NDR61 Driver Series

NDR6110 Single Channel Dynamic Driver for Piezoelectric Actuators

Features

- **Bipolar and unipolar output load**
- **Galvanic separation of the output**
- **Adjustable input range and phase inversion**
- **Full stroke driving capability for**
  - **benders (bimorphs)**
  - **stacked actuators**
  - **bipolar stacks**
  - **shear mode actuators**
- **Low noise**
- **Small unified dimensions**

Purpose

The NDR6110 series piezo actuator driver is intended as the basic device that enables to supply various piezoelectric actuators with static and dynamic voltage in the range up to ±100V or 0-200V. The driver can be used as a part of fine adjustment mechanism in mechanical positioning equipment with piezo feed, or for other piezo element applications.

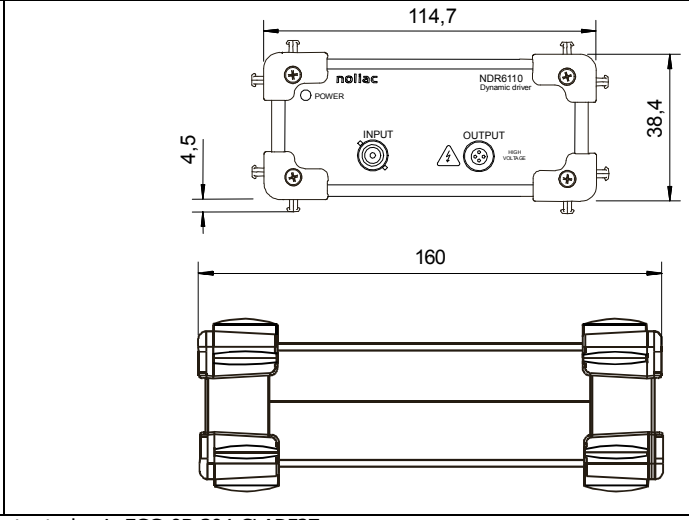
Description

The driver has a built-in voltage converter, so that only a single external supply voltage is needed. The device is supplied by the +5V/1A stabilized adaptor. The adaptor is included. The driver input signal can be static or dynamic. It can be supplied by a potentiometer, trimmer, frequency generator, or D/A converter. The input range can be switched between ± 2.5, ± 5, 0 to 5, 0 to 10 Volts. The gain of the amplifier can be switched to negative (opposite phase). An internal voltage limiter guarantees output voltage within limits during operation and also during startup or shutdown. The actuator is protected against overvoltage or reverse voltage and subsequent depolarization.
The output of the device is galvanicly separated from other circuits. The following voltages are connected to the pins of the output connector: +U, -U, zero Volts, and output. This allows for connecting all categories of piezoelectric actuators.

The NDR6110 series drivers are available in a broad range of versions: with a potentiometer instead the input connector, DIN rail mounting casings, and OEM printed boards. Option is a bipolar asymmetrical output voltage (i.e. -30 to +150 V).

NDR61 Driver Series NDR6110

Parameters

Electrical parameters			
Parameter	**Unit**	**Eurotainer**	**Remark**
Number of channels		1	
Supply voltage	V	110 - 230V/ 50 - 60 Hz →5V/ 1A AC/ DC Adaptor is in the scope of delivery	
Supply current	mA	780	
Output voltage amplitude		±30 V (bender), 60 V (stack)	
		±60 V (bender), 120 V (stack)	
		±75 V (bender), 150 V (stack)	
		±100 V (bender), 200V (stack)	
Output voltage tolerance	%	10	
Frequency range Low Frequency limit	Hz	0	DC coupled
High frequency limit (-3 dB under full stroke, For± 100V)	Hz	50 120 280	1 µF load 0.47 µF load 0.22 µF load
Output limitation tolerance	V	± 4	
Output noise	mV	2 mV RMS	1 µF load
Input voltage range	V	± 2.5, ± 5, 0 to 5, 0 to 10	Switchable
Input impedance	kOhm	10	
Input Connection		BNC	
Output connection		LEMO	LEMO code: see the note below
Environmental parameters			
Temperature range	°C	+5 to +45	
Relative humidity	%	max 80% to 31°C, max 50% above 40°C	
Ingress protection		IP20	When connectors are opened.
Mechanical parameters			
Eurotainer			

Note: LEMO connector codes:The output plug is FGG.0B.304.CLAD52Z.

Piezo driver selection table

Driver model number	
Output voltage range	**Ordering code**
± 30 V (bender) 60 V (stack)	NDR6110 -30+30
± 60 V (bender) 120 V (stack)	NDR6110 -60+60
± 75 V (bender) 150 V (stack)	NDR6110 -75+75
± 100 V (bender) 200 V (stack)	NDR6110 -100+100

Note 1: Input voltage ranges are switchable for all model numbers

Accessories

Output signal cable

SK05BE/1,5m - Output cable. The cable is equipped by LEMO 4 way connector at one side. The second side is free. The cable is intended for experimental purposes. The standard length 1.5 m could be changed in 0.5 m step upon request.

WARNING

The instrument may only be operated by personnel who are capable of recognizing contact hazards and implementing appropriate safety precautions. Contact hazards are present anywhere where voltages are higher than 50 V.

Order example

The single channel NDR6110 driver with output voltage +/- 100 V has the order code **NDR6110 -100+100.**

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NDR 68 Driver Series **NDR 6880**

NDR 6880 Single Channel Dynamic Driver for Piezoelectric Actuators

Features

- **High current**
- **High power**
- **Power recovering**
- **Wide frequency range**
- **Floating output**
- **Galvanic separation of output from other circuitry**

Purpose

The **NDR 6880** is the one channel driving unit used for static and dynamic supply of large piezoelectric actuators having capacity up to 200uF. The NDR 6880 is primarily designed as a standalone laboratory desktop unit. It is used for driving or positioning or (in common sense) for operating only the piezoelectric actuators/stacks of various types. The device is not designed for use with loads having high energetic losses. The device also cannot be used with piezoelectric actuators having positive energetic balance in long term meaning (energy harvesting).

Description

The device is a source of single polarity voltage. Its value is proportional to input signal. The NDR 6880 consists of two main blocks - the preamplifier and the high voltage stage. The input stage is galvanically separate from the output high voltage part. Signal ground of the BNC connector is connected to device casing. Amplifier output is floating. One of its wires could be optionally grounded externally. Block schema is in Figure 1.

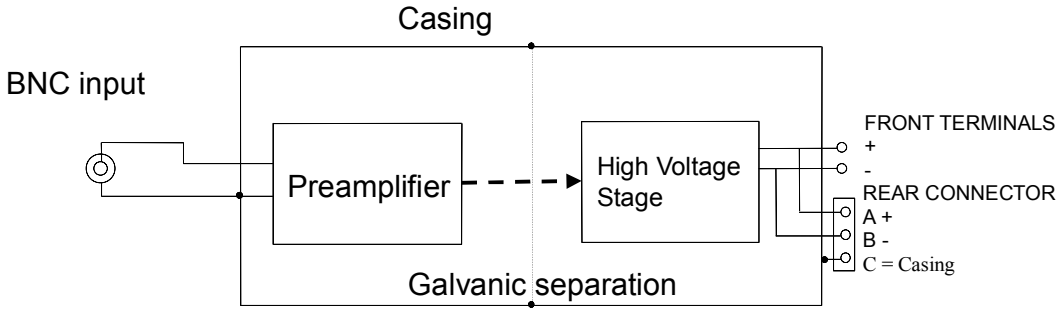

Figure 1 Block schematics of the NDR 6880

The device operates at switching principle with pulse-width modulation.
The energy from mains is forwarded into the actuator. Output voltage grows in accordance with the

input signal. When the phase of the input is changed the electric charge is "pumped" back from the actuator to internal storing capacitors. In the next phase is the charge from the capacitor transferred into the actuator again. If the voltage on the storage capacitor falls under preset limit the energy in the capacitor is refilled from the power supply.

Parameters

Electrical parameters			
Parameter	**Unit**	**Value**[1]	**Remark**
Number of channels		1	
Supply voltage	V	230V/ 50 Hz or 115V/ 60Hz	Two versions of the device
Power	W	Max. 110	
Output voltage amplitude and load current (RMS)	V	0 - 300	
	A	3.5	
Peak current	A	10	Goes down with temperature of the end stage
Power loses actuator covered by the driver	W	80	
Frequency range Low frequency limit	Hz	0	DC coupled, but galvanically isolated
High frequency limit (-3 dB)	kHz	6 20	Full stroke Small signals
Frequency filter	Hz	100	
Output voltage linearity	%	5	
Output noise	mV	30[2]	RMS, 100 µF load
Input voltage range	V	0 to 10 or 10 - 0	Selectable input phase
Input impedance	kOhm	10	
Input connection		BNC	
Output connection		+/- terminal and 3 way Amphenol type 62IP	
Maximum voltage between input and output part	V	500	
Dimension	mm	382x270x160	
Mass	kg	7.4 kg	
Temperature range	°C	+5 to +45	

[1]Tolerance 10 % is applied on all values (if applicable).
[2]Value is guaranteed from 10 to 90% of dynamic range. Out of this range could be the residual noise or distortion at small capacitive loads higher.

NDR 68 Driver Series **NDR 6881**

NDR 6881 Dual Channel Dynamic Driver for Piezoelectric Actuators

Features

- **High current**
- **High power**
- **Power recovering**
- **Wide frequency range**
- **Two separate channels**
- **Floating outputs**
- **Galvanic separation of outputs from other circuitry**

Purpose

The **NDR 6881** is the dual channel driving unit used for static and dynamic supply of large piezoelectric actuators having capacity up to 200uF. The NDR 6881 is primarily designed as a standalone laboratory desktop unit. It is used for driving or positioning or (in common sense) for operating only the piezoelectric actuators/stacks of various types. The device is not designed for use with loads having high energetic losses. The device also cannot be used with piezoelectric actuators having positive energetic balance in long term meaning (energy harvesting).

Description

The device is a source of single polarity voltage. Its value is proportional to input signal. The NDR 6881 consists of two main blocks - the preamplifier and the high voltage stage. The input stage is galvanically separate from the output high voltage part. Signal ground of the BNC connector is connected to device casing. Amplifier outputs are floating. One of its wires could be optionally grounded externally. Block schema is in Figure 1.

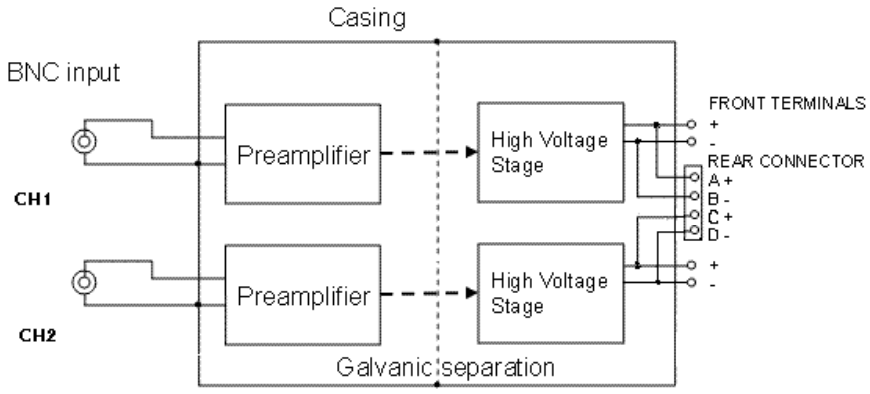

Figure 1 Block schematics of the NDR 6881

The device operates at switching principle with pulse-width modulation.
The energy from mains is forwarded into the actuator. Output voltage grows in accordance with the input signal. When the phase of the input is changed the electric charge is "pumped" back from the actuator to internal storing capacitors. In the next phase is the charge from the capacitor transferred into the actuator again. If the voltage on the storage capacitor falls under preset limit the energy in the capacitor is refilled from the power supply.

Parameters

Electrical parameters			
Parameter	**Unit**	**Value[1]**	**Remark**
Number of channels		2	
Supply voltage	V	230V/ 50 Hz or 115V/ 60Hz	Two versions of the device
Power	W	Max. 110	
Output voltage amplitude and load current (RMS)	V	0 - 150	
	A	3.5	
Peak current	A	10	Goes down with temperature of the end stage
Power loses actuator covered by the driver	W	80	Per all device
Frequency range Low frequency limit	Hz	0	DC coupled, but galvanically isolated
High frequency limit (-3 dB)	kHz	6 20	Full stroke Small signals
Frequency filter	Hz	100	
Output voltage linearity	%	5	
Output noise	mV	30[2]	RMS, 50 µF load
Maximal capacity load	uF	200	
Input voltage range	V	0 to 10 or 10 - 0	Selectable input phase
Input impedance	kOhm	10	
Input connection		BNC	
Output connection		+/ - terminals and 4 way Amphenol type 62IP	
Maximum voltage between input and output part and maximum voltage between channel outputs	V	500	
Dimension	mm	382x270x160	
Mass	kg	7.9kg	
Temperature range	°C	+5 to +45	

[1] Tolerance 10 % is applied on all values (if applicable).
[2] Value is guaranteed from 10 to 90% of dynamic range. Out of this range could be higher the residual noise or distortion at small capacitive loads.