

## P-876 DuraAct™ Piezoelectric Patch Transducers



The small-sized P-876.SP1 DuraAct™ transducers (left) are designed for applications where space is at a premium. On the right, the P-876.A12 series transducer (golf ball for size comparison)

- **Actuator, Sensor or Energy Source**
- **Highly Formable Ceramics**
- **Can be Applied to Curved Surfaces**
- **Customized Solutions on Request**
- **Cost-Effective**

P-876 DuraAct™ patch transducers combine the functionality of piezoceramic materials as sensors and actuators as well as for electrical charge generation and storage. Used as a bender actuator, they allow high deflection with high force and precision. Other possible operation modes of DuraAct™ transducers are as high-dynamics sensor (e.g. for structural health monitoring) or for energy harvesting.

### Application Examples

- High-dynamics actuators
- Adaptive systems
- Vibration and noise cancellation
- Deformation control and stabilization
- Damage monitoring
- Energy harvesting

### Integration into Adaptive Systems

With their compact design, DuraAct™ transducers can be applied to structure areas where deformations are to be generated or detected. For this purpose the transducers can be affixed to the surface of structures or they can be integrated as structural elements. Whole areas are monitored effectively by applying an array of several DuraAct™ on a surface.

DuraAct™ patch transducers are ideally suited for active and adaptive systems. Embedded in a servo-control loop, vibrations can be reduced and structures can be controlled in the nanometer range.

### Robust and Cost-Effective Design for Industrial Applications

The laminated design consisting of a piezoceramic plate and polymers provides a mechanically preloaded and electrically insulated device for easy handling. P-876 patch transducers

feature a rugged design with the mechanical stability of a structural material.

### Energy Harvesting: Self-Sustaining Systems in a Small Package

Another operation mode of DuraAct™ patch transducers is the application as energy harvester. The transformation of mechanical vibrations up to some kilohertz may yield electrical power in the milliwatt range. This power supplies miniature electronic devices like LEDs, sensors or even transmitters for remote data control.

### Notes

DuraAct™ Transducers can be offered in highly customized versions:

- Flexible choice of dimensions

### Ordering Information

**P-876.A11**  
DuraAct™ Patch Transducer,  
61 x 35 x 0,4 mm

**P-876.A12**  
DuraAct™ Patch Transducer,  
61 x 35 x 0,5 mm

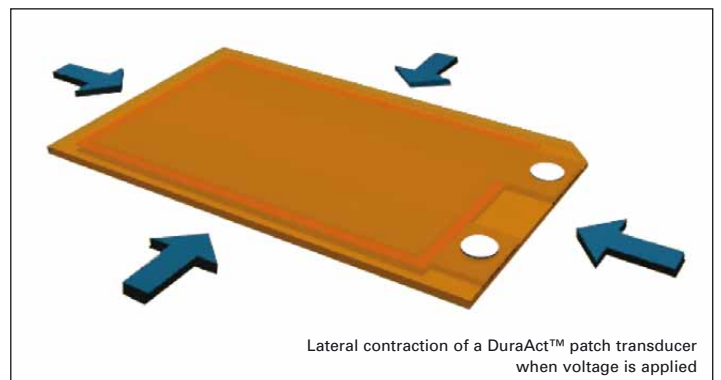
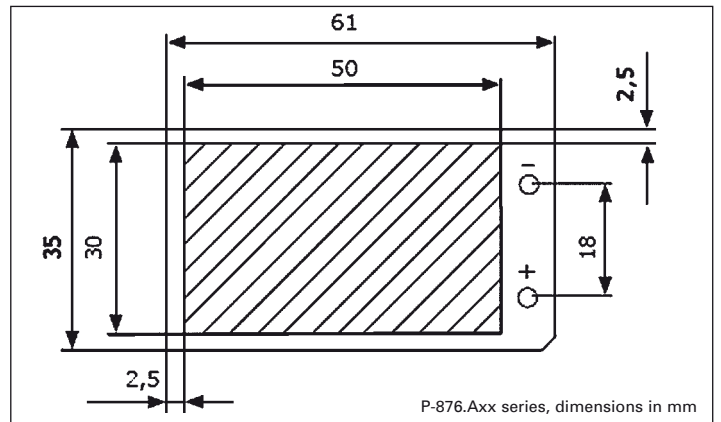
**P-876.A15**  
DuraAct™ Patch Transducer,  
61 x 35 x 0,8 mm

**P-876.SP1**  
DuraAct™ Patch Transducer,  
16 x 13 x 0,5 mm

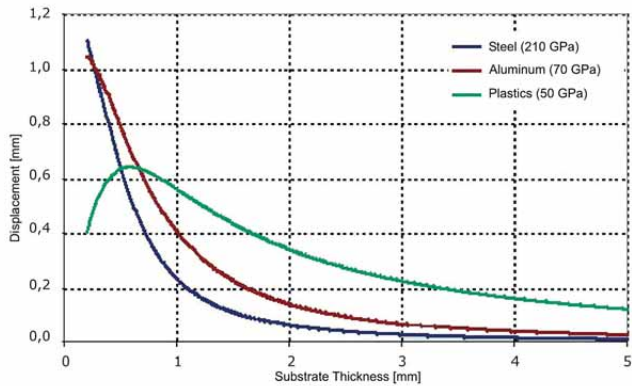
### Ask about custom designs!

- Flexible choice of thickness and bending properties
- Flexible choice of piezoceramic materials and operating temperature
- Various electrical connection designs

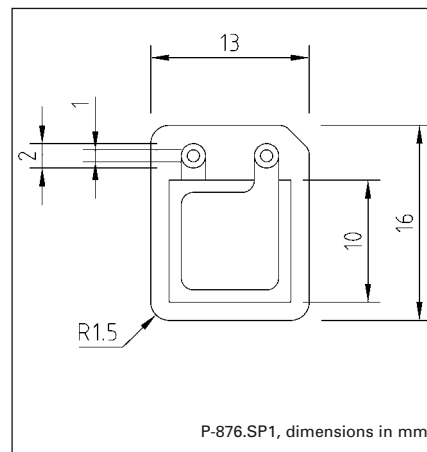
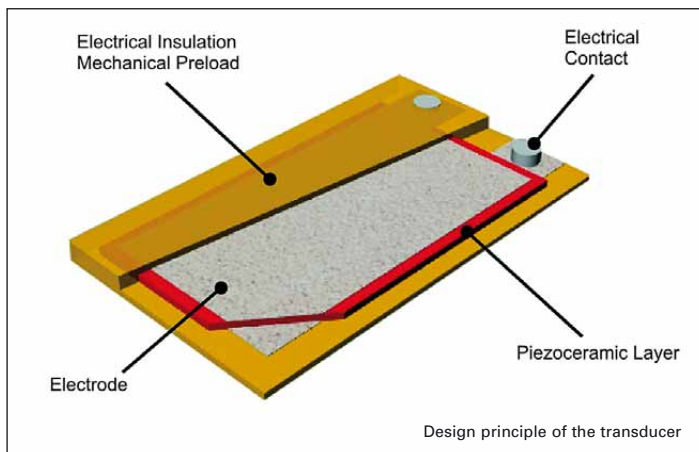
Combining sensor and actuator functions (multiple ceramic layers)



Lateral contraction of a DuraAct™ patch transducer when voltage is applied



Deflection of a bending transducer as a function of the substrate thickness for different materials. A bending transducer consists of a substrate with a P-876 actuator (here: P-876.A15) glued to one side. A contraction of the actuator effects a deflection  $W$



### Linear Actuators & Motors

PiezoWalk® Motors / Actuators

PLLine® Ultrasonic Motors

DC-Servo & Stepper Actuators

### Piezo Actuators & Components

Guided / Preloaded Actuators

Unpackaged stack Actuators

Patches/Benders/Tubes/Shear..

### Nanopositioning / Piezoelectrics

### Nanometrology

### Micropositioning

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### Technical Data

Model	P-876.A11	P-876.A12	P-876.A15	P-876.SP1	Tolerances
Operating voltage	-50 to +200 V	-100 to +400 V	-250 to +1000 V	-100 to +400 V	
<b>Motion and positioning</b>					
Lateral contraction, open-loop	400 µm/m 1.6 µm/m/V	650 µm/m 1.3 µm/m/V	800 µm/m 0.64 µm/m/V	650 µm/m 1.3 µm/m/V	min. (+20 %/-0) min. (+20 %/-0)
<b>Mechanical properties</b>					
Blocking force	90 N	265 N	775 N	280 N	
Length	61 mm	61 mm	61 mm	16 mm	±0.5 mm
Width	35 mm	35 mm	35 mm	13 mm	±0.5 mm
Thickness	0.4 mm	0.5 mm	0.8 mm	0.5 mm	±0.5 mm
Bending radius	12 mm	20 mm	70 mm	–	max.
<b>Drive properties</b>					
Ceramic type	PIC 252 Layer thickness: 100 µm	PIC 255 Layer thickness: 200 µm	PIC 255 Layer thickness: 500 µm	PIC 255 Layer thickness: 200 µm	
Electrical Capacitance	150 nF	90 nF	45 nF	8 nF	±20 %
<b>Miscellaneous</b>					
Operating temperature range*	-20 to +150 °C	-20 to +150 °C	-20 to +150 °C	-20 to +150 °C	
Mass	2.1 g	3.5 g	7.2 g	0.3 g	±10 %
Voltage connection	Soldering pads	Soldering pads	Soldering pads	Soldering pads	
Recommended controller / amplifier (actuator mode)	E-413.D2 (s. p. 2-120) E-835 (s. p. 2-166)	E-413.D2 (s. p. 2-120) E-835 (s. p. 2-166)	E-508 (s. p. 2-150) E-835 (s. p. 2-166)	E-413.D2 (s. p. 2-120) E-835 (s. p. 2-166)	

\* Short-term operation up to 180 °C