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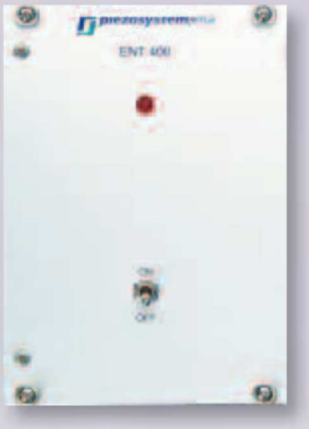
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Find the *Piezosystem Jena ENV / ENT* at our website: ***Click HERE***

system ENV



ENT 400



ENV casings

casings for system ENT, ENV, EDA

	width	part no.
42 TE casing	42 TE	E-103-97
42 TE casing with cooling*	42 TE	E-103-951
63 TE casing	63 TE	E-103-90
63 TE casing with cooling*	63 TE	E-103-901
84 TE casing	84 TE	E-103-91
84 TE casing with cooling*	84 TE	E-103-911
84 TE rack casing**	84 TE	E-103-92
84 TE rack casing 375mm**	84 TE	E-103-921
84 TE double high casing*	2 x 84 TE	E-103-94



rack casing

rack mounting angles



dimensions	unit	42 TE	63 TE	84 TE	84 TE rack	84 TE rack	84 TE double high
width	mm	265	373	480	483	483	480
depth	mm	343	343	343	272	375	343
height	mm	158	158	158	133	133	290

1 TE = 5.08 mm

* casings with active cooling are necessary for high power amplifiers when using more than one ENV 300 or at least one ENV 800 systems.
We strongly recommend active cooling if the output current of all ENV modules is beyond 300mA.

** rack mounting angles available upon request

ENT system · main supply modules ENT 40/20, ENT 400

	main voltage	module width	output power	supply frequency	part no.
ENT 40/20	230V	14TE	25W	50/60Hz	E-103-13
ENT 40/20	115V	14TE	25W	50/60Hz	E-103-14
ENT 400	115V/230V	18TE	100W	50/60Hz	E-103-33

The main supply module ENT 40/20 can be operated with up to four modules ENV 40, but not ENV 30.
The main supply module ENT 400 can be operated with up to two modules ENV 300 or one module ENV 800.

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electronics • analog • modular system ENV

system ENV



ENV system

- modular power supply system for piezo electrical elements
- different currents for optimum solutions
- each channel with separate display
- closed loop module for measurement systems
- module for PC connection
- excellent signal-to-noise ratio
- protection circuit for power supply and piezo-elements

piezosystemjena

applications

- multi-axes actuator
- high frequency applications (ENV 300 and above)
- automated processes in engineering
- precision alignment in optical applications

The amplifier system ENV is a modular system with a 19” casing. In special applications it is possible to combine one or more amplifier modules with different characteristics. Each amplifier module has its own display which shows the output voltage.
If used with a measurement system and closed loop module, it displays the calibrated motion. Different modules for closed loop and PC connections are available.

system 40 – adjustment with highest resolution

The amplifier system 40 was developed for static and low frequency applications. The system has very low noise characteristics (typ. 0.3 mV_{RMS} @500 Hz) and thus provides resolutions in the nm and sub nm range.

system 300 – flexible system for higher dynamic work

The amplifier system 300 was developed for dynamic applications of piezoelectrical elements. For example, it allows the use of the PZ 100 positioning system with frequencies of approximately 500Hz at full amplitude.

The system was designed using a modern electronic concept to reach the same noise characteristics of the system 40. This allows the system 300 to be used in dynamic applications for positioning purposes with very high resolution.
The amplifier series ENV 300 has been complemented with the series CLE systems so they can be used with actuators with integrated measurement systems.

system 800 – high dynamic work for high load actuators

The amplifier system 800 is perfectly suited for high dynamic applications. Multi-layer low voltage actuators have a high capacitance. For dynamic work, it is necessary to charge and discharge this capacitance with high switching currents.
The amplifier system 800 delivers current of 800mA. A monitor output gives the equivalent output voltage. Please find advice for dynamic work with piezoelectrical elements in the chapter “piezoline”.
The amplifier series ENV 800 has been complemented with the series CLE systems so they can be used with actuators with integrated measurement systems.

assembly

Each amplifier system consists of at least two modules. The ENT module supplies the main voltages for the ENV amplifier module, which is the actual amplifier. The ENT and ENV modules should be placed in a casing. The casing can be delivered as a 19” rack mount. Depending on the application, several amplifier modules can be combined with one power supply module ENT into one casing.
The input and output connections, the display and the potentiometer for manual control are on the front side of each ENV module.

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system ENV 40

piezosystem jena

- 40mA permanent current
- 19" module for ENV systems
- OEM version available
- low voltage noise
- static and dynamic applications



ENV 40 SG

system 40 – adjustment with highest resolution

The amplifier system 40 was developed for static and low frequency applications. The system has very low noise characteristics (typ. 0.3 mV_{RMS} @500 Hz) and thus provides resolutions in the nm and sub nm range.

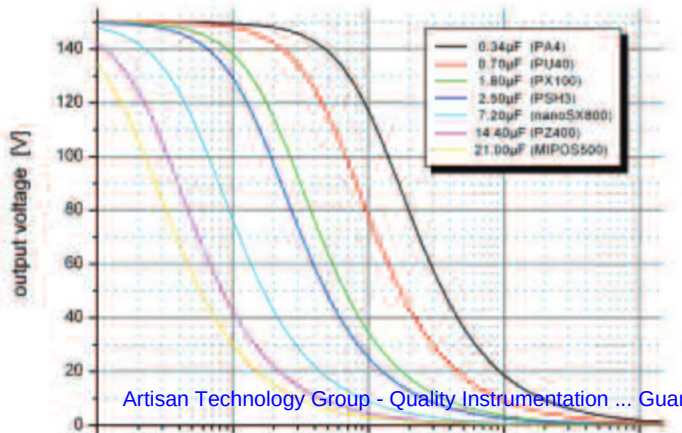
In all amplifier systems of the series ENV 40 a protection circuit is implemented which protects from high voltage spikes when the unit is turned on and off.

technical data part no.	ENV 40 E-103-10	ENV 40 SG E-240-100	ENV 40 CAP E-103-60	ENV 40 nanoX E-248-000	ENV 40 nanoX SG E-248-100	ENV 40 nanoX CAP E-248-600
display	LCD, 3.5 digit					
sensor controller	–	strain gage	capacitive	–	strain gage	capacitive
output voltage	-10...+150V	-10...+150V	-10...+150V	-10...+150V	-10...+150V	-10...+150V
output current (continuous)	40mA	40mA	40mA	2x40mA	2x40mA	2x40mA
voltage noise	<0.3mV_{RMS}@500Hz					
connector output voltage	LEMO 0S.302	LEMO 0S.302	LEMO 0S.302	ODU3pin	ODU3pin	ODU3pin
DC voltage offset	adjustable via potentiometer					
modulation input (BNC connector)	0...+10V	0...+10V	0...+10V	0...+10V	0...+10V	0...+10V
input impedance	10kΩ	10kΩ	10kΩ	10kΩ	10kΩ	10kΩ
monitor output (BNC connector)*	-1...+15V	±13V OL** 0...+10V CL***	±13V OL** 0...+10V CL***	-1...+15V	±13V OL** 0...+10V CL***	±13V OL** 0...+10V CL***
monitor output impedance typ.	100kΩ	10kΩ	10kΩ	100kΩ	10kΩ	10kΩ
connector sensor	–	LEMO.0S.304	LEMO.0S.650	–	LEMO.0S.304	LEMO.0S.650
width	14TE	20TE	20TE	14TE	20TE	20TE

* For open loop systems the output voltage is displayed in a 10:1 (-1...+15V) ratio. For closed loop systems the adjusted sensor signal is available. The monitor output voltage is 0...+10V for 0...100% of closed loop motion.

** OL – open loop *** CL – closed loop

options
Automatic "closed loop on" function by switching on the whole system.



The amplifier module ENV 40 nanoX was especially developed for the high load, ultra fast positioners of the series nanoX. The special amplifier provides an output signal in the plus/minus range to realize the bi-directional motion of the nanoX systems.
The ENV 40 amplifier is also available with integrated sensor controller for strain gage measurement system as well as capacitive measurement system. These systems are marked with suffix SG or CAP.

The diagram shows the typical frequency which can be reached as a function of the capacitance of the piezoelectric actuator and the driving voltage by an output current of 40mA.

The sine wave is searched with a THD (Total Harmonic Distortion) of <1%

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modular system ENV
table top
OEM piezo-amplifier

electronics • analog • modular system ENV

ENV 40C

system ENV 40 compact

The latest development ENV 40 C of the ENV series combines the excellent features of the ENV system with the compactness of the 12V40 OEM piezo amplifier modules (please see series 12V40 OEM amplifier). The compact ENV series is very suitable for automated positioning and scanning applications in labs and industry where the direct display of the output values is not needed.

The ENV 40 C module is available with integrated controller for the use of different position measurement systems.



ENV 40 CSG

- *amplifier for low voltage piezo elements*
- *multi channel system*
- *excellent cost effectiveness*
- *closed loop system integrated (option)*
- *compact dimensions*

piezosystemjena

technical data	ENV 40 C	ENV 40 CSG	ENV 40 CCP
part no.	E-104-00	E-104-10	E-104-30
display	no	no	no
sensor controller	–	strain gage	capacitive
output voltage	-10...+150V	-10...+150V	-10...+150V
output current (continuous)	40mA	40mA	40mA
voltage noise	<0.3mV$_{RMS}$@500Hz	<0.3mV$_{RMS}$@500Hz	<0.3mV$_{RMS}$@500Hz
connector output voltage	LEMO 0S.302	LEMO 0S.302	LEMO 0S.302
DC voltage offset	3/4 turn potentiometer	3/4 turn potentiometer	3/4 turn potentiometer
modulation input (SMB connector)*	0...+10V	0...+10V	0...+10V
input impedance	10kΩ	10kΩ	10kΩ
monitor output (SMB connector)*	-1...+15V	±13V OL** 0...+10V CL***	±13V OL** 0...+10V CL***
monitor output impedance typ.	100kΩ	10kΩ	10kΩ
connector sensor	–	LEMO 0S.304	LEMO 0S.650
width	6TE	6TE	12TE

A PID controller is used for the position control. A very compact attachable printed circuit board processes the analog signals for the integrated capacitive or strain gage measurement systems.

* SMB plug available with part no. Z-006-70 (please see chapter "accessories")

** OL – open loop

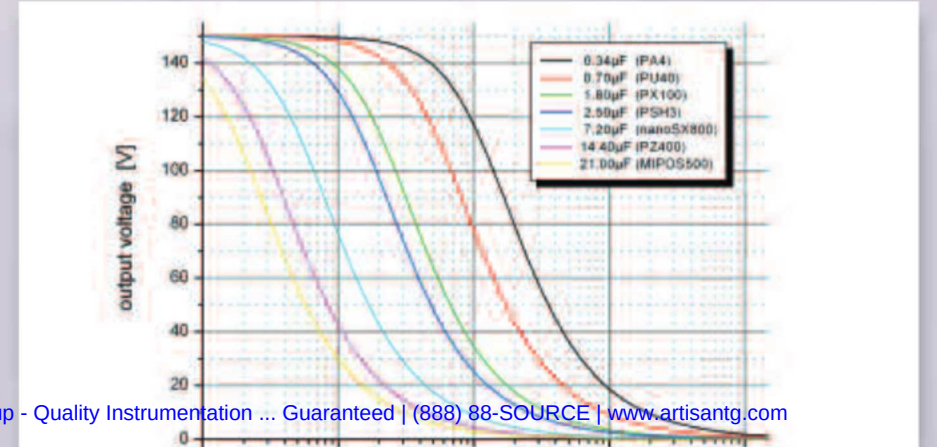
*** CL – closed loop

applications

- automation systems
- operation with low dynamics
- precision adjustment in labs and industry

The diagram shows the typical frequency which can be reached as a function of the capacitance of the piezoelectric actuator and the driving voltage by an output current of 40mA.

The amplitude is reached with a THD (Total Harmonic Distortion) of <1%



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system ENV 300 and ENV 800

system 300 and system 800 – high dynamic piezo amplifier

In all systems of the amplifier series ENV 300 and ENV 800 a protection circuit is implemented which protects from high voltage spikes when the unit is turned on and off. The new soft start ensures an actuator-safe activation of the system.

The ENV 300 and ENV 800 amplifiers are also available with integrated sensor controller for strain gage measurement system as well as capacitive measurement system. These systems are marked with suffix SG, CAP, CLE.

options

- automatic "closed loop on" function by switching on the whole system

Order information

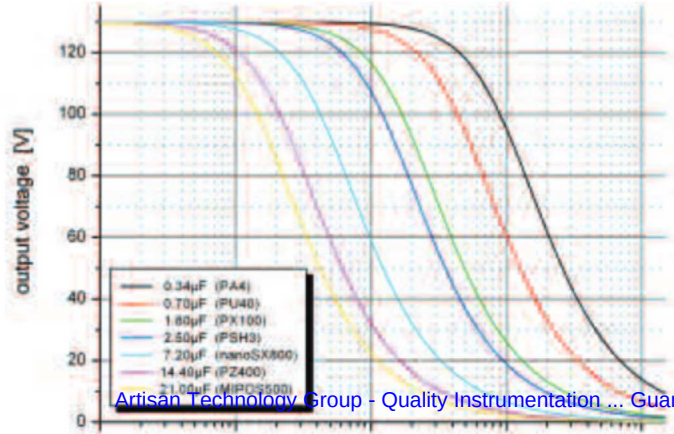
If using more than one ENV 300 high power amplifiers or at least one ENV 800, casings with active cooling are necessary (see page 72 for part number).

technical data part no.	ENV 300 E-270-000	ENV 300 SG E-270-100	ENV 300 CAP E-270-600	ENV 300 CLE E-272-000	ENV 300 nanoX E-278-000	ENV 300 nanoX SG E-278-100	ENV 300 nanoX CAP E-278-600	ENV 300 nanoX CLE E-278-700
display	LCD, 3.5 digit							
sensor controller	–	strain gage	capacitive	strain gage, capacitive	–	strain gage	capacitive	strain gage, capacitive
output voltage	-20…+130V	-20…+130V	-20…+130V	-20…+130V	-20…+130V	-20…+130V	-20…+130V	-20…+130V
output current (continuous)	300mA	300mA	300mA	300mA	2x150mA	2x150mA	2x150mA	2x150mA
voltage noise	<0.3mV$_{RMS}$@500Hz							
connector output voltage	LEMO 0S.302	LEMO 0S.302	LEMO 0S.302	LEMO 0S.302	ODU3pin	ODU3pin	ODU3pin	ODU3pin
DC voltage offset	adjustable via potentiometer							
modulation input (BNC connector)	0…+10V	0…+10V	0…+10V	0…+10V	0…+10V	0…+10V	0…+10V	0…+10V
input impedance	10kΩ	10kΩ	10kΩ	10kΩ	10kΩ	10kΩ	10kΩ	10kΩ
monitor output (BNC connector)*	-2…+13V	±13V OL** 0…+10V CL***	±13V OL** 0…+10V CL***	±13V OL** 0…+10V CL***	-2…+13V	±13V OL** 0…+10V CL***	±13V OL** 0…+10V CL***	±13V OL** 0…+10V CL***
monitor output impedance typ.	100kΩ	50Ω	50Ω	50Ω	100kΩ	50Ω	50Ω	50Ω
connector sensor	–	LEMO.0S.304	LEMO.0S.650	ODU4pin	–	LEMO 0S.304	LEMO 0S.650	ODU4pin
width	14TE	20TE	20TE	20TE	14TE	20TE	20TE	20TE
special features	soft start, overvoltage protection, temperature rise protection, short circuit proof closed loop mode selectable via button, optional: auto-closed-loop-on-function (part no.: Z-300-70)							
closed loop systems	optional: optimization of the PID parameter load-dependent by the supplier							

* For open loop systems the output voltage is displayed on "MON" in a 10:1 (-2...+13V) ratio. For closed loop systems the adjusted sensor signal is available. The monitor output voltage is 0...+10V for 0...100% of closed loop motion.

** OL – open loop

*** CL – closed loop



The diagram shows the typical frequency which can be reached as a function of the capacitance of the piezoelectric actuator and the driving voltage by an output current of 300mA.

The amplitude is reached with a THD (Total Harmonic Distortion) of <1%.

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modular system ENV
table top
OEM piezo-amplifier

electronics • analog • modular system ENV

system ENV 300 and ENV 800



ENV 300



ENV 800 CAP

- 300mA permanent for dynamic applications
- 800mA permanent for high dynamic applications
- 19" module for ENV systems
- excellent price-performance ratio
- low voltage noise (< 0.3 mV_{RMS})

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technical data part no.	ENV 800 E-280-000	ENV 800 SG E-280-100	ENV 800 CAP E-280-600	ENV 800 CLE E-282-000	ENV 800 nanoX E-288-000	ENV 800 nanoX SG E-288-100	ENV 800 nanoX CAP E-288-600	ENV 800 nanoX CLE E-288-700
display	LCD, 3.5 digit							
sensor controller	–	strain gage	capacitive	strain gage, capacitive	–	strain gage	capacitive	strain gage, capacitive
output voltage	-20…+130V	-20…+130V	-20…+130V	-20…+130V	-20…+130V	-20…+130V	-20…+130V	-20…+130V
output current (continuous)	800mA	800mA	800mA	800mA	2x400mA	2x400mA	2x400mA	2x400mA
voltage noise	<0.3mV_{RMS}@500Hz							
connector output voltage	LEMO 0S.302	LEMO 0S.302	LEMO 0S.302	LEMO 0S.302	ODU3pin	ODU3pin	ODU3pin	ODU3pin
DC voltage offset	adjustable via potentiometer							
modulation input (BNC connector)	0…+10V	0…+10V	0…+10V	0…+10V	0…+10V	0…+10V	0…+10V	0…+10V
input impedance	10kΩ	10kΩ	10kΩ	10kΩ	10kΩ	10kΩ	10kΩ	10kΩ
monitor output (BNC connector)*	-2…+13V	±13V OL** 0…+10V CL***	±13V OL** 0…+10V CL***	±13V OL** 0…+10V CL***	-2…+13V	±13V OL* 0…+10V CL**	±13V OL* 0…+10V CL**	±13V OL* 0…+10V CL**
monitor output impedance typ.	100kΩ	50Ω	50Ω	50Ω	100kΩ	50Ω	50Ω	50Ω
connector sensor	–	LEMO 0S.304	LEMO 0S.650	ODU4pin	–	LEMO 0S.304	LEMO 0S.650	ODU4pin
width	14TE	20TE	20TE	20TE	14TE	20TE	20TE	20TE
special features	soft start, overvoltage protection, temperature rise protection, short circuit proof closed loop mode selectable via button, optional: auto-closed-loop-on-function (part no.: Z-300-70)							
closed loop systems	optional: optimization of the PID parameter load-dependent by the supplier							

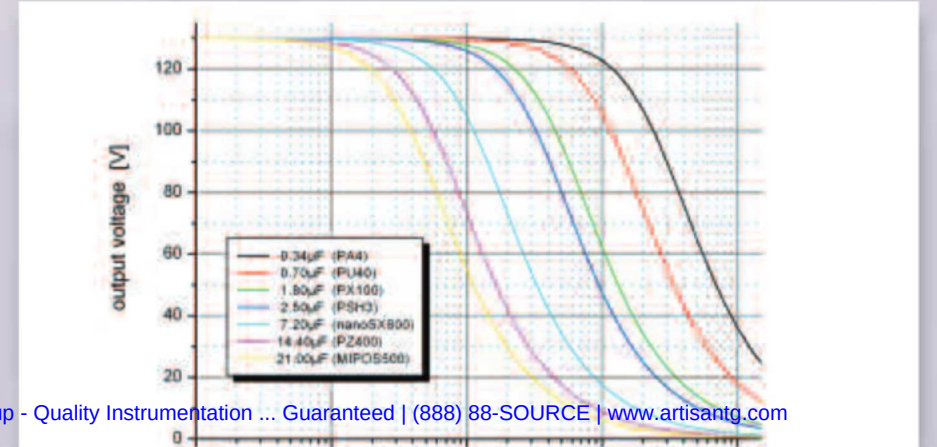
* For open loop systems the output voltage is displayed on "MON" in a 10:1 (-2...+13V) ratio. For closed loop systems the adjusted sensor signal is available. The monitor output voltage is 0...+10V for 0...100% of closed loop motion.

** OL – open loop

*** CL – closed loop

The diagram shows the typical frequency which can be reached as a function of the capacitance of the piezoelectric actuator and the driving voltage by an output current of 800mA.

The amplitude is reached with a THD (Total Harmonic Distortion) of <1%.



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interface boards series EDA

EDA – the interface board with microcontroller

The EDA interface boards have eight analog inputs and four analog outputs, as well as eight digital in- and outputs. It is well suited to the automation of positioning processes, the programming of specific scan functions, data acquisition and the control of any analog system.

The card comes with demo software providing different functions and a monitor program for monitoring the in- and output data.

Programming of useful functions can be easily done by using the demo software as well. Please see the first steps of programming below. The full description can be found in the user manual of the EDA or please ask our office for further assistance.

After starting the demo program for the first time, parameters and possible settings are set by **default.** The language setting adjusts to the language of the operating system.

In case of the PC system language is different from German or English the program language is set to English. The subroutine **'Voltage/Way'** is activated. The interface is specified as **RS232** on COM1 with 9600 Baud. If COM 1 is not accessible an error is prompted and the menu **'Settings'** opens. The settings have to be adjusted. After changing to the subroutine **'Terminal'** the EDA should use the prompt:

EDAn Vn.nnn S0>

In the case where the system replies:

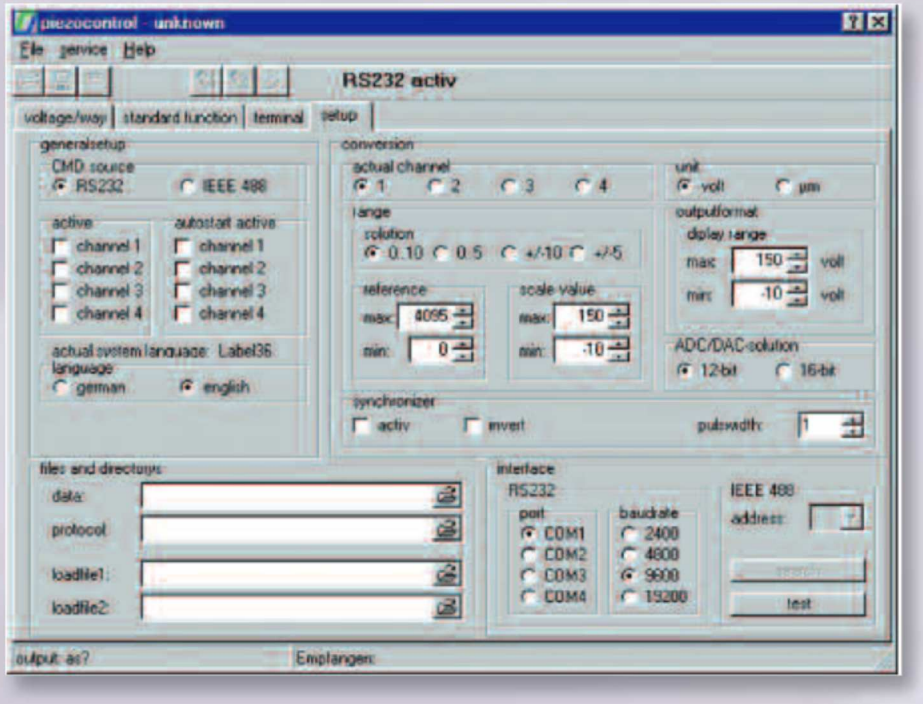
URL Vn.nnn S1>

the function switch S1 is in position 2 and has to be switched to position 1. Reset the interface card afterwards.

If the terminal shows no response the following points should be checked:

- is the EDA (the ENV-System) switched on?
- is the **RS232-Connection** between PC and interface card established ?
- is the configuration of the **RS232-Connection** ok?
- were the appropriate COM-parameters chosen?

The 19" casing allows the card to be interchangeable with any other analog amplifier component from ***piezosystem jena*** and can be incorporated in other electronics without any problems.



modular system ENV
table top
OEM piezo-amplifier

electronics • analog • modular system ENV
interface boards series EDA

The EDA interface modules are universal I/O boards designed as a 19" slot card. The modules provide analog input and digital I/Os used for recording measurement signals or operating additional electronics. With additional software the programming of special scan functions is very easily.
The main advantages of these modules are the built-in micro-controller and a free programmable memory capacity. The micro-controller is capable of input and output procedures or voltage values programmed in the memory.

The EDA modules can also work as a normal PC-line operated system directly from the PC.
All EDA 4 and EDA 5 interface cards have the same features. The EDA 5 also has an IEEE 488.2 interface.

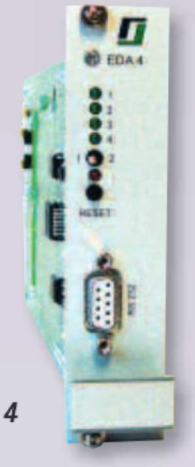
general remarks
Piezo electrical systems and their electronics work with high voltages and high currents. Please consider the advices and rules for safety. Please read our manual and the ad vice given in the piezoline download file.

applications
- PC control of analog amplifiers
- automatic process control

specifications
input voltage range: 0 to +10V
power supply digital: +5V (100mA)
power supply analog: ±15V (±15mA)

- LED indicating the active channels (function can be changed by programming the FLASH EPROM)
- switch (can be programmed for stand alone work)
- reset switch

connections
- RS 232
- IEEE 488 connector (EDA 5 only)



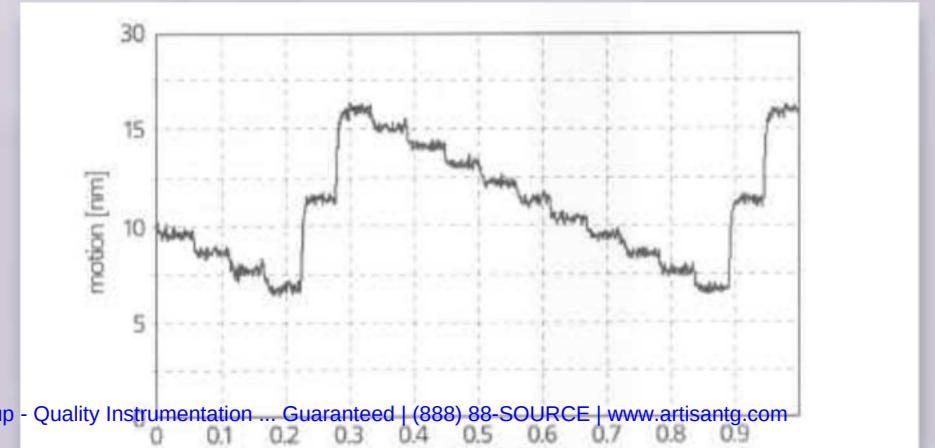
EDA 4

- ***universal AD/DA interface boards***
- ***4 channel DAC, 8 channel ADC 16 bit***
- ***8 bit µP, 64 k RAM, 128 k Flash on-board programmable***
- ***comes with demo program for Windows***
- ***easy access via terminal program***

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technical data part no.		EDA 4 E-202-40	EDA 5 E-202-50
type of interface		RS 232-C, 9600 or 19200 or 57600 baud	RS 232-C, 9600 or 19200 or 57600 baud and IEEE 488.2
resolution		16bit	16bit
sample rate		32 ksamples/s	32 ksamples/s
number of analog	outputs inputs	4 8	4 8
number of digital	outputs inputs	8 TTL (HCT573) 8 as analog inputs programmable 0...+5V, 10bit	8 TTL (HCT573) 8 as analog inputs programmable 0...+5V, 10bit
output voltage range		0...+10V	0...+10V
size		100x160mm²	100x160mm²
width		6TE	10TE

Figure 1 shows motion of a piezo element with an inte grated capacitive sensor. The TRITOR is controlled by an EDA 4 interface card with a resolution of 16 bit.
Because of the high resolu ton of the capacitive sensor, the minimal step of 1.2nm (16 bit resolution corresponding to a motion of 80µm in closed loop mode) can be resolved easily.



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NV 40/1 CLE

piezosystem jena

- *compact, one channel piezo amplifier*
- *computer interface RS 232*
- *closed loop/open loop operation for strain gage and capacitive feedback sensors*
- *memory function*
- *modulation input*
- *monitor output*



NV 40/1 CLE

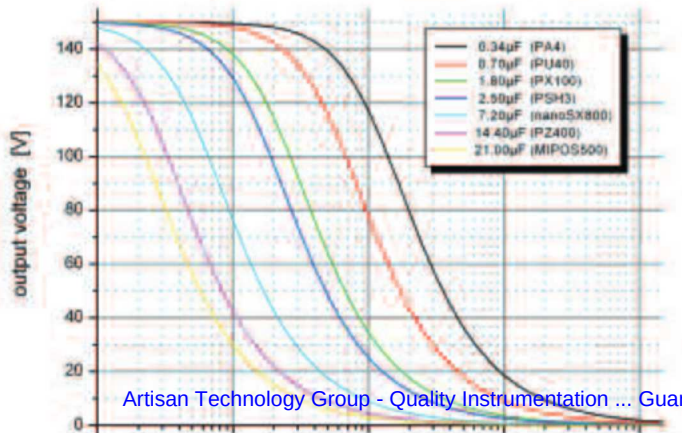
The NV 40/1 CLE is a standard one channel piezo amplifier with a permanent output current of 40mA. The max. voltage is 150VDC. The amplifier is built as a compact table top unit for laboratory use mainly. Different versions for main supply voltage of 95V to 230V are available.

The output voltage can be adjusted manually by an offset potentiometer on the front panel. A BNC connector is located on the front panel for external control by an analog voltage signal from 0...+10V. The external offset signal is effectively added to the DC-level.

The third way for control is given by the RS 232 interface on the back panel. All parameters of the commands are scaled with 16bit resolution. Easy programming can be done via the Terminal Program. All commands are given in the user manual. A driver for Labview® is available.

Using integrated measurement systems such as strain gage or capacitive systems makes it possible to get a typical accuracy of 0.05% of the full motion. The NV 40/1 CLE is able to control piezo elements with both types of feed back sensors inside, when the element is equipped with an external sensor signal preamplifier (signified by the suffix "E" at the actuator part number).

technical data part no.	NV 40/1 CLE E-101-73 (230VAC version) E-101-74 (115 VAC version) E-101-75 (95 VAC version)
channels	1
display	LED, 5 digit
sensor controller	strain gage, capacitive
output voltage	-10...+150V
output current (continuous)	40mA
voltage noise	<0.3mV$_{RMS}$@500Hz
connector output voltage	LEMO 0S.302
DC voltage offset	10 turn potentiometer
modulation input (BNC connector)	0...+10V
input impedance	10kΩ
monitor output (closed loop on), BNC-connector	0...+10V
monitor output impedance typical	100Ω
interface	RS 232
command parameter resolution	16bit
connector sensor	ODU4pin
dimensions (l x w x h)	200x170x70mm
weight	1.6kg



The diagram shows the typical frequency which can be reached as a function of the capacitance of the piezoelectric actuator and the driving voltage by an output current of 40mA. The amplitude is reached with a THD (Total Harmonic Distortion)

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NV 40/3 and NV 120/1

ASI (Automatic Sensor Identification)*

The NV 40/3 and NV 120/1 are a three and one channel piezo amplifier built in a compact table top unit. The continuous output current is 40mA for NV 40/3 and 120mA for NV 120/1. The max. voltage is 130VDC.
The amplifier is built in two different versions. The NV 40/3CLE and NV 120/1CLE are the closed loop amplifier units for piezo elements with an integrated feedback measurement system for strain gage or capacitive sensors. This provides highest precision in positioning. The open loop version is named NV 40/3 and NV 120/1 and can operate in open loop mode only.
The output voltage can be adjusted manually by an offset incremental encoder on the front panel. External control can be done by an analog voltage signal is 0...+10V applied to MOD-input.
The external offset signal is effectively added to the DC-Level. The position of the actuator or the value of the output voltage signal can be examined via the monitor output.
For computer control, the piezo amplifier comes with an RS232 and USB interface as well. All parameters of the commands are scaled with 16bit resolution. All settings and readings of values can be done directly by PC. All commands are given in the user manual. All im portant user information like position value, applied voltage signal and operational modes are displayed by a QVGA color display on the front panel.

*** *ASI function:* Automatic Sensor Identification**
The ASI function allows you to exchange the same type of actuator and use it with the same amplifier. Actuators for an ASI compatible amplifier are equipped with an external pre-amplifier.
New calibration is no longer necessary (valid only for standard calibration).

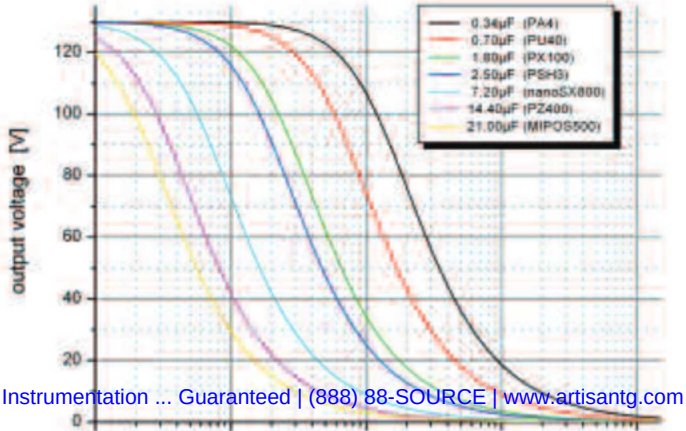


NV 40/3 CLE

- *compact*
- *computer interface RS232/USB*
- *closed loop/ open loop operation for strain gage and capacitive feed-back sensors (model NV 40/3CLE and NV 120/1CLE only)*
- *modulation input*
- *monitor output*
- *soft start function for increased PZT lifetime*

piezosystemjena

technical data part no.	NV 40/3 E-101-20	NV 40/3 CLE E-101-23	NV 120/1 E-101-90	NV 120/1 CLE E-101-93
channels	3	3	1	1
display	QVGA color display			
sensor controller	–	strain gage, capacitive	–	strain gage, capacitive
output voltage	-20...+130V	-20...+130V	-20...+130V	-20...+130V
output current (continuous)	3x40mA	3x40mA	1x120mA	1x120mA
voltage noise	<0.3mV$_{RMS}$@500Hz			
connector output voltage	SUB-D 15pin (per channel)	SUB-D 15pin (per channel)	SUB-D 15pin	SUB-D 15pin
DC voltage offset	via encoder	via encoder	via encoder	via encoder
modulation input	0...+10V	0...+10V	0...+10V	0...+10V
input impedance	10kΩ	10kΩ	10kΩ	10kΩ
monitor output	0...+10V	0...+10V	0...+10V	0...+10V
monitor output impedance typ.	100Ω	100Ω	100Ω	100Ω
connector modulation/monitor	SUB-D 25pin	SUB-D 25pin	SUB-D 25pin	SUB-D 25pin
interface	USB, RS 232	USB, RS 232	USB, RS 232	USB, RS 232
command parameter resolution	16bit	16bit	16bit	16bit
connector sensor	–	via SUB-D 15pin output voltage connector	–	via SUB-D 15pin output voltage connector
dimensions (l x w x h)	240x210x88mm	240x210x88mm	240x210x88mm	240x210x88mm
weight	2.1kg	2.1kg	2.1kg	2.1kg
main supply	24VDC/2.5A (wide range power supply 90-264VAC included)			



The diagram shows the typical frequency which can be reached as a function of the capacitance of the piezoelectric actuator and the driving voltage by an output current of 40mA. The amplitude is reached with a THD (Total Harmonic Distortion)

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system 12V40 and 24V40

12V40

The voltage amplifier 12V40 is well suited for low voltage piezo elements. Two different types of casings are available. The amplifier requires only 12VDC for supply. It can be controlled via MOD input (front- or backside). The output voltage or sensor signal can be supervised on the monitor output. Special circuits are integrated to protect the piezo element from voltage peaks and too high voltages.

Due to very low voltage noise of only $0.3mV_{RMS}$@500Hz this amplifier is well suited for sub-nm positioning tasks.
All connections are also available on the backside thus this amplifier can easily be integrated as an OEM product.
The amplifiers of the series 12V40 are also available with a supply voltage of 24V. The special part number for the 24V versions are given in the table of technical data below.

technical data part no.	12V40 E-440-011	12V40 E-440-012	12V40 SG E-440-111	12V40 SG E-440-112	12V40 CLE E-440-711
display	no	no	no	no	no
sensor controller	–	–	strain gage	strain gage	strain gage, capacitive
output voltage	-10…+150V	-10…+150V	-10…+150V	-10…+150V	-10…+150V
output current (continuous))	40mA	40mA	40mA	40mA	40mA
voltage noise ($_{RMS}$@500Hz)	<0.3mV	<0.3mV	<0.3mV	<0.3mV	<0.3mV
connector output voltage	LEMO 0S.302	LEMO 0S.302	LEMO 0S.302	LEMO 0S.302	LEMO 0S.302
DC voltage offset	3/4 turn potentiometer	3/4 turn potentiometer	3/4 turn potentiometer	3/4 turn potentiometer	3/4 turn potentiometer
modulation input					
front (SMB connector)	0…+10V	0…+10V	0…+10V	0…+10V	0…+10V
back	0…+10V	0…+10V	0…+10V	0…+10V	0…+10V
MOD input impedance	10kΩ	10kΩ	10kΩ	10kΩ	10kΩ
monitor output					
front (SMB connector)	-1…+15V	-1…+15V	0…+10V**	0…+10V**	0…+10V**
back	0…+10V	0…+10V	0…+10V**	0…+10V**	0…+10V**
MON output impedance typ.	100kΩ	100kΩ	100kΩ OL* 50Ω CL**	100kΩ OL* 50Ω CL**	100kΩ OL* 50Ω CL**
connector sensor	–	–	LEMO 0S.304	LEMO 0S.304	ODU4pin
type of casing	screw slot	plug-in	screw slot	plug-in	screw slot
dimensions (l x w x h) mm	181x130x45	181x105x47.35	181x130x45	181x105x47.35	181x130x45
special features	power on delay, overdrive protection	power on delay, overdrive protection	power on delay, overdrive protection	power on delay, overdrive protection	power on delay, overdrive protection
main supply	12VDC	12VDC	12VDC	12VDC	12VDC

version 24V40 part no.	E-440-031	E-440-032	E-440-131	E-440-132	E-440-732
main supply	24VDC	24VDC	24VDC	24VDC	24VDC

* OL – open loop ** CL – closed loop

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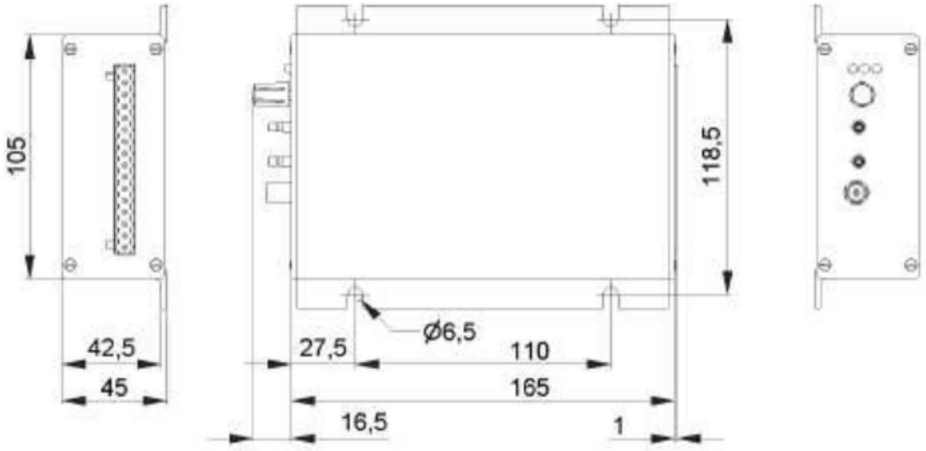
system 12V40 and 24V40



12V40 SG

- closed casing
- 12V or 24VDC power supply
- excellent cost effectiveness
- small dimensions
- closed loop version available
- casing design changeable between screw slot and 19" plug-in version

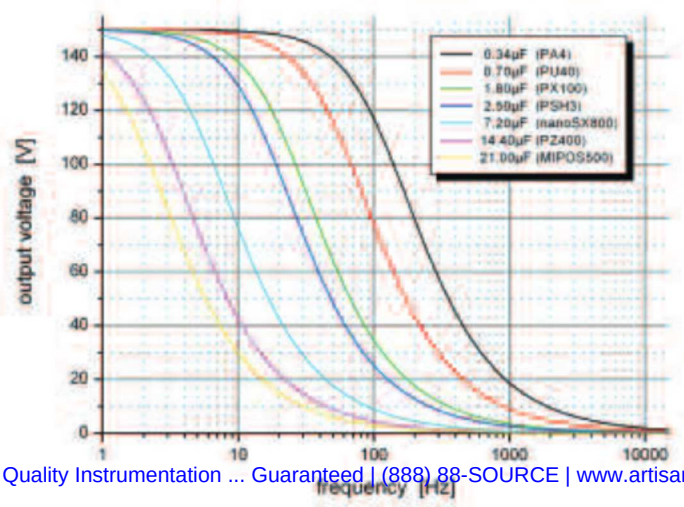
piezosystemjena



12V40 E-440-011

The diagram shows the typical frequency which can be reached as a function of the capacitance of the piezoelectric actuator and the driving voltage by an output current of 40mA.

The amplitude is reached with a THD (Total Harmonic Distortion) of <1%.



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30V300 / 30V300nanoX

The line of OEM piezo amplifiers from ***piezosystem jena*** has been extended by the OEM amplifier 30V300. With its remarkable output current of 300mA this amplifier can be used especially for driving standard systems in very high frequency applications. A main supply voltage from 10V to 30VDC enables the new 30V300 for universal use. The casing is available as a screw slot version (see picture) or for in a 19"-rack mount casing.

It is compact, robust and mountable in many different manners and most importantly is it high reliability.
The outstanding performance of the 30V300 guarantees high speed positioning with the highest accuracy available.
The high output current of 300mA allows dynamic use of actuators with a higher capacitance. Rise time and frequency response can be precisely adjusted for each application.

The 30V300 CLE works with positioning sensor (closed loop) and without sensor (open loop) as well.

applications

- driving piezo elements
- OEM-applications

technical data	30V300/30V300nanoX			30V300 CLE/30V300nanoX CLE		
part no.	E-460-011 E-468-011	E-460-012 E-468-012	E-460-013 E-468-013	E-460-111 E-468-111	E-460-112 E-468-112	E-460-113 E-468-113
channel	1	1	1	1	1	1
display	no	no	no	no	no	no
sensor controller	no	no	no	yes	yes	yes
output voltage	-20…+130V (+130…-20V for nanoX™ actuators)					
output current (continuous))	300mA (nanoX 2x150mA)	300mA (nanoX 2x150mA)	300mA (nanoX 2x150mA)	300mA (nanoX 2x150mA)	300mA (nanoX 2x150mA)	300mA (nanoX 2x150mA)
voltage noise ($_{RMS}$@500Hz)	<0.3mV	<0.3mV	<0.3mV	<0.3mV	<0.3mV	<0.3mV
connector output voltage	LEMO 0S.302 (ODU3pin nanoX)	LEMO 0S.302 (ODU3pin nanoX)	LEMO 0S.302 (ODU3pin nanoX)	LEMO 0S.302 (ODU3pin nanoX)	LEMO 0S.302 (ODU3pin nanoX)	LEMO 0S.302 (ODU3pin nanoX)
DC voltage offset	-20…+130V	-20…+130V	-20…+130V	-20…+130V	-20…+130V	-20…+130V
modulation input (BNC-connector)	0…+10V	0…+10V	0…+10V	0…+10V	0…+10V	0…+10V
MOD input impedance	10kΩ	10kΩ	10kΩ	10kΩ	10kΩ	10kΩ
monitor output (BNC-connector)	-2…+13V	-2…+13V	-2…+13V	0…+10V*	0…+10V*	0…+10V*
monitor output impedance typ.	100KΩ	100KΩ	100KΩ	50Ω	50Ω	50Ω
connector sensor	–	–	–	ODU4pin	ODU4pin	ODU4pin
type of casing	screw slot	19"rack mount	stand alone	screw slot	19" rack mount	stand alone
dimensions (l x w x h) mm	235.5x130x85.7	16TEx3HE	235.5x105x85.7	235.5x130x 85.7	16TEx3HE	235.5x105x 85.7
weight	1.6kg	1.6kg	1.6kg	1.6kg	1.6kg	1.6kg
special features	short circuit proof, soft start	short circuit proof, soft start	short circuit proof, soft start	short circuit proof, soft start	short circuit proof, soft start	short circuit proof, soft start
main supply	+10…+30VDC /max. 5A	+10…+30VDC /max. 5A	+10…+30VDC /max. 5A	+10…+30VDC /max. 5A	+10…+30VDC /max. 5A	+10…+30VDC /max. 5A
connector main supply	low voltage socket with 2.1mm-pin	low voltage socket with 2.1mm-pin	low voltage socket with 2.1mm-pin	low voltage socket with 2.1mm-pin	low voltage socket with 2.1mm-pin	low voltage socket with 2.1mm-pin

** CL – closed loop

E-468-xxx – all actuator types with bidirectional level transmission design e.g. nanoX400

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30V300



30V300nanoX

- closed casing
- main supply voltage 10...30VDC
- 300mA output current permanent
- closed loop version available
- different casing designs available

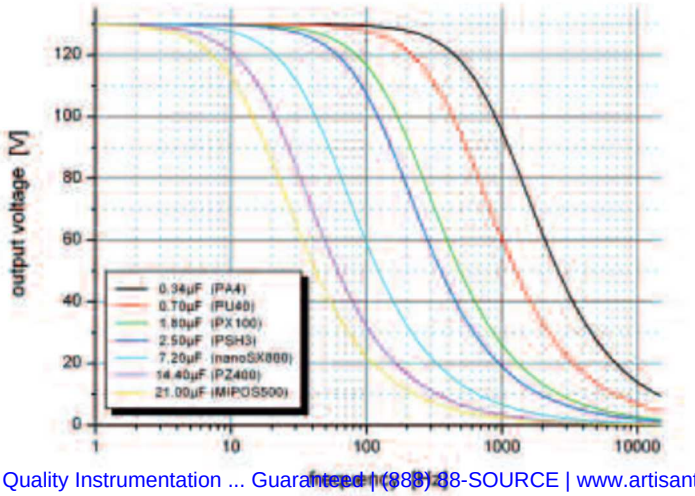
piezosystemjena



30V300 CLE

The diagram shows the typical frequency which can be reached as a function of the capacitance of the piezoelectric actuator and the driving voltage by an output current of 300mA.

The amplitude is reached with a THD (Total Harmonic Distortion) of <1%.



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system 5V10, nanox box and nanox box USB

piezosystemjena

- *channel low cost amplifier*
- *miniature amplifier for low voltage piezo elements*
- *DC supply voltage*
- *low power*
- *small size casing*



5V10

nano box

5V10

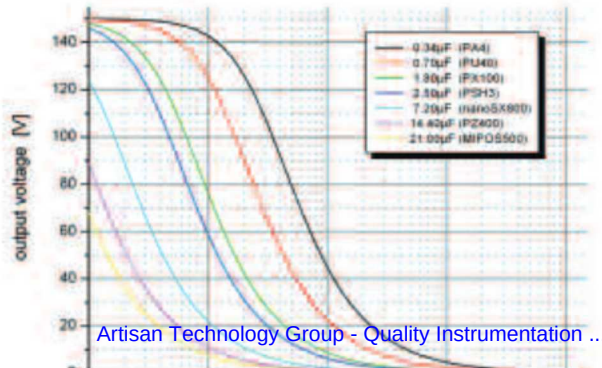
The OEM amplifier 5V10 has been developed for bimorph and low voltage piezo elements. The design and construction provides a flex ble alternative in electronic drives and control systems.
The easy adaptation of the output voltage and current to customer`s system enables a variety of applications.

Special circuits are integrated to protect the piezo element from voltage spikes and excessive voltages.

OEM amplifier part no.	5V10 E-304-10	nano box E-310-00	nano box USB E-320-00
output voltage	0…+150V	0…+150V	0…+130V
output current (continuous)	10mA	8mA	10mA
connector output voltage	LEMO 0S.302	LEMO 0S.302	LEMO 0S.302
voltage noise ($_{RMS}$@500Hz)	3mV	3mV	3mV
modulation input (BNC connector)	0…+5V	0…+5V	–
input impedance	10kΩ	5kΩ	–
dimensions (l x w x h)	80x55x20mm	130x55x24mm	95x55x25mm
weight	150 g	175 g	175g
USB interface	–	–	USB 2.0
integrated saw tooth generator	–	2…35Hz 0…+150V (fixed) duty-cycle 50%	–
main supply	5VDC	9VDC	24VDC
connector main supply	bare wires	DC-connector 2.1mm	DC-connector 2.1mm

The diagram shows the typical frequency which can be reached as a function of the capacitance of the piezoelectric actuator and the driving voltage by an output current ***of 10mA.***

The amplitude is reached with a THD (Total Harmonic Distortion) of <1%.



5V10

nano box

An easy-to-use electronic system which also features an integrated function generator.
The frequency is manually adjustable in a small range.
The potentiometer is used to adjust either offset or frequency.

nano box USB

USB devices are being used more frequently in lab type environments. piezosystem jena now offers analog amplifier with 16bit D/A resolution and a USB 2.0 interface, with a capable list of commands.
No additional manual or analog inputs are necessary. The simple connection via USB to a PC allows for a fast implementation of high precise positioning tasks at every workplace.

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ASI (Automatic Sensor Identification)*
ASC (Automatic System Calibration)*

electronics • digital • OEM

30DV50

The line of digital piezo amplifiers (d-Drive) of ***piezosystem jena*** is extended by the OEM amplifier module 30DV50. This amplifier was designed for use as a single unit in industrial settings.
It is compact, robust and mountable in different manners and it is highly reliably. The 30DV50 was designed for universal use with a main supply voltage from 10V to 30VDC. The casing is available as screw slot version (see picture) or for use in a 19"-rack mount casing.



30DV50

- *1-channel digital amplifier*
- *for all kinds of closed loop sensors*
- *power supply 10 ... 30VDC*
- *20-bit resolution (oversampling)*
- *64 MHz processor*
- *built-in wave function generator programmable*

Piezo actuators can be controlled in three different ways

- by using the potentiometer on the front panel
- via analog signal 0...+10V
- via PC-Interface

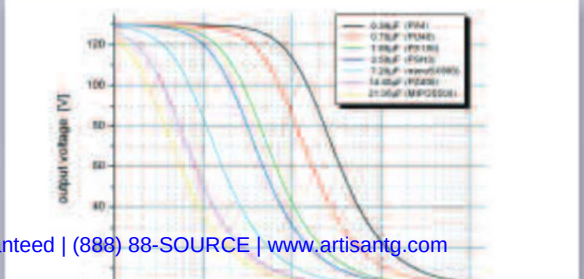
* The 30DV50 comes with an ***Automatic Sensor Identification (ASI)*** and an ***Automatic System Calibration (ASC)***. These are new functionalities of piezo electrical systems from ***piezosystem jena*** for automatic sensor identifier and exchangeability of single parts of the system (actuator or electronic without new calibration procedure). For further Information please see page 88 or the general remarks (page 5).

A unique feature of the 30DV50 is that it can be used in combination with strain gage, or capacitive feed-back sensors without additional modification. The DSP (digital signal processor) runs at 64MHz.
The sampling rate is only 20µsec.

applications

- digital control of piezo actuating systems in industrial and laboratory settings
- for automatic control of high resolution
- nano positioning applications

technical data OEM amplifier part no.	30DV50 E-754-300
channels	1
display	no
processor	64MHz, 32bit floating point DSP
resolution (oversampling)	20bit
servo rate	20µsec
sensor controller	capacitive, strain gage
controller	PID digital with DSP, low pass, notch filter
output voltage	-20...+130V (+130...-20V for nanoX™actuators)
output current (continuous)	50mA/2x50mA for nanoX™actuators
voltage noise	<0.3mV$_{RMS}$@500Hz
connector output voltage	SUB-D 15pin
DC voltage offset	-20...+130V (adjustable on front panel or via interface)
modulation input	0...+10V (programmable slew rate)
input impedance	25kΩ
monitor output	0...+10V
monitor output impedance typical	50Ω
connector modulation/monitor	SUB-D 9pin
interface	RS232
dimensions (l x w x h)	230x130x86mm
weight	1.6kg
special features	short circuit proved, overtemperature protection, ASI-function (AutomaticSensor Identification), ASC-function (Automatic System Calibration),slew rate, notch filter, low pass filters, integrated function generator (sine, triangular, square function, sweep)
main supply	+10...+30VDC/max.2.5A
connector main supply	low voltage socket with 2.1mm-pin



The diagram shows the typical frequency which can be reached as a function of the capacitance of the piezoelectric actuator and the driving voltage by an output current of 50mA.

The amplitude is reached with a THD (Total Harmonic

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electronics • digital • modular system

d-Drive

ASI (Automatic Sensor Identification)*
ASC (Automatic System Calibration)*

The new digital generation of piezo controllers of ***piezosystem jena*** combines the highest positioning accuracy with a unique handling comfort. This means that all features can be controlled via PC and the main functions can be directly regulated on front panel. Moreover, the actuators are now separable and interchangeable (ASC-function*). We also implemented free adjustable features, such as slew rate, notch filter frequency and low pass filter frequency.

A built-in function generator offers sine, triangular and square functions as well as noise and sweep.
A unique feature of the d-Drive system is that it can be used in combination with strain gage, or capacitive feed-back sensors without additional modification. The DSP (digital signal processor) runs at 64MHz. The servo rate is only 20µsec.

The modular setup allows custom configurations for each application. Typically a controller consists of

- a casing with an integrated wide range power supply (90-265V/ 50-60Hz),
- an amplifier module for each axis (output current 50mA/per slot can contain up to six amplifier modules) called EVD 50,
- an interface module EDS 2 (optional without display: EDS 1) with 20bit resolution (effective).

technical data part no.	EVD 50 OL E-720-100	EVD 50 CL E-720-300	EVD 125 CL E-720-600	EVD 300 CL E-720-700
channels	1	1	1	1
display	no	no	no	no
processor	64MHz, 32bit floating point DSP			
resolution (oversampling)	20bit	20bit	20bit	20bit
servo rate	20µsec	20µsec	20µsec	20µsec
sensor controller	–	capacitive, strain gage	capacitive, strain gage	capacitive, strain gage
controller	PID digital with DSP, low pass, notch filter			
output voltage	-20…+130V	-20…+130V	-20…+130V	-20…+130V
output current (continuous)	50mA (2x50mA for nanoX™ actuators)	50mA (2x50mA for nanoX™ actuators)	125mA (2x125mA for nanoX™ actuators)	300mA (2x150mA for nanoX™ actuators)
voltage noise ($_{RMS}$@500Hz)	<0.3mV	<0.3mV	<0.5mV	<0.5mV
connector output voltage	SUB-D 15pin	SUB-D 15pin	SUB-D 15pin	SUB-D 15pin
DC voltage offset	-20…+130V (adjustable on front panel or via interface)			
modulation input	0…+10V	0…+10V	0…+10V	0…+10V
input impedance	25kΩ	25kΩ	25kΩ	25kΩ
monitor output	0…+10V	0…+10V	0…+10V	0…+10V
monitor output impedance typ.	50Ω	50Ω	50Ω	50Ω
connector modulation/monitor	SUB-D 9pin	SUB-D 9pin	SUB-D 9pin	SUB-D 9pin
dimensions	3HE 10TE	3HE 10TE	3HE 20TE	3HE 20TE
special features	overtemperature protection, short circuit proof, slew rate, notch filter, low pass filter, integrated function generator (sine, triangular, square function), ASI-function (Automatic Sensor Identification), ASC-function (Automatic System Calibration)			
no. of amplifiers served	1…6	1…6	1…3	1…3
interface (EDS1, EDS2)	RS232, USB	RS232, USB	RS232, USB	RS232, USB
display	no	yes, the menu based user interface allows the control of the system without a PC as stand-alone device.		

**** ASI function:* Automatic Sensor Identification**

The ASI function allows you to exchange the same type of actuator and use it with the same amplifier.
Actuators for an ASI compatible amplifier are equipped with an external preamplifier.
New calibration is no longer necessary (valid only for standard calibration).

**** ASC function:* Automatic System Calibration**

In addition to the ASI function ASC provides even more functionality for our customers.
The integrated circuit built into a closed loop actuator contains also the parameters for its calibration and other information such as:

- motion
- name
- axis
- serial number
- PID-control and filter setting

be used with a different type of electronic, without needing to be recalibrated. The new system works immediately, and at its peak performance.

Another significant advantage is the full function generator setup. The full function generator setup contains standard values for amplitude, offset, frequency, and so on. All of this information is stored inside an id-chip that is located on the actuator's connector. The setup is immedi ately active again

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d-Drive

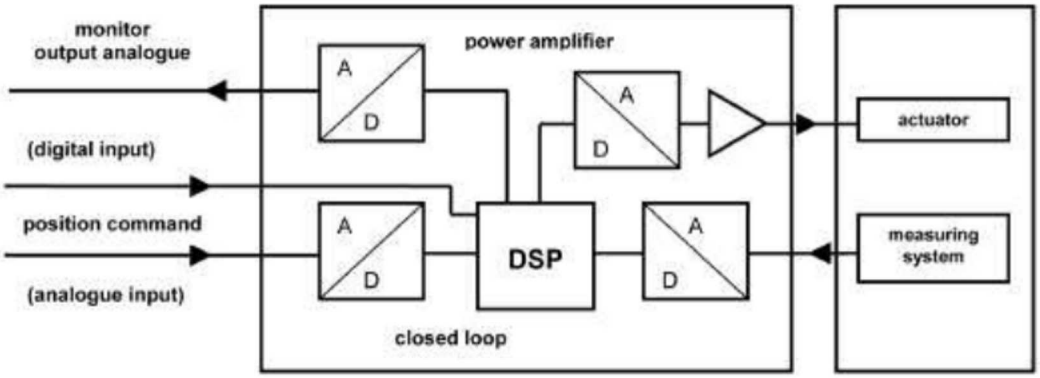


d-Drive

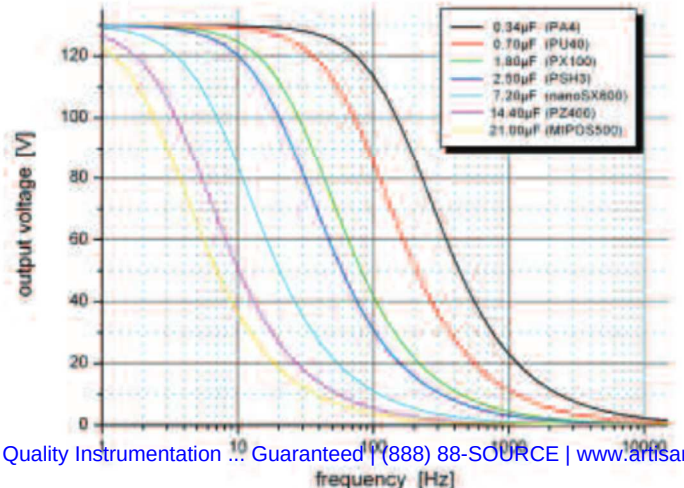
- *automatic sensor identification (ASI-function*)*
- *available for open loop and closed loop*
- *power supply 90–264VAC/50–60 Hz*
- *20µsec servo rate*
- *interface with or without display*
- *20 bit resolution (oversampling)*
- *up to 300mA output current*
- *closed loop settings possible by customer*
- *notch filter*
- *programmable built-in wave function generator*

piezosystem jena

digital electronics – principle of function



piezosystem jena provides demo software for controlling the d-Drive system. picture: the software ***remoteDrive*** allows fast and easy remote control of the system. All functions are available as backup function as well as default setting option.



The diagram shows the typical frequency which can be reached as a function of the capacitance of the piezoelectric actuator and the driving voltage by an output current of 50mA.

The amplitude is reached with a THD (Total Harmonic Distortion) of <1%.

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