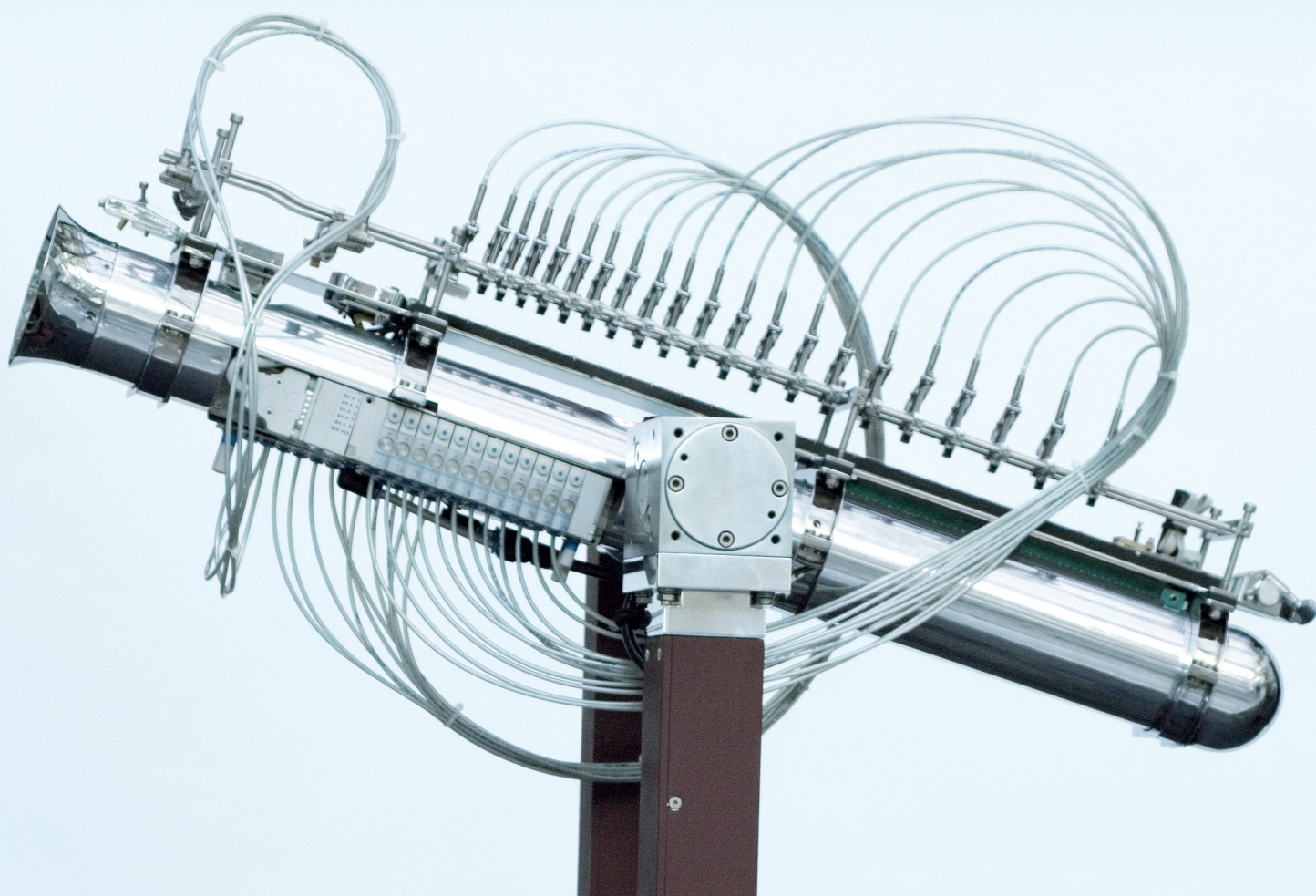


# The Sound Machines

**FESTO**



**Pneumatic  
microcylinders  
put to virtuosic use  
by Roland Olbeter**

**Info**

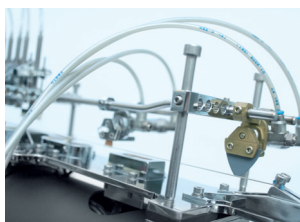
# Pneumatic tones



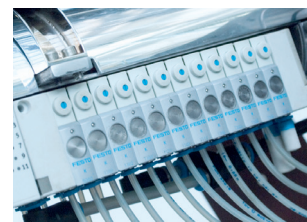
Microcylinders from Festo

Flowing air is the operating medium of pneumatics, a substantial core competence of Festo. Pneumatic components can be used not only in industrial machinery, but also in musical instruments. The stage set designer and robot artist Roland Olbeter developed and realised an automatically operated, electric string quartet and drum as unique objects. These four stringed instruments, “The Sound Machines”, sound and function like electric guitars, with the difference that they each have only one string. Over the course of his long artistic career, Roland Olbeter has made repeated use of mechanically operated sculptures as central elements of his stage sets; these incorporate pneumatics from Festo and state-of-the-art technology otherwise used in industrial processes.

For a work by the multi-media artist Marcel-lí Antúnez, Roland Olbeter developed a miniature orchestra that provides the on-stage musical accompaniment by means of a specially developed computer programme. In 2003 Roland Olbeter integrated these automatic instruments into an installation that he exhibited at the “SONAR” festival of New Music at the Museum of Modern Art, Barcelona “MACBA”. For this installation, seven classical and electronic musicians composed two- to four-minute pieces to be played in succession. Roland Olbeter used this ensemble as a point of departure for developing entirely new, technically refined sound machines that could provide far-reaching development opportunities for a large variety of musical and theatre production projects.



Sound generation

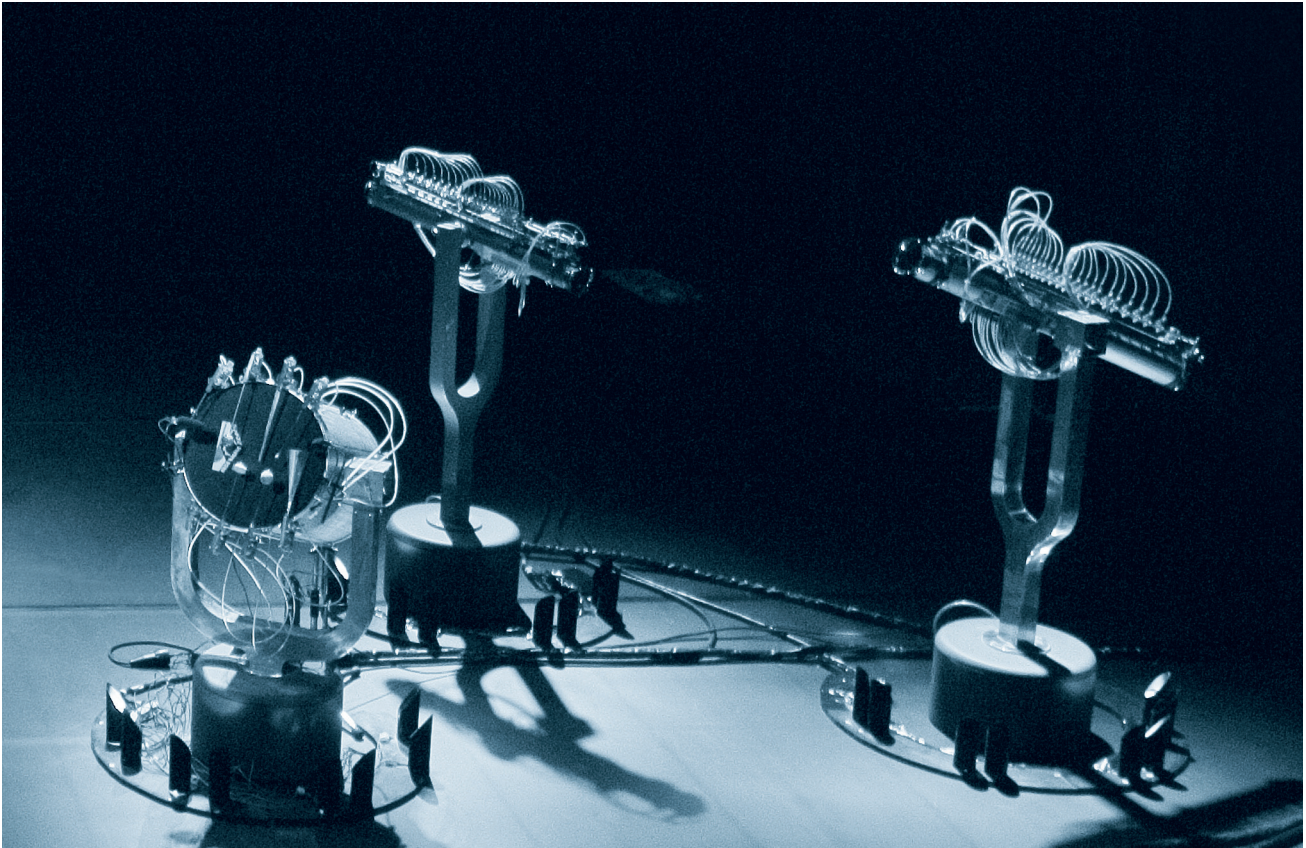


Valve terminal

The idea of constructing musical robots or music machines is by no means new. The 18th century was the heyday of the machine constructors. However, the technical possibilities of Roland Olbeter’s sound machines by far transcend those of earlier music-boxes, especially since electronic media open up entirely new realms of sound. “The Sound Machines” were presented to the public for the first time with the Concerto for String Quartet, Drum, and Soprano “Orlando Furioso!” in November 2005.

The programme for the music to be performed is stored in midfiles, and the sound is produced in three stages. In the first, digital stage, “The Sound Machines” are operated by a programmable logic controller “PLC”. Then, in the second stage, the string is set in vibration by means of pneumatic components, either by plucking as on a guitar or with a bow as on a violin. In “The Sound Machines”, two small plectrums of differing thickness, which can produce hard or soft tones, are manipulated by a circular cylinder to pluck the string. Just as a string-player sets the string in vibration with the violin bow and thus produces a tone, the “resonator”, an electromagnetic system, takes the place of the traditional bow in “The Sound Machines”. The frequency of vibration of a string that has been struck is recorded, converted into continuous vibration through voltage reversal and returned to the string, so that the sound may be played for as long as required.

Each sound machine makes use of 21 microcylinders from Festo. With the stringed instruments, the mechanical movement of the microcylinders emulates that of the musician’s left hand and determines the pitch of a note by stopping the string at a certain length. The pressure hoses and valve terminal are located on the outside of the sound pipe. The cylinders must function precisely in their role of shortening the string and altering the pitch. In the case of the drum, the microcylinders operate the various drumsticks and the jazz brush.



Drum, Electric baritone guitar, Electric bass guitar

In the third stage, the sound is received and amplified by electronic pick-ups, as in an electric guitar. It is then processed by analogue filters, compressors and equalizers, but can be used in a reduced way so that the sound is perceived as being almost “acoustic”; in other words, it does not appear to have been electronically modified. Each sound machine has its own dedicated synthesizer for further sound mixing. “The Sound Machines” offer a wide range of opportunities for producing the most diverse sound effects. In the case of the drum, the vibration of the skin mechanically produced by the drumsticks is also electronically registered and reinforced.

“The Sound Machines” were designed by Roland Olbeter and realised together with a team of multimedia specialists. Based on CAD drawings, all metal parts were lasered, fitted, turned, machined and drilled on high-precision CNC machines. The sound tubes of the “stringed instruments” are of aluminium, and the cylinders and the fine machinery for sound production are of chromed brass.

This music, especially written for the Hanover Trade Fair by the Australian composer Elena Kats-Chernin, makes use of the diverse acoustic possibilities of “The Sound Machines” and the sounds produced by the pneumatic elements. Composing music for “The Sound Machines” requires a profound understanding of this technology and of sound processing. In her works, Elena Kats-Chernin sets out to emphasise the playful element of “The Sound Machines”.

Driven by the technical creativity and enthusiasm arising from interaction between the human being and the fields of technology, design and art, Festo has repeatedly created fresh impetus for the future. This also extends to investigating forms of art and music that apply the company’s technology in new contexts. Festo endeavours to arouse enthusiasm especially for air as an element and a medium of technical innovation and to further convey this enthusiasm.



## Technical data

### Electric guitar

Height: approx. 160 cm  
 String length: approx. 65 cm  
 21 microcylinders from Festo: type EG-4-20-PK-2  
 2 round cylinders: DSEU-8-10-P-A-MQ  
 Valve terminal: CPV-SC  
 Basic tuning: as for an electric guitar  
 Compass: 21 semitones  
 Sound tubes: silvered

### Electric guitar

Height: approx. 160 cm  
 String length: approx. 65 cm  
 21 microcylinders from Festo: type EG-4-20-PK-2  
 2 round cylinders: DSEU-8-10-P-A-MQ  
 Valve terminal: CPV-SC  
 Basic tuning: as for an electric guitar  
 Compass: 21 semitones  
 Sound tubes: Ivory-coloured painted

### Electric baritone guitar

Height: approx. 180 cm  
 String length: approx. 72 cm  
 21 microcylinders from Festo: type EG-4-20-PK-2  
 2 round cylinders: DSEU-8-10-P-A-MQ  
 Valve terminal: CPV-SC  
 Basic tuning: as for an electric baritone guitar  
 Compass: 21 semitones  
 Sound tubes: Red painted

### Electric bass guitar

Height: approx. 190 cm  
 String length: approx. 92 cm  
 21 microcylinders from Festo: type EG-4-20-PK-2  
 2 round cylinders: DSEU-8-10-P-A-MQ  
 Valve terminal: CPV-SC  
 Basic tuning: as for an electric bass guitar  
 Compass: 21 semitones  
 Sound tubes: with wood veneer finish

### Drum

8 screw-in cylinders: EGZ-10-10 from Festo  
 Valve terminal: CPV-SC  
 8 drumsticks: different and jazz brush  
 Drum body: of walnut wood

## Project partners

Project initiator:  
 Dr. Heinrich Frontzek, Corporate Communication, Festo AG & Co. KG

Stage set designer and robot artist:  
 Roland Olbeter, Barcelona, Spain

Composer:  
 Elena Kats-Chernin, Sydney, Australia  
 Michael Gross, Berlin, Germany

Mezzosoprano:  
 Claudia Schneider, Barcelona, Spain

Technical concept:  
 Paco Santiago, Barcelona, Spain

Development and technical director:  
 Carlos Jovellar, Barcelona, Spain

Instrument maker:  
 Christian Konn, Masters, Barcelona, Spain

Sound processing:  
 Carlos Fesser, Barcelona, Spain

Production and management:  
 Marta Pérez-Porro, Barcelona, Spain

Project team, Festo AG & Co. KG:  
 Karin Thiemann, Corporate Communication  
 Markus Fischer, Corporate Design

## Festo AG & Co. KG

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