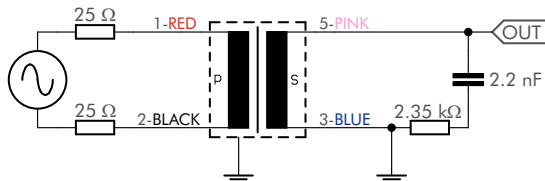
Test circuit 1 - impedance, self resonance point



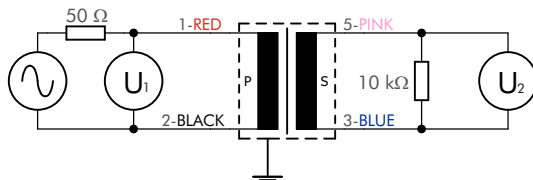
Test circuit 2 - voltage gain, level and phase audio range, max input level, distortion



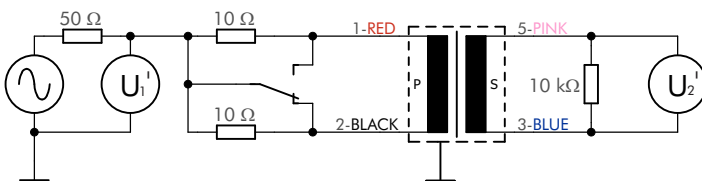
Test circuit 3 - frequency response total range



Test circuit 4 - common mode rejection ratio part 1



Test circuit 5 - common mode rejection ratio part 2

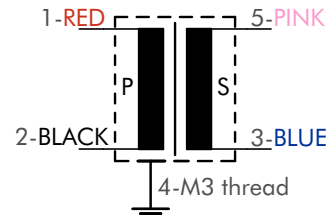




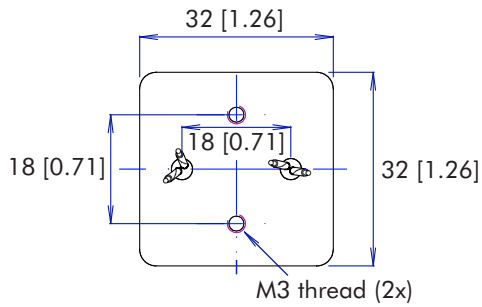
LEHLE TRANSFORMER MZ

TECNICAL DRAWING

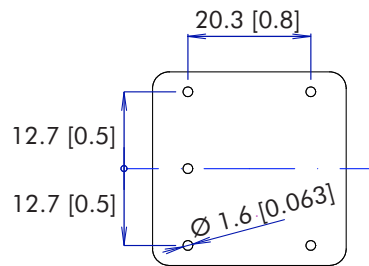
Connections	MZ-L with leads	MZ-P for PCBs
Primary winding	red lead wire black lead wire	Pin 1 Pin 2
Secondary winding	pink lead wire blue lead wire	Pin 5 Pin 3
Ground	M3 thread	Pin 4



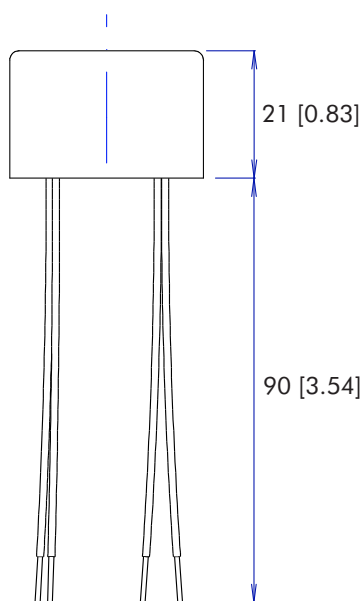
BOTTOM VIEW MZ-L



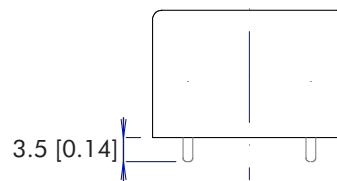
BOTTOM VIEW MZ-P



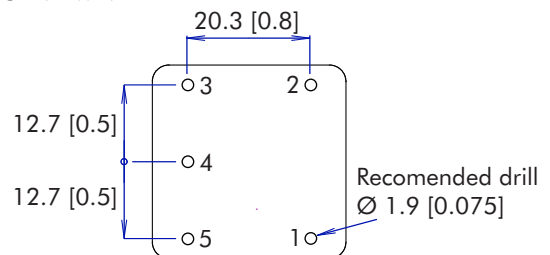
SIDE VIEW MZ-L



SIDE VIEW MZ-P



PCB TOP VIEW MZ-P



all measurements in mm [inch]

LEHLE TRANSFORMER MZ

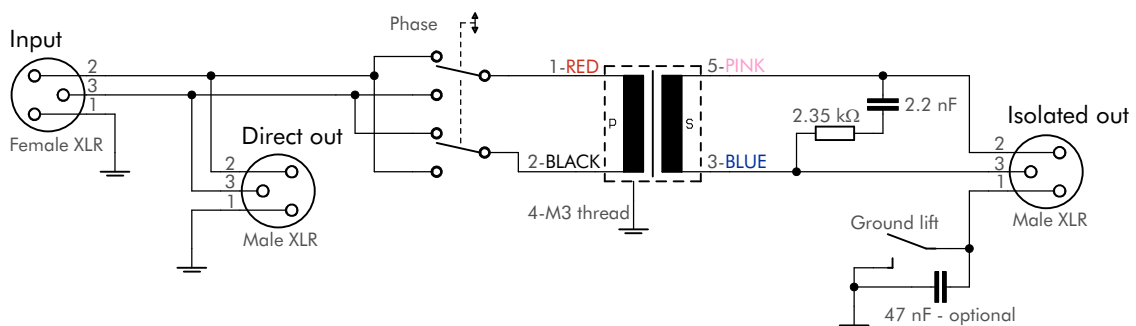
APPLICATIONS

IMPEDANCE

The Lehle Transformer MZ is designed for low to mid impedance audio line signal sources. The optimal output or source impedance of any device that delivers a signal to the transformer when used as an input transformer or basic splitter should be max 1 kOhm, lower is always better. The input or

load impedance of the device that receives a signal from the transformer when used as an output transformer or basic splitter can be in the range of 1 kOhm to 100 kOhm. The most pro audio or hi fi / high end devices fulfill these impedance requirements without any problems.

BASIC SPLITTER FOR BALANCED OR UNBALANCED LINE SIGNALS



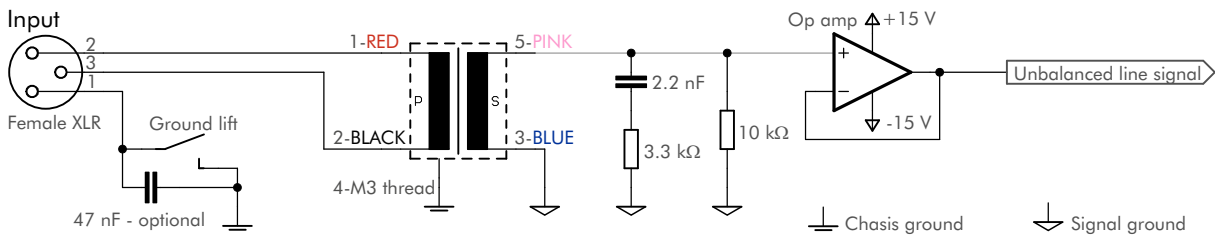
This basic splitter combines passive splitting with maximum signal fidelity. The Lehle transformer MZ electrically isolates the two outputs, eliminating the possibility of ground loops. The signal can be picked off either symmetrically or asymmetrically from the isolated output. A phase inverter switch permits reversal of input signal phase at the isolated out, preventing phase cancellations from impairing signal reproduction. The classical application for this circuit is splitting of an input signal to the two outputs, enabling you to connect your instrument or source to two devices, which may, for example, be two amplifiers, or an amp and a mixer or recording unit (PC/DAW). Thanks to the possibility for feeding the input with a balanced or

unbalanced signal, this basic splitter is eminently suitable for use as a high-quality compact DI solution for nearly all types of pro audio and high end signals. Another useful application for this splitter is as an effective suppressor for unwanted hum. Background noise occurs again and again, caused by ground loops, when two electronic devices are connected to each other. This splitter can be installed between the two units. Using the isolated output, the two devices are electrically isolated, and this background noise becomes a thing of the past. And: this splitter needs no separate power supply because its 100% passive!



LEHLE TRANSFORMER MZ

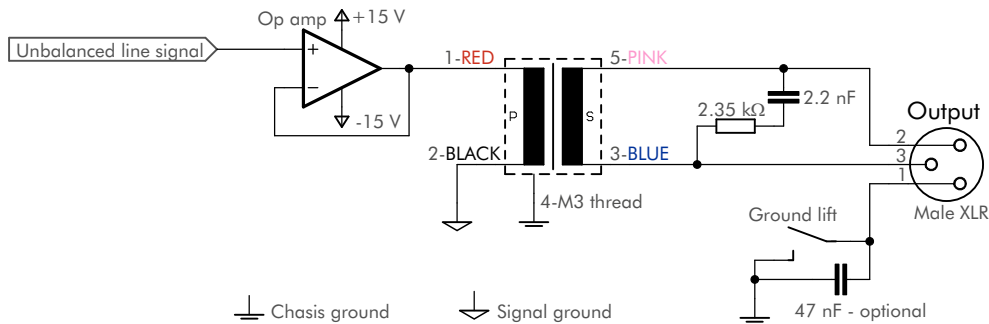
INPUT ISOLATION AND BALANCING



The Lehle Transformer MZ works in this application as an input transformer. Any balanced or unbalanced line signal can be connected to this input jack socket. The big advantage here is the galvanic isolation, which will help to avoid any hum and buzz through ground loops. The input impedance here is 10.2 kOhm mostly influenced by the resistor which is connected to

the + input of the op amp. Of course this resistor can have other values if necessary. For a much higher input impedance like 1 MOhm we recommend to use the Lehle Transformer HZ. This circuit works well with numerous low noise bipolar op amps like the OPA1611 for net powered devices or the ADA4084-1 when battery powered.

OUTPUT ISOLATION AND BALANCING



This application shows how the Lehle Transformer MZ will work as an output transformer. Like the circuit above the big advantage here is galvanic isolation plus the balancing of the unbalanced signal coming from the op amp. This balanced output is free floating with a great common mode rejection ratio that will help to refuse any unwanted electromagnetic interference. The output impedance of this circuit is in the range

of 200 Ohm, depending on the used op amp. The correct value can be calculated by the output impedance of the op amp plus the DC-resistance of the primary and secondary winding. With an output impedance of 200 Ohm you can drive a cable length up to 350 m (1150 ft) without any degradation of your sound. You can use any low noise op amp of your choice like the ones named above.

Specifications and products listed herein are subject to change without notice.