

Force and Torque Sensors for Research and Production

Kistler Offers Complete Range of Sensor Systems – from Standard to Custom Solutions

Piezoelectric force sensors are the first choice for dynamic measurement, providing the user with a whole series of impressive benefits:

- Multiple measuring ranges with just one sensor – the piezo sensor measures just as accurately between 0 and 1 % of FSO as between 0 and 100 %. All this is made possible by simple range switching.
- High rigidity – the piezo sensor is 200 times as rigid as strain gage sensors. The piezo type is as rigid as the structure whose forces it measures.
- Extremely high overload protection, despite the use of small partial measuring ranges the sensor is capable of withstanding the full maximum force. Therefore, in a small range from 0 ... 1 % it offers 100-fold overload protection.

Even if it is accepted that the strength of strain gage sensors lies in static long-term measurements where they generally have a price advantage over piezo-

electric sensors; the piezo sensor is far superior for dynamic measurement. The fact that it may cost more is more than offset if a second strain gage sensor has to be purchased for an additional measurement task involving a smaller range.

For force measurements between 1 mN and 20 MN, Kistler offers a wealth of sensors based on the piezoelectric principle. These come in a variety of shapes and designs readily accommodating any standard application in R&D, laboratory and production.

Reaction torque sensors from Kistler for dynamic measurement from $\pm 0,1 \dots 1\,000$ N·m are likewise based on the piezoelectric principle. The range includes a wide variety of types of strain gage sensor for determining torques on rotating shafts, with compact versions measuring torques from $0,2 \dots 5\,000$ N·m very accurately even in extreme speed ranges.

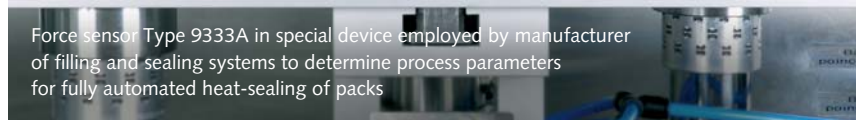
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Force sensor Type 9333A in special device employed by manufacturer of filling and sealing systems to determine process parameters for fully automated heat-sealing of packs



Selection of Force and Torque Sensors from Kistler

Single-component force sensors

Load washers for mounting directly in the force flux or the force shunt



Force links, preloaded for measuring tensile and compressive forces

Sensors for extremely small forces

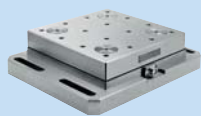
Particularly compact design with high sensitivity



3-component force sensors

Sensors for mounting in the path of the force in structures

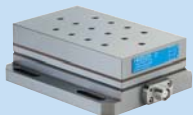
Force links, preloaded for measuring tensile and compressive forces



Multicomponent dynamometers

With cover plate for measuring forces involved in heavy machining

MiniDyn for measuring extremely small process forces



With cover plate for general-purpose force measurement

Reaction torque sensors

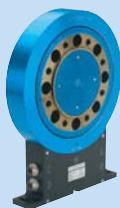
For dynamic product testing



Torque sensors for measurement on rotating shafts

Dual-range sensor

Measuring flange without any mechanical bearings



The catalog entitled **Process Instrumentation and Automation** and our website www.kistler.com provide a complete overview

Kistler caters to custom force and/or torque measurement with special solutions based on modified types of sensors or even on individually designed special sensors. No matter whether re-forming, joining and assembly forces, machining forces, torques on rotating shafts or reaction torques are

measured and the results interpreted: specialists from the Kistler Business Unit Manufacturing draw on their application engineering experience to solve even complex measurement problems and provide integrated measuring systems from a single source.

New Calibration Unit in Operation

In April 2009 Kistler commissioned an additional calibration unit on the Lorch production site. Having been accredited by the German Calibration Service (DKD), this unit can be used for DKD calibration of torque sensors up to 5 000 N·m.



NC Compact System for Joining Modules

Standard joining processes, such as pressing bearings onto shafts, can be flexibly and reliably automated through the use of electromechanical NC joining modules from Kistler with integral force-displacement monitoring. The NC Compact Firmware Type 2159A loaded into the servo controller cuts

capital expenditures and installation costs, reduces susceptibility to faults and facilitates integration into existing on-site control environments. The operating panel Type 2158A is used for configuring the parameters of a standard joining process, visualizing the process and backing up data.

Intec Prize 2009 Awarded for Development of NCFT Joining System



Christoph Molitor with NCFT NC joining system for forces up to 1 kN

Christoph Molitor, a development engineer with Kistler in Lorch, has been presented with the award in the 2nd

category of the Intec prize (Promoting Young Talents). He received the distinction in Leipzig during Intec 2009, the trade fair for manufacturing, tool and special-purpose machine construction. The Intec prize recognizes new or ongoing developments in production technology that set new standards in terms of innovative and market potential.

The electromechanical NC joining module NCFT Type 2157A... with integral piezoelectric force sensor system and nominal joining forces of 0,25 kN, 0,5 kN and 1 kN is suitable for both automated precision manufacture and standalone workstations that offer high sensitivity and dynamics in a very compact package.

Kistler CAD Download Service Brings Sensors and Electronics Straight into Design

To allow incorporation of Kistler products into CAD designs, the Kistler CAD Download Services offers prospective and existing customers 3D CAD models free of charge. These models can be quickly and easily downloaded over the Internet for immediate importation into CAD designs. This saves the designer considerable time involved in laboriously redrawing Kistler components.

There are 46 different 3D file formats and 28 different 2D data formats available for the numerous CAD systems. All of the data sheets for the products offered can also be obtained through this service.

To ensure continuous updating of the data offered, the Kistler CAD Download Service has been developed in conjunction with CADENAS, the leading supplier of electronic product catalogs and parts management systems. The parts portal www.partserver.com provides a worldwide presence in the five languages currently supported.

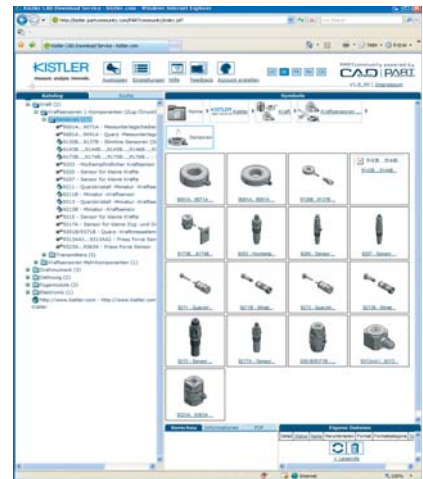
Quick and easy approach to design data

The CAD data is made readily accessible by the clearly arranged interface of the Kistler PARTcommunity, which organizes Kistler products (force, torque and strain sensors, electronics, joining modules, etc) in a tree structure for quick and easy searches.

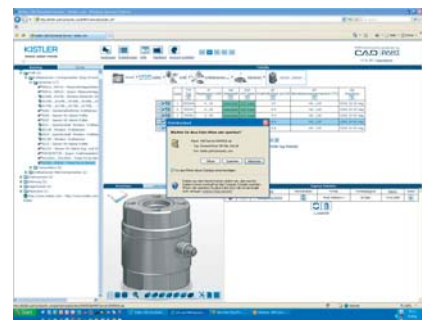
A 3D preview of each selected individual product is generated initially, which can be viewed from each side. Products that come in different versions or have moving parts can be individually configured by setting parameters. A command can be given to load the CAD models in the chosen format onto the designer's PC for immediate incorporation in a CAD design.

Before accessing the Kistler PARTcommunity for the first time a free account has to be set up. An existing account from Kistler's website www.kistler.com, as required to download documentation such as software, can be used to log into the PARTcommunity.

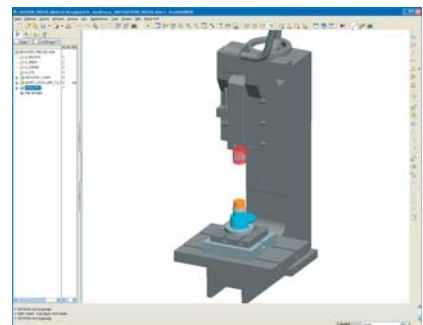
The CAD Download Service provides you with the latest design data of Kistler products for use in your local CAD system in a matter of minutes. This simplifies and speeds up creation of different design variants, ultimately helping you achieve a technically mature solution and hence a significant market edge.



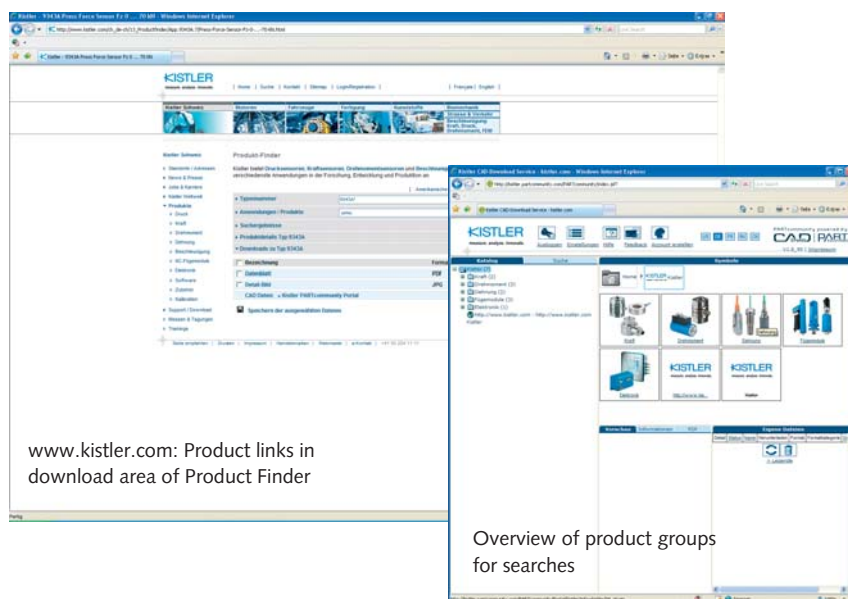
Selection of specific sensor (Type 9343A in this case)



Product preview and downloading product Data



Positioning sensor, for example in ProEngineer



www.kistler.com: Product links in download area of Product Finder

Overview of product groups for searches

The Kistler CAD Download Service can be accessed in three different ways:

- www.kistler.com
> Products > Product Finder using direct product links (also called deep links) in the download area
- www.partserver.com, which can be accessed in 18 country domains and 5 languages
- <http://kistler.partcommunity.com> with direct login

New System for 3-Component Measurement of Cutting Forces during Turning

All of the components of the cutting force are measured and analyzed in order to monitor the turning process. Kistler has designed the cutting force dynamometer Type 9129A... as a new system for recording these force components. This modular system measures cutting forces of up to 8 kN involved in boring and outside turning on turret lathes in three directions.

The dynamometer is mounted on the turret toolholder with the aid of a lathe adapter. Kistler offers the following such adapters as accessories for the dynamometer:

- VDI toolholders, ø30, 40 and 50 mm
- Coromant Capto C6 adapter
- Direct toolholders, 20x40 mm, 25x50 mm, ¾"x1½" and 1"x2".

The tool adapter mounted on the cover plate of the dynamometer accepts the required turning tool. Adapters for the popular sizes of inside and outside turning tools are available:

- Toolholders for outside turning tools, 20x20 mm, 25x25 mm, ¾"x ¾" and 1"x1"
- Toolholders for inside turning tools, ø25, 32 and 40 mm.

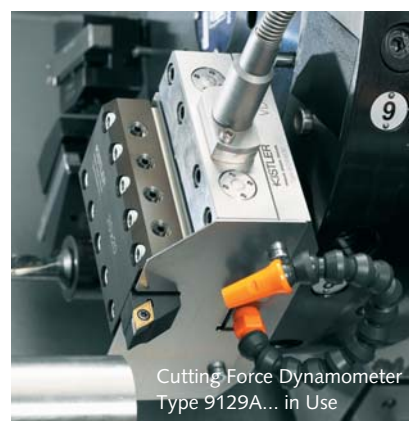
On inclined bed lathes with two turrets the measuring system can be mounted over or under the workpiece. The components of the measuring system are engineered to ensure that – irrespective of the mounting position – the cutting edge of the tool is always at the height of the rotational axis, i.e. in the middle of the workpiece.

The new cutting force dynamometer is designed for analyzing process capability in cutting, investigating new general and cutting materials, and optimizing high-performance cutting with greater widths and depths. The modularity of the cutting force measuring system Type 9129A... allows the incorporated dynamometer Type 9129AA to be used for other force measurements. It is also available separately, has an impressively low overall height of 32 mm and



New Cutting Force Dynamometer Type 9129A...

a large measuring range of up to ±10 kN. The Type 9129AA replaces the CompacDyn dynamometer Type 9254.



Cutting Force Dynamometer Type 9129A... in Use

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