

Piezoelectric Devices Market by Product (Sensors, Actuator, Motor, Generator, Transducer, Transformers, Resonator), Material (Polymer, Crystal, Ceramic, Composites), Element (Discs, Rings, Plates), Application and Region - Global Forecast to 2028

<https://marketpublishers.com/r/P332CB36461EN.html>

Date: June 2023

Pages: 309

Price: US\$ 4,950.00 (Single User License)

ID: P332CB36461EN

Abstracts

The piezoelectric devices market is valued at USD 32.7 billion in 2023 and is projected to reach USD 46.0 billion by 2028, growing at a CAGR of 7.0% from 2023 to 2028. Developing alternative materials to PZT ceramic materials having similar properties is one of the major challenge in the market.

“Market for piezoelectric transducers to hold second-largest share during the forecast period.”

Piezoelectric transducer is expected to have second largest market size in terms of product during the forecast period. Piezoelectric transducers use the piezoelectric effect to measure changes with respect to acceleration, force, pressure, strain, and temperature. They produce an electric output voltage by converting these parameters into an electric charge. Piezoelectric ultrasonic transducers transmit and receive ultrasonic waves used in sensing and imaging applications. These devices possess the properties of both sensors and actuators.

“Market for piezoelectric crystal segment is expected to hold the significant share during the forecast period”

Piezoelectric crystals are small-scale energy sources. They change their shapes in small amounts, mostly in nanometers, and generate electricity whenever subjected to vibrations or external mechanical stress. When a mechanical force is applied for

ultrasound applications, piezoelectric crystals are automatically deformed and produce a tiny voltage, which is used for producing and detecting ultrasonic sound waves.

“Market for healthcare application segment to witness highest growth during the forecast period ”

The healthcare application is expected to record the highest CAGR in the piezoelectric devices market during the forecast period. The healthcare sector depends on advanced techniques, including imaging, diagnostic scanning, and robotic surgeries, to provide the best possible care to patients. Medical device manufacturers are aware of the benefits of integrating piezoelectric components and materials into life-saving medical devices such as respirators, ventilators, and atomization systems.

“Germany is expected to have largest market size in Europe during the forecast period”

Germany is one of the largest manufacturing hubs for automobile companies in Europe. Technological innovations in the automotive sector of the country contribute to the growth of the piezoelectric devices market in Germany. Along with the automotive industry, piezoelectric devices are also likely to be adopted in industrial and manufacturing, consumer electronics, and healthcare applications. As Germany has the largest automotive sector, it witnesses a higher consumption of piezoelectric actuators, motors, and sensors.

In the process of determining and verifying the market size for several segments and subsegments gathered through secondary research, extensive primary interviews have been conducted with key industry experts in the piezoelectric devices space. The break-up of primary participants for the report has been shown below:

By Company Type: Tier 1 – 40%, Tier 2 – 40%, and Tier 3 – 20%

By Designation: C-level Executives – 40%, Directors –40%, and Others – 20%

By Region: North America –40%, Asia Pacific– 30%, Europe – 20%, and RoW – 10%

The report profiles key players in the piezoelectric devices market with their respective market ranking analysis. Prominent players profiled in this report are include CeramTec

GmbH (Germany); CTS Corporation (US); Kistler Group (Switzerland); Physik Instrumente (PI) GmbH & Co. KG. (Germany); piezosystem jena GmbH (Germany); Piezo Technologies (US); Aerotech Inc. (US); APC International, Ltd., (US); Mad City Labs, Inc. (US). Apart from these, Kinetic Ceramics (US), Johnson Matthey Piezo Products GmbH (Germany), PI Ceramic (Germany), Piezo Solutions (US), DYTRAN INSTRUMENTS INCORPORATED (US), Piezomechanik Dr. Lutz Pickelmann GmbH (Germany), PiezoMotor (Sweden), PCB Piezotronics, Inc. (US) are among a few emerging companies in the piezoelectric devices market.

Report Coverage

The report defines, describes, and forecasts the piezoelectric devices market based on product, material, application, element, operation mode and region. It provides detailed information regarding drivers, restraint, opportunities, and challenges influencing the growth of piezoelectric devices market. It also analyzes competitive developments such as product launches, acquisition, expansion contract, partnership and action carried out by the key players to grow the market.

Reasons to Buy This Report

The report will help the market leaders/new entrants in the market with information on the closest approximations of the revenue for the overall piezoelectric devices market and the subsegments. The report will help stakeholders understand the competitive landscape and gain more insight to position their business better and plan suitable go-to-market strategies. The report also helps stakeholders understand the pulse of the market and provides them information on key drivers, restraint, opportunities, and challenge.

The report will provide insights to following pointers:

Analysis of key drivers (High adoption of piezoelectric devices in aerospace & defense industry), restraints (High costs associated with piezoelectric materials), opportunities (growing use of piezoelectric nanomaterials in electronic devices) and challenges (Developing alternative materials to PZT ceramic materials having similar properties) of the piezoelectric devices market.

Product development /Innovation: Detailed insights on upcoming technologies, research & development activities, and new product & service launches in the piezoelectric devices market.

Market Development: Comprehensive information about lucrative markets, the report analyses the piezoelectric devices market across various regions.

Market Diversification: Exhaustive information about new product & services, untapping geographies, recent developments, and investments in the piezoelectric devices market.

Competitive Assessment: In depth assessment of market share, growth strategies, and services, offering of leading players like CeramTec GmbH (Germany); CTS Corporation (US); Kistler Group (Switzerland); Physik Instrumente (PI) GmbH & Co. KG. (Germany); piezosystem jena GmbH (Germany) among others in piezoelectric devices market.

Contents

1 INTRODUCTION

- 1.1 STUDY OBJECTIVES
- 1.2 MARKET DEFINITION
 - 1.2.1 INCLUSIONS AND EXCLUSIONS
- 1.3 STUDY SCOPE
 - 1.3.1 MARKETS COVERED
 - 1.3.2 REGIONAL SCOPE
 - 1.3.3 YEARS CONSIDERED
- 1.4 CURRENCY CONSIDERED
- 1.5 STAKEHOLDERS
- 1.6 UNIT CONSIDERED
- 1.7 RECESSION IMPACT
- 1.8 SUMMARY OF CHANGES

2 RESEARCH METHODOLOGY

2.1 RESEARCH DATA

FIGURE 1 PROCESS FLOW: PIEZOELECTRIC DEVICES MARKET SIZE ESTIMATION

FIGURE 2 PIEZOELECTRIC DEVICES MARKET: RESEARCH DESIGN

2.1.1 SECONDARY DATA

- 2.1.1.1 List of key secondary sources
- 2.1.1.2 Key data from secondary sources

2.1.2 PRIMARY DATA

- 2.1.2.1 Interviews with experts
- 2.1.2.2 Breakdown of primary interviews

2.1.3 SECONDARY AND PRIMARY RESEARCH

- 2.1.3.1 Key industry insights

2.2 MARKET SIZE ESTIMATION

2.2.1 BOTTOM-UP APPROACH

- 2.2.1.1 Approach to arrive at market size using bottom-up analysis

FIGURE 3 MARKET SIZE ESTIMATION METHODOLOGY: REVENUE OF MARKET PLAYERS

2.2.2 TOP-DOWN APPROACH

- 2.2.2.1 Approach to obtain market share using top-down analysis (supply side)

FIGURE 4 MARKET SIZE ESTIMATION METHODOLOGY: TOP-DOWN APPROACH

2.3 MARKET BREAKDOWN AND DATA TRIANGULATION

FIGURE 5 DATA TRIANGULATION

2.4 RESEARCH ASSUMPTIONS AND LIMITATIONS

2.4.1 RESEARCH ASSUMPTIONS

2.4.2 RESEARCH LIMITATIONS

2.5 PARAMETERS CONSIDERED TO ANALYZE RECESSION IMPACT ON PIEZOELECTRIC DEVICES MARKET

3 EXECUTIVE SUMMARY

3.1 PIEZOELECTRIC DEVICES MARKET: RECESSION IMPACT

FIGURE 6 RECESSION IMPACT: GDP GROWTH PROJECTION TILL 2023 FOR MAJOR ECONOMIES

FIGURE 7 RECESSION IMPACT ON PIEZOELECTRIC DEVICES MARKET, 2019–2028 (USD MILLION)

FIGURE 8 PIEZOELECTRIC GENERATORS SEGMENT TO EXHIBIT HIGHEST CAGR DURING FORECAST PERIOD

FIGURE 9 PIEZOELECTRIC CERAMICS TO BE DOMINATING MATERIAL SEGMENT DURING FORECAST PERIOD

FIGURE 10 HEALTHCARE APPLICATION SEGMENT TO WITNESS HIGHEST CAGR FROM 2023 TO 2028

FIGURE 11 ASIA PACIFIC TO BE FASTEST-GROWING MARKET FOR PIEZOELECTRIC DEVICES DURING FORECAST PERIOD

4 PREMIUM INSIGHTS

4.1 ATTRACTIVE GROWTH OPPORTUNITIES FOR PLAYERS IN PIEZOELECTRIC DEVICES MARKET

FIGURE 12 HIGH ADOPTION OF PIEZOELECTRIC DEVICES IN AEROSPACE & DEFENSE INDUSTRY TO FUEL MARKET DURING FORECAST PERIOD

4.2 PIEZOELECTRIC DEVICES MARKET, BY PRODUCT

FIGURE 13 PIEZOELECTRIC ACTUATORS TO HOLD LARGEST MARKET SHARE DURING FORECAST PERIOD

4.3 PIEZOELECTRIC DEVICES MARKET, BY APPLICATION

FIGURE 14 AEROSPACE & DEFENSE SEGMENT TO ACCOUNT FOR LARGEST MARKET SHARE BY 2028

FIGURE 15 PIEZOELECTRIC CERAMICS TO DOMINATE PIEZOELECTRIC DEVICES MARKET DURING FORECAST PERIOD

4.4 PIEZOELECTRIC DEVICES MARKET, BY COUNTRY

FIGURE 16 CHINA TO GROW AT HIGHEST CAGR DURING FORECAST PERIOD

5 MARKET OVERVIEW

5.1 INTRODUCTION

5.2 MARKET DYNAMICS

FIGURE 17 PIEZOELECTRIC DEVICES MARKET: DRIVERS, RESTRAINTS, OPPORTUNITIES, AND CHALLENGES

5.2.1 DRIVERS

5.2.1.1 High adoption of piezoelectric products in aerospace industry

5.2.1.2 Elevated use of piezoelectric energy harvesters

5.2.1.3 Accelerated demand for piezoelectric devices from automobile manufacturers

5.2.1.4 Increased investments in renewable energy projects

FIGURE 18 GLOBAL RENEWABLE POWER INVESTMENTS, 2019–2021 (USD BILLION)

FIGURE 19 ENERGY TRANSITION INVESTMENTS, BY COUNTRY, 2021 (USD BILLION)

FIGURE 20 DRIVERS

5.2.2 RESTRAINTS

5.2.2.1 High cost associated with piezoelectric materials

5.2.2.2 Limitations of piezoelectric ceramics

5.2.2.3 Stringent government policies restricting use of lead-based piezoelectric materials

FIGURE 21 RESTRAINTS

5.2.3 OPPORTUNITIES

5.2.3.1 Growing use of piezoelectric nanomaterials in electronic devices

5.2.3.2 Rising adoption of piezoelectric devices and polymers in biomedical and surgical applications

5.2.3.3 Increasing demand for polymer-based piezoelectric sensors and films from aerospace, nuclear instrumentation, and consumer electronics applications

5.2.3.4 Surging deployment of piezoelectric sensors and polymers in healthcare devices

FIGURE 22 OPPORTUNITIES

5.2.4 CHALLENGES

5.2.4.1 Developing alternative materials to PZT ceramic materials with similar properties

FIGURE 23 CHALLENGES

5.3 SUPPLY CHAIN ANALYSIS

FIGURE 24 PIEZOELECTRIC DEVICES MARKET: SUPPLY CHAIN ANALYSIS

5.4 TRENDS/DISRUPTIONS IMPACTING BUSINESSES OF MARKET PLAYERS AND RAW MATERIAL SUPPLIERS

5.4.1 REVENUE SHIFT AND NEW REVENUE POCKETS FOR MARKET PLAYERS

FIGURE 25 REVENUE SHIFT IN PIEZOELECTRIC DEVICES MARKET

5.5 ECOSYSTEM ANALYSIS

FIGURE 26 PIEZOELECTRIC DEVICES MARKET: ECOSYSTEM ANALYSIS

TABLE 1 LIST OF ORIGINAL EQUIPMENT MANUFACTURERS, SUPPLIERS, AND DISTRIBUTORS OF PIEZOELECTRIC DEVICES

5.6 PORTER'S FIVE FORCES ANALYSIS

TABLE 2 PIEZOELECTRIC DEVICES MARKET: PORTER'S FIVE FORCES ANALYSIS

FIGURE 27 PIEZOELECTRIC DEVICES MARKET: PORTER'S FIVE FORCES ANALYSIS

5.6.1 THREAT OF NEW ENTRANTS

5.6.2 THREAT OF SUBSTITUTES

5.6.3 BARGAINING POWER OF SUPPLIERS

5.6.4 BARGAINING POWER OF BUYERS

5.6.5 INTENSITY OF COMPETITIVE RIVALRY

5.7 KEY STAKEHOLDERS AND BUYING CRITERIA

FIGURE 28 KEY STAKEHOLDERS IN BUYING PROCESS

TABLE 3 INFLUENCE OF STAKEHOLDERS ON BUYING PROCESS FOR TOP 3 APPLICATIONS (%)

5.7.1 BUYING CRITERIA

FIGURE 29 KEY BUYING CRITERIA FOR TOP 3 APPLICATIONS

TABLE 4 KEY BUYING CRITERIA FOR TOP 3 APPLICATIONS

5.8 CASE STUDY ANALYSIS

5.8.1 GERMAN AEROSPACE CENTER TO OPT FOR KISTLER GROUP'S ADVANCED PIEZOELECTRIC SENSORS TO PERFORM VIBRATION TESTS

5.8.2 USE OF PIEZO DISCS, PLATES, AND FOCUS BOWLS BY PI CERAMIC FOR HIGH-INTENSITY FOCUSED ULTRASOUND (HIFU) APPLICATIONS

5.8.3 ONERA LEVERAGED PIEZOTRONIC ACCELEROMETERS FROM PCB PIEZOTRONICS FOR VIBRATION MEASUREMENTS

5.8.4 USE OF PIEZO STRAIN SENSORS FOR GROUND VIBRATION TESTING OF AIRCRAFT

5.8.5 SPANISH CLINIC LEVERAGED PIEZOELECTRIC FORCE PLATES FROM KISTLER GROUP FOR DIAGNOSTICS AND TREATMENT DEVELOPMENT

5.9 TECHNOLOGY ANALYSIS

5.9.1 KEY TECHNOLOGY

5.9.1.1 MEMS technology

5.9.2 ADJACENT TECHNOLOGY

5.9.2.1 Pyroelectric technology

5.10 TRADE ANALYSIS

5.10.1 IMPORT SCENARIO

FIGURE 30 IMPORT DATA FOR HS CODE 854160, BY COUNTRY, 2018–2022

5.10.1.1 Import scenario for piezoelectric devices

TABLE 5 IMPORT DATA, BY COUNTRY, 2018–2022 (USD THOUSAND)

5.10.2 EXPORT SCENARIO

FIGURE 31 EXPORT DATA FOR HS CODE 854160, BY COUNTRY, 2018–2022

5.10.2.1 Export scenario for piezoelectric devices

TABLE 6 EXPORT DATA, BY COUNTRY, 2018–2022 (USD THOUSAND)

5.10.3 TARIFF ANALYSIS

TABLE 7 TARIFF FOR MOUNTED PIEZOELECTRIC CRYSTALS EXPORTED BY CHINA, 2022

TABLE 8 TARIFF FOR MOUNTED PIEZOELECTRIC CRYSTALS EXPORTED BY JAPAN, 2022

TABLE 9 TARIFF FOR MOUNTED PIEZOELECTRIC CRYSTALS EXPORTED BY US, 2022

5.11 PATENT ANALYSIS

TABLE 10 PATENT REGISTRATIONS RELATED TO PIEZOELECTRIC DEVICES MARKET

FIGURE 32 PATENTS PUBLISHED FOR PIEZOELECTRIC DEVICES BETWEEN 2012 AND 2022

TABLE 11 NUMBER OF PATENTS REGISTERED IN PIEZOELECTRIC DEVICES MARKET FROM 2012 TO 2022

FIGURE 33 TOP 10 COMPANIES WITH HIGHEST NUMBER OF PATENT APPLICATIONS FROM 2012 TO 2022

5.12 REGULATORY LANDSCAPE

5.13 REGULATORY STANDARDS

5.13.1 REGULATORY COMPLIANCE

5.13.1.1 Regulations

5.13.1.2 Standards

TABLE 12 NORTH AMERICA: REGULATORY BODIES, GOVERNMENT AGENCIES, AND OTHER ORGANIZATIONS

TABLE 13 EUROPE: REGULATORY BODIES, GOVERNMENT AGENCIES, AND OTHER ORGANIZATIONS

TABLE 14 ASIA PACIFIC: REGULATORY BODIES, GOVERNMENT AGENCIES, AND OTHER ORGANIZATIONS

TABLE 15 ROW: REGULATORY BODIES, GOVERNMENT AGENCIES, AND OTHER

ORGANIZATIONS

5.14 KEY CONFERENCES AND EVENTS, 2023–2024

TABLE 16 PIEZOELECTRIC DEVICES MARKET: KEY CONFERENCES AND EVENTS

5.15 PRICING ANALYSIS

TABLE 17 AVERAGE SELLING PRICE OF PIEZOELECTRIC PRODUCTS AND ELEMENTS

5.15.1 AVERAGE SELLING PRICE OF PRODUCTS OFFERED BY MARKET PLAYERS

FIGURE 34 AVERAGE SELLING PRICE OF PIEZOELECTRIC PRODUCTS, BY KEY PLAYERS

TABLE 18 AVERAGE SELLING PRICE OF PIEZOELECTRIC PRODUCTS SOLD BY KEY PLAYERS (USD)

6 PIEZOELECTRIC DEVICES MARKET, BY PRODUCT

6.1 INTRODUCTION

FIGURE 35 PIEZOELECTRIC DEVICES MARKET, BY PRODUCT

FIGURE 36 PIEZOELECTRIC ACTUATORS TO ACCOUNT FOR LARGEST MARKET SHARE BY 2028

TABLE 19 PIEZOELECTRIC DEVICES MARKET, BY PRODUCT, 2019–2022 (USD MILLION)

TABLE 20 PIEZOELECTRIC DEVICES MARKET, BY PRODUCT, 2023–2028 (USD MILLION)

TABLE 21 PIEZOELECTRIC DEVICES MARKET, BY PRODUCT, 2019–2022 (MILLION UNITS)

TABLE 22 PIEZOELECTRIC DEVICES MARKET, BY PRODUCT, 2023–2028 (MILLION UNITS)

6.2 PIEZOELECTRIC SENSORS

6.2.1 SUITABLE FOR PORTABLE CONSUMER DEVICES AND WEARABLES

TABLE 23 PIEZOELECTRIC SENSORS: PIEZOELECTRIC DEVICES MARKET, BY MATERIAL, 2019–2022 (USD MILLION)

TABLE 24 PIEZOELECTRIC SENSORS: PIEZOELECTRIC DEVICES MARKET, BY MATERIAL, 2023–2028 (USD MILLION)

TABLE 25 PIEZOELECTRIC SENSORS: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2019–2022 (USD MILLION)

TABLE 26 PIEZOELECTRIC SENSORS: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2023–2028 (USD MILLION)

TABLE 27 PIEZOELECTRIC SENSORS: PIEZOELECTRIC DEVICES MARKET FOR

AEROSPACE & DEFENSE, BY REGION, 2019–2022 (USD MILLION)

TABLE 28 PIEZOELECTRIC SENSORS: PIEZOELECTRIC DEVICES MARKET FOR AEROSPACE & DEFENSE, BY REGION, 2023–2028 (USD MILLION)

TABLE 29 PIEZOELECTRIC SENSORS: PIEZOELECTRIC DEVICES MARKET FOR INDUSTRIAL & MANUFACTURING, BY REGION, 2019–2022 (USD MILLION)

TABLE 30 PIEZOELECTRIC SENSORS: PIEZOELECTRIC DEVICES MARKET FOR INDUSTRIAL & MANUFACTURING, BY REGION, 2023–2028 (USD MILLION)

TABLE 31 PIEZOELECTRIC SENSORS: PIEZOELECTRIC DEVICES MARKET FOR AUTOMOTIVE, BY REGION, 2019–2022 (USD MILLION)

TABLE 32 PIEZOELECTRIC SENSORS: PIEZOELECTRIC DEVICES MARKET FOR AUTOMOTIVE, BY REGION, 2023–2028 (USD MILLION)

TABLE 33 PIEZOELECTRIC SENSORS: PIEZOELECTRIC DEVICES MARKET FOR HEALTHCARE, BY REGION, 2019–2022 (USD MILLION)

TABLE 34 PIEZOELECTRIC SENSORS: PIEZOELECTRIC DEVICES MARKET FOR HEALTHCARE, BY REGION, 2023–2028 (USD MILLION)

TABLE 35 PIEZOELECTRIC SENSORS: PIEZOELECTRIC DEVICES MARKET FOR INFORMATION & COMMUNICATION, BY REGION, 2019–2022 (USD MILLION)

TABLE 36 PIEZOELECTRIC SENSORS: PIEZOELECTRIC DEVICES MARKET FOR INFORMATION & COMMUNICATION, BY REGION, 2023–2028 (USD MILLION)

TABLE 37 PIEZOELECTRIC SENSORS: PIEZOELECTRIC DEVICES MARKET FOR CONSUMER ELECTRONICS, BY REGION, 2019–2022 (USD MILLION)

TABLE 38 PIEZOELECTRIC SENSORS: PIEZOELECTRIC DEVICES MARKET FOR CONSUMER ELECTRONICS, BY REGION, 2023–2028 (USD MILLION)

TABLE 39 PIEZOELECTRIC SENSORS: PIEZOELECTRIC DEVICES MARKET FOR OTHER APPLICATIONS, BY REGION, 2019–2022 (USD MILLION)

TABLE 40 PIEZOELECTRIC SENSORS: PIEZOELECTRIC DEVICES MARKET FOR OTHER APPLICATIONS, BY REGION, 2023–2028 (USD MILLION)

6.3 PIEZOELECTRIC ACTUATORS

6.3.1 CRUCIAL FOR AEROSPACE & DEFENSE AND HEALTHCARE APPLICATIONS

6.3.2 STACK ACTUATORS

6.3.2.1 Have high load-bearing capability

FIGURE 37 STACK ACTUATORS

6.3.3 STRIPE ACTUATORS

6.3.3.1 Can produce large mechanical deflection in response to electrical signals

FIGURE 38 STRIPE ACTUATORS

6.3.4 SHEAR ACTUATORS

6.3.4.1 Feature high-speed response, high-resonant frequency, and high-positioning force

FIGURE 39 SHEAR ACTUATORS**6.3.5 TUBE ACTUATORS****6.3.5.1 Used in high precision instruments****FIGURE 40 TUBE ACTUATORS****TABLE 41 PIEZOELECTRIC ACTUATORS: PIEZOELECTRIC DEVICES MARKET, BY MATERIAL, 2019–2022 (USD MILLION)****TABLE 42 PIEZOELECTRIC ACTUATORS: PIEZOELECTRIC DEVICES MARKET, BY MATERIAL, 2023–2028 (USD MILLION)****TABLE 43 PIEZOELECTRIC ACTUATORS: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2019–2022 (USD MILLION)****TABLE 44 PIEZOELECTRIC ACTUATORS: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2023–2028 (USD MILLION)****TABLE 45 PIEZOELECTRIC ACTUATORS: PIEZOELECTRIC DEVICES MARKET FOR AEROSPACE & DEFENSE, BY REGION, 2019–2022 (USD MILLION)****TABLE 46 PIEZOELECTRIC ACTUATORS: PIEZOELECTRIC DEVICES MARKET FOR AEROSPACE & DEFENSE, BY REGION, 2023–2028 (USD MILLION)****TABLE 47 PIEZOELECTRIC ACTUATORS: PIEZOELECTRIC DEVICES MARKET FOR INDUSTRIAL & MANUFACTURING, BY REGION, 2019–2022 (USD MILLION)****TABLE 48 PIEZOELECTRIC ACTUATORS: PIEZOELECTRIC DEVICES MARKET FOR INDUSTRIAL & MANUFACTURING, BY REGION, 2023–2028 (USD MILLION)****TABLE 49 PIEZOELECTRIC ACTUATORS: PIEZOELECTRIC DEVICES MARKET FOR AUTOMOTIVE, BY REGION, 2019–2022 (USD MILLION)****TABLE 50 PIEZOELECTRIC ACTUATORS: PIEZOELECTRIC DEVICES MARKET FOR AUTOMOTIVE, BY REGION, 2023–2028 (USD MILLION)****TABLE 51 PIEZOELECTRIC ACTUATORS: PIEZOELECTRIC DEVICES MARKET FOR HEALTHCARE, BY REGION, 2019–2022 (USD MILLION)****TABLE 52 PIEZOELECTRIC ACTUATORS: PIEZOELECTRIC DEVICES MARKET FOR HEALTHCARE, BY REGION, 2023–2028 (USD MILLION)****TABLE 53 PIEZOELECTRIC ACTUATORS: PIEZOELECTRIC DEVICES MARKET FOR INFORMATION & COMMUNICATION, BY REGION, 2019–2022 (USD MILLION)****TABLE 54 PIEZOELECTRIC ACTUATORS: PIEZOELECTRIC DEVICES MARKET FOR INFORMATION & COMMUNICATION, BY REGION, 2023–2028 (USD MILLION)****TABLE 55 PIEZOELECTRIC ACTUATORS: PIEZOELECTRIC DEVICES MARKET FOR CONSUMER ELECTRONICS, BY REGION, 2019–2022 (USD MILLION)****TABLE 56 PIEZOELECTRIC ACTUATORS: PIEZOELECTRIC DEVICES MARKET FOR CONSUMER ELECTRONICS, BY REGION, 2023–2028 (USD MILLION)****TABLE 57 PIEZOELECTRIC ACTUATORS: PIEZOELECTRIC DEVICES MARKET FOR OTHER APPLICATIONS, BY REGION, 2019–2022 (USD MILLION)****TABLE 58 PIEZOELECTRIC ACTUATORS: PIEZOELECTRIC DEVICES MARKET**

FOR OTHER APPLICATIONS, BY REGION, 2023–2028 (USD MILLION)

6.4 PIEZOELECTRIC MOTORS

6.4.1 MORE EFFICIENT AND ECONOMICAL THAN CONVENTIONAL DC MOTORS

TABLE 59 PIEZOELECTRIC MOTORS: PIEZOELECTRIC DEVICES MARKET, BY MATERIAL, 2019–2022 (USD MILLION)

TABLE 60 PIEZOELECTRIC MOTORS: PIEZOELECTRIC DEVICES MARKET, BY MATERIAL, 2023–2028 (USD MILLION)

TABLE 61 PIEZOELECTRIC MOTORS: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2019–2022 (USD MILLION)

TABLE 62 PIEZOELECTRIC MOTORS: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2023–2028 (USD MILLION)

TABLE 63 PIEZOELECTRIC MOTORS: PIEZOELECTRIC DEVICES MARKET FOR AEROSPACE & DEFENSE, BY REGION, 2019–2022 (USD MILLION)

TABLE 64 PIEZOELECTRIC MOTORS: PIEZOELECTRIC DEVICES MARKET FOR AEROSPACE & DEFENSE, BY REGION, 2023–2028 (USD MILLION)

TABLE 65 PIEZOELECTRIC MOTORS: PIEZOELECTRIC DEVICES MARKET FOR INDUSTRIAL & MANUFACTURING, BY REGION, 2019–2022 (USD MILLION)

TABLE 66 PIEZOELECTRIC MOTORS: PIEZOELECTRIC DEVICES MARKET FOR INDUSTRIAL & MANUFACTURING, BY REGION, 2023–2028 (USD MILLION)

TABLE 67 PIEZOELECTRIC MOTORS: PIEZOELECTRIC DEVICES MARKET FOR AUTOMOTIVE, BY REGION, 2019–2022 (USD MILLION)

TABLE 68 PIEZOELECTRIC MOTORS: PIEZOELECTRIC DEVICES MARKET FOR AUTOMOTIVE, BY REGION, 2023–2028 (USD MILLION)

TABLE 69 PIEZOELECTRIC MOTORS: PIEZOELECTRIC DEVICES MARKET FOR HEALTHCARE, BY REGION, 2019–2022 (USD MILLION)

TABLE 70 PIEZOELECTRIC MOTORS: PIEZOELECTRIC DEVICES MARKET FOR HEALTHCARE, BY REGION, 2023–2028 (USD MILLION)

TABLE 71 PIEZOELECTRIC MOTORS: PIEZOELECTRIC DEVICES MARKET FOR INFORMATION & COMMUNICATION, BY REGION, 2019–2022 (USD MILLION)

TABLE 72 PIEZOELECTRIC MOTORS: PIEZOELECTRIC DEVICES MARKET FOR INFORMATION & COMMUNICATION, BY REGION, 2023–2028 (USD MILLION)

TABLE 73 PIEZOELECTRIC MOTORS: PIEZOELECTRIC DEVICES MARKET FOR CONSUMER ELECTRONICS, BY REGION, 2019–2022 (USD MILLION)

TABLE 74 PIEZOELECTRIC MOTORS: PIEZOELECTRIC DEVICES MARKET FOR CONSUMER ELECTRONICS, BY REGION, 2023–2028 (USD MILLION)

TABLE 75 PIEZOELECTRIC MOTORS: PIEZOELECTRIC DEVICES MARKET FOR OTHER APPLICATIONS, BY REGION, 2019–2022 (USD MILLION)

TABLE 76 PIEZOELECTRIC MOTORS: PIEZOELECTRIC DEVICES MARKET FOR OTHER APPLICATIONS, BY REGION, 2023–2028 (USD MILLION)

6.5 PIEZOELECTRIC GENERATORS

6.5.1 TO REGISTER FASTEST GROWTH DURING FORECAST PERIOD

6.5.2 SINGLE-LAYER PIEZOELECTRIC GENERATORS

6.5.2.1 Find applications in cigarette lighter push buttons and gas-fired BBQ grill igniters

6.5.3 MULTILAYER PIEZOELECTRIC GENERATORS

6.5.3.1 Excellent for solid-state batteries in electronic circuits

TABLE 77 PIEZOELECTRIC GENERATORS: PIEZOELECTRIC DEVICES MARKET, BY MATERIAL, 2019–2022 (USD MILLION)

TABLE 78 PIEZOELECTRIC GENERATORS: PIEZOELECTRIC DEVICES MARKET, BY MATERIAL, 2023–2028 (USD MILLION)

TABLE 79 PIEZOELECTRIC GENERATORS: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2019–2022 (USD MILLION)

TABLE 80 PIEZOELECTRIC GENERATORS: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2023–2028 (USD MILLION)

TABLE 81 PIEZOELECTRIC GENERATORS: PIEZOELECTRIC DEVICES MARKET FOR AEROSPACE & DEFENSE, BY REGION, 2019–2022 (USD MILLION)

TABLE 82 PIEZOELECTRIC GENERATORS: PIEZOELECTRIC DEVICES MARKET FOR AEROSPACE & DEFENSE, BY REGION, 2023–2028 (USD MILLION)

TABLE 83 PIEZOELECTRIC GENERATORS: PIEZOELECTRIC DEVICES MARKET FOR INDUSTRIAL & MANUFACTURING, BY REGION, 2019–2022 (USD MILLION)

TABLE 84 PIEZOELECTRIC GENERATORS: PIEZOELECTRIC DEVICES MARKET FOR INDUSTRIAL & MANUFACTURING, BY REGION, 2023–2028 (USD MILLION)

TABLE 85 PIEZOELECTRIC GENERATORS: PIEZOELECTRIC DEVICES MARKET FOR AUTOMOTIVE, BY REGION, 2019–2022 (USD MILLION)

TABLE 86 PIEZOELECTRIC GENERATORS: PIEZOELECTRIC DEVICES MARKET FOR AUTOMOTIVE, BY REGION, 2023–2028 (USD MILLION)

TABLE 87 PIEZOELECTRIC GENERATORS: PIEZOELECTRIC DEVICES MARKET FOR HEALTHCARE, BY REGION, 2019–2022 (USD MILLION)

TABLE 88 PIEZOELECTRIC GENERATORS: PIEZOELECTRIC DEVICES MARKET FOR HEALTHCARE, BY REGION, 2023–2028 (USD MILLION)

TABLE 89 PIEZOELECTRIC GENERATORS: PIEZOELECTRIC DEVICES MARKET FOR INFORMATION & COMMUNICATION, BY REGION, 2019–2022 (USD MILLION)

TABLE 90 PIEZOELECTRIC GENERATORS: PIEZOELECTRIC DEVICES MARKET FOR INFORMATION & COMMUNICATION, BY REGION, 2023–2028 (USD MILLION)

TABLE 91 PIEZOELECTRIC GENERATORS: PIEZOELECTRIC DEVICES MARKET FOR CONSUMER ELECTRONICS, BY REGION, 2019–2022 (USD MILLION)

TABLE 92 PIEZOELECTRIC GENERATORS: PIEZOELECTRIC DEVICES MARKET FOR CONSUMER ELECTRONICS, BY REGION, 2023–2028 (USD MILLION)

TABLE 93 PIEZOELECTRIC GENERATORS: PIEZOELECTRIC DEVICES MARKET FOR OTHER APPLICATIONS, BY REGION, 2019–2022 (USD MILLION)

TABLE 94 PIEZOELECTRIC GENERATORS: PIEZOELECTRIC DEVICES MARKET FOR OTHER APPLICATIONS, BY REGION, 2023–2028 (USD MILLION)

6.6 PIEZOELECTRIC TRANSDUCERS

6.6.1 OFFER COMBINED PROPERTIES OF SENSORS AND ACTUATORS

TABLE 95 PIEZOELECTRIC TRANSDUCERS: PIEZOELECTRIC DEVICES MARKET, BY MATERIAL, 2019–2022 (USD MILLION)

TABLE 96 PIEZOELECTRIC TRANSDUCERS: PIEZOELECTRIC DEVICES MARKET, BY MATERIAL, 2023–2028 (USD MILLION)

TABLE 97 PIEZOELECTRIC TRANSDUCERS: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2019–2022 (USD MILLION)

TABLE 98 PIEZOELECTRIC TRANSDUCERS: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2023–2028 (USD MILLION)

TABLE 99 PIEZOELECTRIC TRANSDUCERS: PIEZOELECTRIC DEVICES MARKET FOR AEROSPACE & DEFENSE, BY REGION, 2019–2022 (USD MILLION)

TABLE 100 PIEZOELECTRIC TRANSDUCERS: PIEZOELECTRIC DEVICES MARKET FOR AEROSPACE & DEFENSE, BY REGION, 2023–2028 (USD MILLION)

TABLE 101 PIEZOELECTRIC TRANSDUCERS: PIEZOELECTRIC DEVICES MARKET FOR INDUSTRIAL & MANUFACTURING, BY REGION, 2019–2022 (USD MILLION)

TABLE 102 PIEZOELECTRIC TRANSDUCERS: PIEZOELECTRIC DEVICES MARKET FOR INDUSTRIAL & MANUFACTURING, BY REGION, 2023–2028 (USD MILLION)

TABLE 103 PIEZOELECTRIC TRANSDUCERS: PIEZOELECTRIC DEVICES MARKET FOR AUTOMOTIVE, BY REGION, 2019–2022 (USD MILLION)

TABLE 104 PIEZOELECTRIC TRANSDUCERS: PIEZOELECTRIC DEVICES MARKET FOR AUTOMOTIVE, BY REGION, 2023–2028 (USD MILLION)

TABLE 105 PIEZOELECTRIC TRANSDUCERS: PIEZOELECTRIC DEVICES MARKET FOR HEALTHCARE, BY REGION, 2019–2022 (USD MILLION)

TABLE 106 PIEZOELECTRIC TRANSDUCERS: PIEZOELECTRIC DEVICES MARKET FOR HEALTHCARE, BY REGION, 2023–2028 (USD MILLION)

TABLE 107 PIEZOELECTRIC TRANSDUCERS: PIEZOELECTRIC DEVICES MARKET FOR INFORMATION & COMMUNICATION, BY REGION, 2019–2022 (USD MILLION)

TABLE 108 PIEZOELECTRIC TRANSDUCERS: PIEZOELECTRIC DEVICES MARKET FOR INFORMATION & COMMUNICATION, BY REGION, 2023–2028 (USD MILLION)

TABLE 109 PIEZOELECTRIC TRANSDUCERS: PIEZOELECTRIC DEVICES MARKET FOR CONSUMER ELECTRONICS, BY REGION, 2019–2022 (USD MILLION)

TABLE 110 PIEZOELECTRIC TRANSDUCERS: PIEZOELECTRIC DEVICES MARKET FOR CONSUMER ELECTRONICS, BY REGION, 2023–2028 (USD MILLION)

TABLE 111 PIEZOELECTRIC TRANSDUCERS: PIEZOELECTRIC DEVICES MARKET

FOR OTHER APPLICATIONS, BY REGION, 2019–2022 (USD MILLION)

TABLE 112 PIEZOELECTRIC TRANSDUCERS: PIEZOELECTRIC DEVICES MARKET

FOR OTHER APPLICATIONS, BY REGION, 2023–2028 (USD MILLION)

6.7 OTHER PRODUCTS

TABLE 113 OTHER PRODUCTS: PIEZOELECTRIC DEVICES MARKET, BY MATERIAL, 2019–2022 (USD MILLION)

TABLE 114 OTHER PRODUCTS: PIEZOELECTRIC DEVICES MARKET, BY MATERIAL, 2023–2028 (USD MILLION)

TABLE 115 OTHER PRODUCTS: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2019–2022 (USD MILLION)

TABLE 116 OTHER PRODUCTS: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2023–2028 (USD MILLION)

TABLE 117 OTHER PRODUCTS: PIEZOELECTRIC DEVICES MARKET FOR AEROSPACE & DEFENSE, BY REGION, 2019–2022 (USD MILLION)

TABLE 118 OTHER PRODUCTS: PIEZOELECTRIC DEVICES MARKET FOR AEROSPACE & DEFENSE, BY REGION, 2023–2028 (USD MILLION)

TABLE 119 OTHER PRODUCTS: PIEZOELECTRIC DEVICES MARKET FOR INDUSTRIAL & MANUFACTURING, BY REGION, 2019–2022 (USD MILLION)

TABLE 120 OTHER PRODUCTS: PIEZOELECTRIC DEVICES MARKET FOR INDUSTRIAL & MANUFACTURING, BY REGION, 2023–2028 (USD MILLION)

TABLE 121 OTHER PRODUCTS: PIEZOELECTRIC DEVICES MARKET FOR AUTOMOTIVE, BY REGION, 2019–2022 (USD MILLION)

TABLE 122 OTHER PRODUCTS: PIEZOELECTRIC DEVICES MARKET FOR AUTOMOTIVE, BY REGION, 2023–2028 (USD MILLION)

TABLE 123 OTHER PRODUCTS: PIEZOELECTRIC DEVICES MARKET FOR HEALTHCARE, BY REGION, 2019–2022 (USD MILLION)

TABLE 124 OTHER PRODUCTS: PIEZOELECTRIC DEVICES MARKET FOR HEALTHCARE, BY REGION, 2023–2028 (USD MILLION)

TABLE 125 OTHER PRODUCTS: PIEZOELECTRIC DEVICES MARKET FOR INFORMATION & COMMUNICATION, BY REGION, 2019–2022 (USD MILLION)

TABLE 126 OTHER PRODUCTS: PIEZOELECTRIC DEVICES MARKET FOR INFORMATION & COMMUNICATION, BY REGION, 2023–2028 (USD MILLION)

TABLE 127 OTHER PRODUCTS: PIEZOELECTRIC DEVICES MARKET FOR CONSUMER ELECTRONICS, BY REGION, 2019–2022 (USD MILLION)

TABLE 128 OTHER PRODUCTS: PIEZOELECTRIC DEVICES MARKET FOR CONSUMER ELECTRONICS, BY REGION, 2023–2028 (USD MILLION)

TABLE 129 OTHER PRODUCTS: PIEZOELECTRIC DEVICES MARKET FOR OTHER APPLICATIONS, BY REGION, 2019–2022 (USD MILLION)

TABLE 130 OTHER PRODUCTS: PIEZOELECTRIC DEVICES MARKET FOR OTHER

APPLICATIONS, BY REGION, 2023–2028 (USD MILLION)

7 PIEZOELECTRIC DEVICES MARKET, BY MATERIAL

7.1 INTRODUCTION

FIGURE 41 MARKET SEGMENTATION, BY MATERIAL

FIGURE 42 PIEZOELECTRIC POLYMERS TO EXHIBIT HIGHEST CAGR FROM 2023 TO 2028

TABLE 131 PIEZOELECTRIC DEVICES MARKET, BY MATERIAL, 2019–2022 (USD MILLION)

TABLE 132 PIEZOELECTRIC DEVICES MARKET, BY MATERIAL, 2023–2028 (USD MILLION)

7.2 PIEZOELECTRIC POLYMERS VS. PIEZOELECTRIC CERAMICS

7.3 PIEZOELECTRIC CRYSTALS

7.3.1 ACT AS TINY BATTERIES AND DETECT HIGH-FREQUENCY ULTRASOUND WAVES

7.4 PIEZOELECTRIC CERAMICS

7.4.1 TO DOMINATE PIEZOELECTRIC DEVICES MARKET DURING FORECAST PERIOD

7.4.2 SOFT CERAMICS

7.4.2.1 Designed for accelerometers, level sensors, flow sensors, pressure sensors, hydrophones, microphones, and gyroscopes

7.4.3 HARD CERAMICS

7.4.3.1 Suitable for high-power generators and transducers

7.5 PIEZOELECTRIC POLYMERS

7.5.1 TO GROW AT HIGHEST RATE DURING FORECAST PERIOD

7.6 PIEZOELECTRIC COMPOSITES

7.6.1 USED EXTENSIVELY AS FILLERS

8 PIEZOELECTRIC DEVICES MARKET, BY APPLICATION

8.1 INTRODUCTION

FIGURE 43 MARKET SEGMENTATION, BY APPLICATION

FIGURE 44 HEALTHCARE SEGMENT TO WITNESS HIGHEST CAGR IN PIEZOELECTRIC DEVICES MARKET BY 2028

TABLE 133 PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2019–2022 (USD MILLION)

TABLE 134 PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2023–2028(USD MILLION)

8.2 AEROSPACE & DEFENSE

8.2.1 TO HOLD LARGEST MARKET SHARE DURING FORECAST PERIOD

TABLE 135 AEROSPACE & DEFENSE: PIEZOELECTRIC DEVICES MARKET, BY PRODUCT, 2019–2022 (USD MILLION)

TABLE 136 AEROSPACE & DEFENSE: PIEZOELECTRIC DEVICES MARKET, BY PRODUCT, 2023–2028(USD MILLION)

TABLE 137 AEROSPACE & DEFENSE: PIEZOELECTRIC DEVICES MARKET, BY REGION, 2019–2022 (USD MILLION)

TABLE 138 AEROSPACE & DEFENSE: PIEZOELECTRIC DEVICES MARKET, BY REGION, 2023–2028 (USD MILLION)

TABLE 139 AEROSPACE & DEFENSE: PIEZOELECTRIC DEVICES MARKET IN NORTH AMERICA, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 140 AEROSPACE & DEFENSE: PIEZOELECTRIC DEVICES MARKET IN NORTH AMERICA, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 141 AEROSPACE & DEFENSE: PIEZOELECTRIC DEVICES MARKET IN EUROPE, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 142 AEROSPACE & DEFENSE: PIEZOELECTRIC DEVICES MARKET IN EUROPE, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 143 AEROSPACE & DEFENSE: PIEZOELECTRIC DEVICES MARKET IN ASIA PACIFIC, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 144 AEROSPACE & DEFENSE: PIEZOELECTRIC DEVICES MARKET IN ASIA PACIFIC, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 145 AEROSPACE & DEFENSE: PIEZOELECTRIC DEVICES MARKET IN ROW, BY REGION, 2019–2022 (USD MILLION)

TABLE 146 AEROSPACE & DEFENSE: PIEZOELECTRIC DEVICES MARKET IN ROW, BY REGION, 2023–2028 (USD MILLION)

8.3 INDUSTRIAL & MANUFACTURING

8.3.1 TO CAPTURE SIZABLE SHARE OF PIEZOELECTRIC DEVICES MARKET

TABLE 147 INDUSTRIAL & MANUFACTURING: PIEZOELECTRIC DEVICES MARKET, BY PRODUCT, 2019–2022 (USD MILLION)

TABLE 148 INDUSTRIAL & MANUFACTURING: PIEZOELECTRIC DEVICES MARKET, BY PRODUCT, 2023–2028 (USD MILLION)

TABLE 149 INDUSTRIAL & MANUFACTURING: PIEZOELECTRIC DEVICES MARKET, BY REGION, 2019–2022 (USD MILLION)

TABLE 150 INDUSTRIAL & MANUFACTURING: PIEZOELECTRIC DEVICES MARKET, BY REGION, 2023–2028 (USD MILLION)

TABLE 151 INDUSTRIAL & MANUFACTURING: PIEZOELECTRIC DEVICES MARKET IN NORTH AMERICA, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 152 INDUSTRIAL & MANUFACTURING: PIEZOELECTRIC DEVICES MARKET

IN NORTH AMERICA, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 153 INDUSTRIAL & MANUFACTURING: PIEZOELECTRIC DEVICES MARKET IN EUROPE, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 154 INDUSTRIAL & MANUFACTURING: PIEZOELECTRIC DEVICES MARKET IN EUROPE, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 155 INDUSTRIAL & MANUFACTURING: PIEZOELECTRIC DEVICES MARKET IN ASIA PACIFIC, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 156 INDUSTRIAL & MANUFACTURING: PIEZOELECTRIC DEVICES MARKET IN ASIA PACIFIC, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 157 INDUSTRIAL & MANUFACTURING: PIEZOELECTRIC DEVICES MARKET IN ROW, BY REGION, 2019–2022 (USD MILLION)

TABLE 158 INDUSTRIAL & MANUFACTURING: PIEZOELECTRIC DEVICES MARKET IN ROW, BY REGION, 2023–2028 (USD MILLION)

8.4 AUTOMOTIVE

8.4.1 THRIVING AUTOMOTIVE SECTOR TO SUPPORT MARKET GROWTH

TABLE 159 AUTOMOTIVE: PIEZOELECTRIC DEVICES MARKET, BY PRODUCT, 2019–2022 (USD MILLION)

TABLE 160 AUTOMOTIVE: PIEZOELECTRIC DEVICES MARKET, BY PRODUCT, 2023–2028 (USD MILLION)

TABLE 161 AUTOMOTIVE: PIEZOELECTRIC DEVICES MARKET, BY REGION, 2019–2022 (USD MILLION)

TABLE 162 AUTOMOTIVE: PIEZOELECTRIC DEVICES MARKET, BY REGION, 2023–2028 (USD MILLION)

TABLE 163 AUTOMOTIVE: PIEZOELECTRIC DEVICES MARKET IN NORTH AMERICA, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 164 AUTOMOTIVE: PIEZOELECTRIC DEVICES MARKET IN NORTH AMERICA, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 165 AUTOMOTIVE: PIEZOELECTRIC DEVICES MARKET IN EUROPE, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 166 AUTOMOTIVE: PIEZOELECTRIC DEVICES MARKET IN EUROPE, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 167 AUTOMOTIVE: PIEZOELECTRIC DEVICES MARKET IN ASIA PACIFIC, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 168 AUTOMOTIVE: PIEZOELECTRIC DEVICES MARKET IN ASIA PACIFIC, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 169 AUTOMOTIVE: PIEZOELECTRIC DEVICES MARKET IN ROW, BY REGION, 2019–2022 (USD MILLION)

TABLE 170 AUTOMOTIVE: PIEZOELECTRIC DEVICES MARKET IN ROW, BY REGION, 2023–2028 (USD MILLION)

8.5 HEALTHCARE

8.5.1 TO BE FASTEST-GROWING APPLICATION OF PIEZOELECTRIC DEVICES DURING FORECAST PERIOD

FIGURE 45 MAJOR APPLICATIONS OF PIEZOELECTRIC DEVICES IN HEALTHCARE

8.5.2 IMAGING DEVICES

8.5.2.1 Integration of piezoelectric devices into imaging devices for ultrasound and cone beam three-dimensional imaging applications

8.5.3 DIAGNOSTIC EQUIPMENT

8.5.3.1 Piezoelectric ceramics used in MRI scanners and endoscopes

8.5.4 SURGICAL TOOLS

8.5.4.1 Deployment of piezoelectric technology in surgery tools for faster recovery

TABLE 171 HEALTHCARE: PIEZOELECTRIC DEVICES MARKET, BY PRODUCT, 2019–2022 (USD MILLION)

TABLE 172 HEALTHCARE: PIEZOELECTRIC DEVICES MARKET, BY PRODUCT, 2023–2028 (USD MILLION)

TABLE 173 HEALTHCARE: PIEZOELECTRIC DEVICES MARKET, BY REGION, 2019–2022 (USD MILLION)

TABLE 174 HEALTHCARE: PIEZOELECTRIC DEVICES MARKET, BY REGION, 2023–2028 (USD MILLION)

TABLE 175 HEALTHCARE: PIEZOELECTRIC DEVICES MARKET IN NORTH AMERICA, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 176 HEALTHCARE: PIEZOELECTRIC DEVICES MARKET IN NORTH AMERICA, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 177 HEALTHCARE: PIEZOELECTRIC DEVICES MARKET IN EUROPE, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 178 HEALTHCARE: PIEZOELECTRIC DEVICES MARKET IN EUROPE, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 179 HEALTHCARE: PIEZOELECTRIC DEVICES MARKET IN ASIA PACIFIC, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 180 HEALTHCARE: PIEZOELECTRIC DEVICES MARKET IN ASIA PACIFIC, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 181 HEALTHCARE: PIEZOELECTRIC DEVICES MARKET IN ROW, BY REGION, 2019–2022 (USD MILLION)

TABLE 182 HEALTHCARE: PIEZOELECTRIC DEVICES MARKET IN ROW, BY REGION, 2023–2028(USD MILLION)

8.6 INFORMATION & COMMUNICATION

8.6.1 ADOPTION OF PIEZOELECTRIC COMPONENTS IN SONAR APPLICATIONS TO PROPEL MARKET

TABLE 183 INFORMATION & COMMUNICATION: PIEZOELECTRIC DEVICES MARKET, BY PRODUCT, 2019–2022 (USD MILLION)

TABLE 184 INFORMATION & COMMUNICATION: PIEZOELECTRIC DEVICES MARKET, BY PRODUCT, 2023–2028 (USD MILLION)

TABLE 185 INFORMATION & COMMUNICATION: PIEZOELECTRIC DEVICES MARKET, BY REGION, 2019–2022 (USD MILLION)

TABLE 186 INFORMATION & COMMUNICATION: PIEZOELECTRIC DEVICES MARKET, BY REGION, 2023–2028 (USD MILLION)

TABLE 187 INFORMATION & COMMUNICATION: PIEZOELECTRIC DEVICES MARKET IN NORTH AMERICA, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 188 INFORMATION & COMMUNICATION: PIEZOELECTRIC DEVICES MARKET IN NORTH AMERICA, BY COUNTRY, 2023–2028(USD MILLION)

TABLE 189 INFORMATION & COMMUNICATION: PIEZOELECTRIC DEVICES MARKET IN EUROPE, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 190 INFORMATION & COMMUNICATION: PIEZOELECTRIC DEVICES MARKET IN EUROPE, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 191 INFORMATION & COMMUNICATION: PIEZOELECTRIC DEVICES MARKET IN ASIA PACIFIC, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 192 INFORMATION & COMMUNICATION: PIEZOELECTRIC DEVICES MARKET IN ASIA PACIFIC, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 193 INFORMATION & COMMUNICATION: PIEZOELECTRIC DEVICES MARKET IN ROW, BY REGION, 2019–2022 (USD MILLION)

TABLE 194 INFORMATION & COMMUNICATION: PIEZOELECTRIC DEVICES MARKET IN ROW, BY REGION, 2023–2028(USD MILLION)

8.7 CONSUMER ELECTRONICS

8.7.1 INCREASING USE OF PIEZOELECTRIC SENSORS IN CONSUMER ELECTRONICS TO DRIVE MARKET

FIGURE 46 APPLICATIONS OF PIEZOELECTRIC ELEMENTS AND MATERIALS IN CONSUMER ELECTRONICS

8.7.2 WEARABLE DEVICES

8.7.2.1 Collaboration of market players with universities and research institutes to develop advanced piezoelectricity-based wearables

8.7.3 ELECTRONIC DEVICES

8.7.3.1 Growing consumer electronics segment to spur demand for piezoelectric devices

TABLE 195 CONSUMER ELECTRONICS: PIEZOELECTRIC DEVICES MARKET, BY PRODUCT, 2019–2022 (USD MILLION)

TABLE 196 CONSUMER ELECTRONICS: PIEZOELECTRIC DEVICES MARKET, BY PRODUCT, 2023–2028 (USD MILLION)

TABLE 197 CONSUMER ELECTRONICS: PIEZOELECTRIC DEVICES MARKET, BY REGION, 2019–2022 (USD MILLION)

TABLE 198 CONSUMER ELECTRONICS: PIEZOELECTRIC DEVICES MARKET, BY REGION, 2023–2028(USD MILLION)

TABLE 199 CONSUMER ELECTRONICS: PIEZOELECTRIC DEVICES MARKET IN NORTH AMERICA, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 200 CONSUMER ELECTRONICS: PIEZOELECTRIC DEVICES MARKET IN NORTH AMERICA, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 201 CONSUMER ELECTRONICS: PIEZOELECTRIC DEVICES MARKET IN EUROPE, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 202 CONSUMER ELECTRONICS: PIEZOELECTRIC DEVICES MARKET IN EUROPE, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 203 CONSUMER ELECTRONICS: PIEZOELECTRIC DEVICES MARKET IN ASIA PACIFIC, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 204 CONSUMER ELECTRONICS: PIEZOELECTRIC DEVICES MARKET IN ASIA PACIFIC, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 205 CONSUMER ELECTRONICS: PIEZOELECTRIC DEVICES MARKET IN ROW, BY REGION, 2019–2022 (USD MILLION)

TABLE 206 CONSUMER ELECTRONICS: PIEZOELECTRIC DEVICES MARKET IN ROW, BY REGION, 2023–2028 (USD MILLION)

8.8 OTHER APPLICATIONS

TABLE 207 OTHER APPLICATIONS: PIEZOELECTRIC DEVICES MARKET, BY PRODUCT, 2019–2022 (USD MILLION)

TABLE 208 OTHER APPLICATIONS: PIEZOELECTRIC DEVICES MARKET, BY PRODUCT, 2023–2028 (USD MILLION)

TABLE 209 OTHER APPLICATIONS: PIEZOELECTRIC DEVICES MARKET, BY REGION, 2019–2022 (USD MILLION)

TABLE 210 OTHER APPLICATIONS: PIEZOELECTRIC DEVICES MARKET, BY REGION, 2023–2028 (USD MILLION)

TABLE 211 OTHER APPLICATIONS: PIEZOELECTRIC DEVICES MARKET IN NORTH AMERICA, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 212 OTHER APPLICATIONS: PIEZOELECTRIC DEVICES MARKET IN NORTH AMERICA, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 213 OTHER APPLICATIONS: PIEZOELECTRIC DEVICES MARKET IN EUROPE, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 214 OTHER APPLICATIONS: PIEZOELECTRIC DEVICES MARKET IN EUROPE, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 215 OTHER APPLICATIONS: PIEZOELECTRIC DEVICES MARKET IN ASIA PACIFIC, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 216 OTHER APPLICATIONS: PIEZOELECTRIC DEVICES MARKET IN ASIA PACIFIC, BY COUNTRY, 2023–2028 (USD MILLION)

TABLE 217 OTHER APPLICATIONS: PIEZOELECTRIC DEVICES MARKET IN ROW, BY REGION, 2019–2022 (USD MILLION)

TABLE 218 OTHER APPLICATIONS: PIEZOELECTRIC DEVICES MARKET IN ROW, BY REGION, 2023–2028 (USD MILLION)

9 PIEZOELECTRIC DEVICES MARKET, BY PIEZOELECTRIC ELEMENT

9.1 INTRODUCTION

FIGURE 47 PIEZOELECTRIC ELEMENTS

FIGURE 48 PIEZO DISCS HELD LARGEST MARKET SHARE IN 2022

TABLE 219 PIEZOELECTRIC DEVICES MARKET, BY PIEZOELECTRIC ELEMENT, 2019–2022 (USD MILLION)

TABLE 220 PIEZOELECTRIC DEVICES MARKET, BY PIEZOELECTRIC ELEMENT, 2023–2028 (USD MILLION)

9.2 PIEZOELECTRIC DISCS

9.2.1 CONSUME LOW POWER AND PROVIDE FAST RESPONSE

9.3 PIEZOELECTRIC RINGS

9.3.1 DESIGNED FOR HEALTHCARE AND ULTRASONIC APPLICATIONS

9.4 PIEZOELECTRIC PLATES

9.4.1 MEASURE ACCELERATION, FORCE, PRESSURE, AND STRAIN

10 PIEZOELECTRIC DEVICES MARKET, BY MODE OF OPERATION

10.1 INTRODUCTION

FIGURE 49 OPERATION MODES OF PIEZOELECTRIC DEVICES

10.2 DIRECT PIEZOELECTRIC EFFECT

FIGURE 50 DIRECT PIEZOELECTRIC EFFECT

10.3 CONVERSE PIEZOELECTRIC EFFECT

FIGURE 51 CONVERSE PIEZOELECTRIC EFFECT

11 PIEZOELECTRIC DEVICES MARKET, BY REGION

11.1 INTRODUCTION

FIGURE 52 REGIONAL SPLIT OF PIEZOELECTRIC DEVICES MARKET

FIGURE 53 GEOGRAPHIC SNAPSHOT OF PIEZOELECTRIC DEVICES MARKET, 2023–2028

TABLE 221 PIEZOELECTRIC DEVICES MARKET, BY REGION, 2019–2022 (USD

MILLION)

TABLE 222 PIEZOELECTRIC DEVICES MARKET, BY REGION, 2023–2028 (USD MILLION)

11.2 NORTH AMERICA

11.2.1 RECESSION IMPACT ANALYSIS

FIGURE 54 NORTH AMERICA: PIEZOELECTRIC DEVICES MARKET SNAPSHOT

TABLE 223 NORTH AMERICA: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2019–2022 (USD MILLION)

TABLE 224 NORTH AMERICA: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2023–2028 (USD MILLION)

TABLE 225 NORTH AMERICA: PIEZOELECTRIC DEVICES MARKET, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 226 NORTH AMERICA: PIEZOELECTRIC DEVICES MARKET, BY COUNTRY, 2023–2028 (USD MILLION)

11.2.2 US

11.2.2.1 To be largest North American piezoelectric devices market

11.2.3 CANADA

11.2.3.1 To witness significant investment for R&D of piezoelectric technology

11.2.4 MEXICO

11.2.4.1 Increasing number of industrial & manufacturing facilities to support market

11.3 EUROPE

11.3.1 RECESSION IMPACT ANALYSIS

FIGURE 55 EUROPE: PIEZOELECTRIC DEVICES MARKET SNAPSHOT

TABLE 227 EUROPE: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2019–2022 (USD MILLION)

TABLE 228 EUROPE: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2023–2028 (USD MILLION)

TABLE 229 EUROPE: PIEZOELECTRIC DEVICES MARKET, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 230 EUROPE: PIEZOELECTRIC DEVICES MARKET, BY COUNTRY, 2023–2028 (USD MILLION)

11.3.2 GERMANY

11.3.2.1 Growing automotive sector to contribute to market growth

11.3.3 FRANCE

11.3.3.1 Surging demand for electric vehicles to fuel market

11.3.4 UK

11.3.4.1 Thriving aerospace & defense industry to witness high demand for piezoelectric devices

11.3.5 ITALY

11.3.5.1 Increasing production of automobiles to spur demand for piezoelectric devices

11.3.6 REST OF EUROPE

11.4 ASIA PACIFIC

11.4.1 RECESSION IMPACT ANALYSIS

FIGURE 56 ASIA PACIFIC: PIEZOELECTRIC DEVICES MARKET SNAPSHOT

TABLE 231 ASIA PACIFIC: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2019–2022 (USD MILLION)

TABLE 232 ASIA PACIFIC: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2023–2028 (USD MILLION)

TABLE 233 ASIA PACIFIC: PIEZOELECTRIC DEVICES MARKET, BY COUNTRY, 2019–2022 (USD MILLION)

TABLE 234 ASIA PACIFIC: PIEZOELECTRIC DEVICES MARKET, BY COUNTRY, 2023–2028 (USD MILLION)

11.4.2 JAPAN

11.4.2.1 Emphasis on R&D of piezoelectric materials to accelerate market growth

11.4.3 CHINA

11.4.3.1 To be fastest-growing market in Asia Pacific

11.4.4 SOUTH KOREA

11.4.4.1 Booming consumer electronics and automotive sectors to push market growth

11.4.5 REST OF ASIA PACIFIC

11.5 ROW

11.5.1 RECESSION IMPACT ANALYSIS

TABLE 235 ROW: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2019–2022 (USD MILLION)

TABLE 236 ROW: PIEZOELECTRIC DEVICES MARKET, BY APPLICATION, 2023–2028 (USD MILLION)

TABLE 237 ROW: PIEZOELECTRIC DEVICES MARKET, BY REGION, 2019–2022 (USD MILLION)

TABLE 238 ROW: PIEZOELECTRIC DEVICES MARKET, BY REGION, 2023–2028 (USD MILLION)

11.5.2 MIDDLE EAST & AFRICA

11.5.2.1 Adoption of piezoelectric devices in oil and manufacturing facilities to foster market growth

11.5.3 SOUTH AMERICA

11.5.3.1 Increasing demand from healthcare & automotive applications to favor market growth

12 COMPETITIVE LANDSCAPE

12.1 OVERVIEW

TABLE 239 PIEZOELECTRIC DEVICES MARKET: KEY GROWTH STRATEGIES ADOPTED BY COMPANIES FROM 2019 TO 2023

12.2 MARKET SHARE ANALYSIS

FIGURE 57 PIEZOELECTRIC DEVICES MARKET SHARE ANALYSIS, 2022

TABLE 240 PIEZOELECTRIC DEVICES MARKET: DEGREE OF COMPETITION

TABLE 241 PIEZOELECTRIC DEVICES MARKET: RANKING ANALYSIS

12.3 3-YEAR COMPANY REVENUE ANALYSIS FOR TOP 2 COMPANIES

FIGURE 58 REVENUE ANALYSIS OF TOP TWO PLAYERS IN PIEZOELECTRIC DEVICES MARKET, 2020-2022

12.4 COMPANY EVALUATION QUADRANT

12.4.1 STARS

12.4.2 EMERGING LEADERS

12.4.3 PERVASIVE PLAYERS

12.4.4 PARTICIPANTS

FIGURE 59 PIEZOELECTRIC DEVICES MARKET: COMPANY EVALUATION QUADRANT, 2022

12.5 START-UP/SME EVALUATION MATRIX

TABLE 242 START-UPS/SMES IN PIEZOELECTRIC DEVICES MARKET

12.5.1 PROGRESSIVE COMPANIES

12.5.2 RESPONSIVE COMPANIES

12.5.3 DYNAMIC COMPANIES

12.5.4 STARTING BLOCKS

FIGURE 60 PIEZOELECTRIC DEVICES MARKET, START-UP/SME EVALUATION MATRIX, 2022

TABLE 243 START-UP MATRIX: LIST OF KEY START-UPS/SMES

12.5.5 COMPETITIVE BENCHMARKING

TABLE 244 PIEZOELECTRIC DEVICES MARKET: COMPETITIVE BENCHMARKING OF KEY START-UPS/SMES

12.6 COMPANY FOOTPRINT

TABLE 245 COMPANY FOOTPRINT

TABLE 246 COMPANY PRODUCT FOOTPRINT

TABLE 247 COMPANY APPLICATION FOOTPRINT

TABLE 248 COMPANY REGION FOOTPRINT

12.7 COMPETITIVE SITUATIONS AND TRENDS

12.7.1 PRODUCT LAUNCHES

TABLE 249 PRODUCT LAUNCHES, 2019–2022

12.7.2 DEALS

TABLE 250 DEALS, 2019–2022

12.7.3 OTHERS

TABLE 251 INVESTMENTS AND EXPANSIONS, 2019–2022

13 COMPANY PROFILES

(Business Overview, Products/Solutions/Services Offered, Recent Developments, MnM view (Key strengths/Right to win, Strategic choices made, Weakness/competitive threats)*

13.1 KEY PLAYERS

13.1.1 CERAMTEC GMBH

TABLE 252 CERAMTEC GMBH: COMPANY OVERVIEW

FIGURE 61 CERAMTEC GMBH: COMPANY SNAPSHOT

13.1.2 CTS CORPORATION

TABLE 253 CTS CORPORATION: COMPANY OVERVIEW

FIGURE 62 CTS CORPORATION: COMPANY SNAPSHOT

13.1.3 KISTLER GROUP

TABLE 254 KISTLER GROUP: COMPANY OVERVIEW

13.1.4 PHYSIK INSTRUMENTE (PI) GMBH & CO. KG.

TABLE 255 PHYSIK INSTRUMENTE (PI) GMBH & CO. KG.: COMPANY OVERVIEW

13.1.5 AEROTECH INC.

TABLE 256 AEROTECH INC.: COMPANY OVERVIEW

13.1.6 PIEZOSYSTEM JENA GMBH

TABLE 257 PIEZOSYSTEM JENA GMBH: COMPANY OVERVIEW

13.1.7 KEMET CORPORATION

TABLE 258 KEMET CORPORATION: COMPANY OVERVIEW

13.1.8 PIEZO TECHNOLOGIES

TABLE 259 PIEZO TECHNOLOGIES: COMPANY OVERVIEW

13.1.9 APC INTERNATIONAL, LTD.

TABLE 260 APC INTERNATIONAL, LTD.: COMPANY OVERVIEW

13.1.10 MAD CITY LABS, INC.

TABLE 261 MAD CITY LABS, INC.: COMPANY OVERVIEW

13.2 OTHER KEY PLAYERS

13.2.1 TE CONNECTIVITY LTD.

13.2.2 MIDE TECHNOLOGY CORP.

13.2.3 OMEGA PIEZO TECHNOLOGIES, INC.

13.2.4 PCB PIEZOTRONICS, INC.

13.2.5 PIEZOMOTOR

13.2.6 PIEZOMECHANIK DR. LUTZ PICKELMANN GMBH

13.2.7 DYTRAN INSTRUMENTS INCORPORATED

13.2.8 PIEZO SOLUTIONS

13.2.9 ELPA RESEARCH INSTITUTE

13.2.10 HOERBIGER MOTION CONTROL GMBH

13.2.11 CENTRAL ELECTRONICS LIMITED (CEL)

13.2.12 HONG KONG PIEZO CO. LTD.

13.2.13 TRS TECHNOLOGIES

13.2.14 SPARKLER CERAMICS

13.2.15 PIEZOTECH ARKEMA

13.2.16 SOLVAY

Details on Business Overview, Products/Solutions/Services Offered, Recent Developments, MnM view (Key strengths/Right to win, Strategic choices made, Weakness/competitive threats) might not be captured in case of unlisted companies.

14 APPENDIX

14.1 DISCUSSION GUIDE

14.2 KNOWLEDGESTORE: MARKETSandMARKETS' SUBSCRIPTION PORTAL

14.3 CUSTOMIZATION OPTIONS

14.4 RELATED REPORTS

14.5 AUTHOR DETAILS

I would like to order

Product name: Piezoelectric Devices Market by Product (Sensors, Actuator, Motor, Generator, Transducer, Transformers, Resonator), Material (Polymer, Crystal, Ceramic, Composites), Element (Discs, Rings, Plates), Application and Region - Global Forecast to 2028

Product link: <https://marketpublishers.com/r/P332CB36461EN.html>

Price: US\$ 4,950.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:

info@marketpublishers.com

Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <https://marketpublishers.com/r/P332CB36461EN.html>

To pay by Wire Transfer, please, fill in your contact details in the form below:

First name:
Last name:
Email:
Company:
Address:
City:
Zip code:
Country:
Tel:
Fax:
Your message:

****All fields are required**

Customer signature _____

Please, note that by ordering from marketpublishers.com you are agreeing to our Terms & Conditions at <https://marketpublishers.com/docs/terms.html>

To place an order via fax simply print this form, fill in the information below
and fax the completed form to +44 20 7900 3970