

Measuring directly in the flow of force

# Force measurement in linear drives



Smart in sensing

# WIKA force measuring technology - the efficient solution

How can the force that is present in presses, punches, welding guns and other linear drives be measured in a permanently precise, safe and reliable way?

Force measuring technology from WIKA is the efficient answer. Put your trust in partnership-like advice – and solutions which are based on more than 90 years of experience in measuring and sensor technology.

## Drive elements in a state of change

More and more hydraulic and pneumatically operated drive elements are being replaced by a combination of electric motor and mechanical thrust units. A pressure measurement is no longer possible in this case.

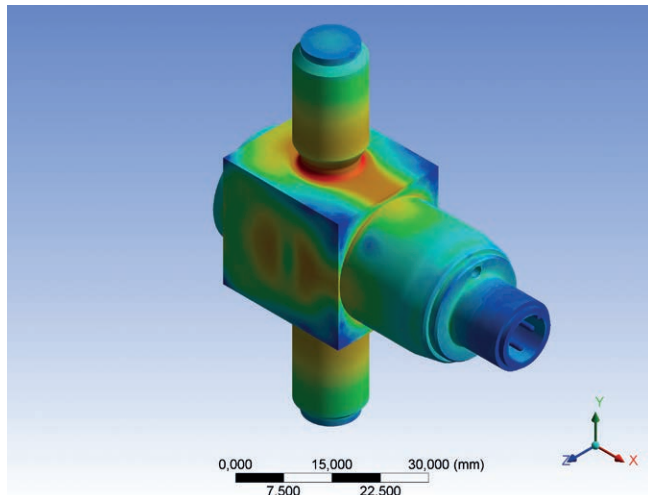
## Taking opportunities

This change provides the perfect opportunity to now measure force directly in the process. Force measuring technology can be easily used in any linear drive. The sensor is integrated in the drive chain to do this, regardless of whether it is at the motor, in mid-section or in the press-in location. The force can be reliably determined anywhere in the force flow.

## Wide range of applications

The application examples for force measurement in linear drives are wide-ranging:

- Measuring the axial force at electric spindle presses for monitoring the joining force
- Monitoring overload protection in lifting cylinders
- Force measurement in electro-mechanical servo spindle drives
- Measurement of robot arms of gripping and clamping robots
- Force measurement at punches and presses
- Force measurement at welding guns





# PRODUCTION

Operation mode Administration

- Dashboard
- Monitoring
- Problems
- Group and tag
- Tactical views
- System
- Configuration
- External

01 STATUS

02 DIAGRAM

03 SETUP

Automatic mode

Home / Dashboard

WORK MANAGER

DAILY TARGET

WEEKLY TARGET

MONTHLY TARGET

MACHINE PRODUCTION

Power Realized

Machine A

Machine B

Machine C

TEMPERATURE CHART





# Safe process monitoring

The transition to digitalisation and the linking of data and structures is unavoidable – now it's a case of reaping the benefits: monitoring processes safely and reducing costs.

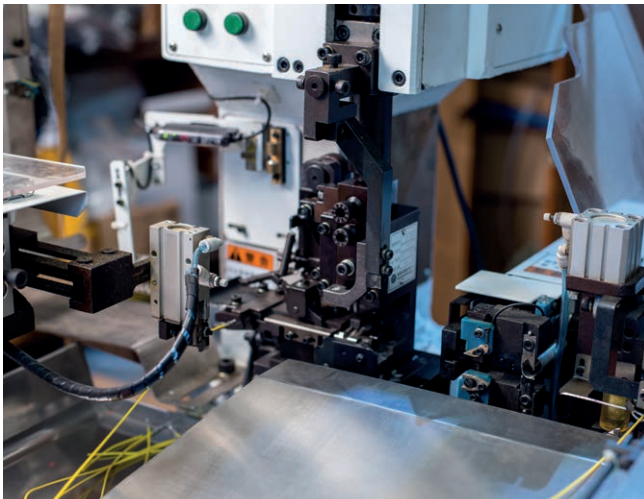
## Optimising process control

Based on accurate recording of the individual requirements, our engineers are developing suitable concepts. The resulting forces can be measured with high precision and quickly. Process control and automation can be improved with this important information, and costs can be reduced and quality assured at the same time.

## Different deployment options

WIKA force transducers with different geometries for different usage areas:

- F2301 tension and compression force transducers with innovative thin film technology, a high degree of long-term stability and integrated amplifiers have a relative linearity error of 0.2 %. A redundant version for safety-oriented applications is optionally possible.
- F2220 miniature tension and compression transducers are specially designed for applications in which very little installation space is available.
- F2221 miniature tension and compression transducers are suitable for applications with restricted installation space. The special feature of this model is the relative linearity error of 0.2 %, which can be achieved with this extremely compact size.
- The ultra-compact F2808 model series is designed in a S-shape and is mainly used in a wide variety of industrial applications in locations, where an extremely small amount of force is in effect, and the amount of installation space is restricted.



**Reliably monitoring distortion**

When crimping cables, it is necessary to monitor the force attaching the two elements to each other by plastic deformation. If too much force is used, the sensitive material can be damaged.



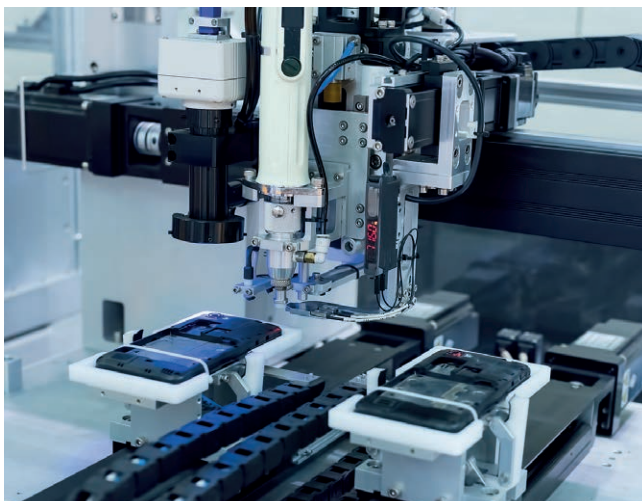
**Force measurement with clamping pressure**

In tablet presses, powder or granulate particles are pressed into a solid shape. There too, force transducers help to apply exactly the right amount of force.

# Efficient - Safe - Exact - Fast

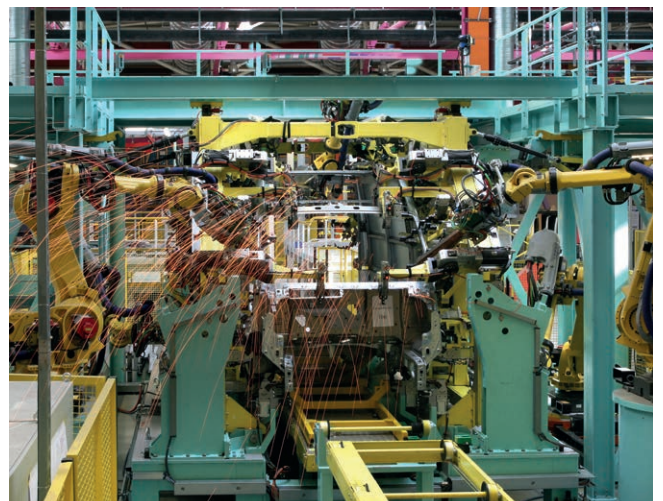
## The advantages of force measurement

- Direct measurement in the force flow
- The force transducer is simply integrated in the force chain:  
it does not matter whether this is at the beginning (at the motor), in the middle (at the actuator)  
or at the end (directly in the force introduction)
- Suitable force transducers, also for extremely small installation spaces
- Extremely accurate measurements are possible
- Plug & play: measurement can start immediately
- The next step to Industry 4.0



### Monitoring joining forces

When it is a case of pressing in components, it is extremely important for this to be done with exactly the right amount of force. It is not possible to achieve the highest quality standards without monitoring these technical procedures.



### Force measurement in welding guns

The clamping force of welding guns can be controlled exactly by using tension/compression force transducers. Optimum quality can be permanently guaranteed.

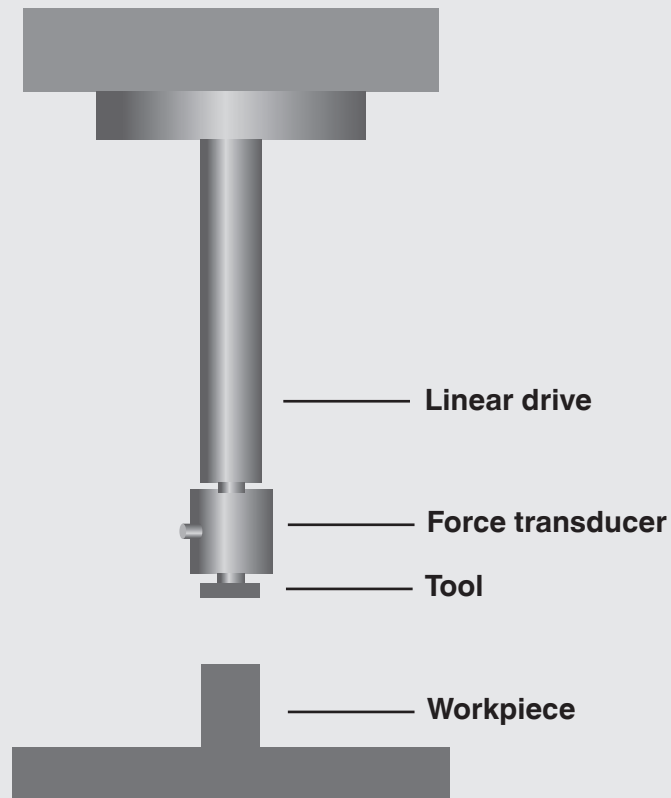
# Tension/compression force transducers in the field

## Modern measuring technology

Modern drive systems are kept simple. Nevertheless modular systems are optimally adaptable to individual customer applications.

It is therefore possible to integrate the force measuring technology with no additional cost: the force transducer is simply integrated into the chain. The motor, the construction kit, the electric drive and the force transducer are therefore in the heart of the electric drive system.

Because the sensor can be used anywhere within the drive chain without problems, customer-specific requirements can be fulfilled.



## F2301, F23C1, F23S1

Tension/compression transducers with thin film technology and integrated amplifier up to 100 kN



Nominal force $F_{nom}$	0 ... 1 to 0 ... 100 kN
Relative linearity error	$\pm 0.2\% F_{nom}$
Output signal	<ul style="list-style-type: none"> <li>■ 4 ... 20 mA, 2-conductor/3-conductor</li> <li>■ 2 x 4 ... 20 mA redundant</li> <li>■ 0 ... 10 V, 3-conductor</li> <li>■ 2 x 0 ... 10 V redundant</li> <li>■ CANopen®</li> </ul>
Vibration resistance	20 g, 100 h, 50 ... 150 Hz in accordance with DIN EN 60068-2-6
Material	Corrosion-resistant CrNi steel, ultrasound-tested 3.1 material (optionally 3.2)
Protection class	IP67 (optionally IP69k)
Data sheet	FO 51.17

## F2220

Tension/compression force transducers from 1.5 N, miniature



Nominal force $F_{nom}$	0 ... 1.5 to 0 ... 5,000 N
Relative linearity error	$\pm 0.5\% F_{nom}$
Nominal temperature	Optionally up to +250 °C
Output signal	2 mV/V (to 5 N 15 mV/V)
Voltage supply	DC 12 ... 28 V (for optionally integrated or cable measuring amplifier)
Protection class	IP65
Datenblatt	FO 51.16

## F2221

Tension/compression force transducers, from 0.01 kN, miniature



Nominal force $F_{nom}$	0 ... 0.01 to 0 ... 50 kN
Relative linearity error	$\pm 0.2\% F_{nom}$
Nominal temperature	Optionally up to +250 °C
Output signal	2 mV/V
Voltage supply	DC 12 ... 28 V (for optionally integrated or cable measuring amplifier)
Protection class	IP65
Data sheet	FO 51.26

## F2808

Tension/compression force transducers from 5 N, miniature



Nominal force $F_{nom}$	0 ... 5 N to 0 ... 50 kN
Relative linearity error	$\pm 0.15\% F_{nom}$
Output signal	$2.0 \pm 10\% \text{ mV/V}$
Voltage supply	DC 12 ... 28 V (for optionally integrated or cable measuring amplifier)
Protection class	IP66
Data sheet	FO 51.68

# Put your trust in a leading manufacturer

Force measurement technology is all about protecting people, high asset values, reliability and manufacturing safety. And that's why a trustworthy partner is important to you: A manufacturer that is also a privately-owned company with a long-term perspective. Our products, solutions and engineering skills are convincing customers from practically every industry.

## tecsis – a division of the WIKA Group

tecsis stands for innovative, quality solutions in measurement and sensor technology. For more than 90 years, teccis has developed into a globally recognised manufacturer of measurement technology – for large corporations as well as medium-sized companies.

Through the integration of teccis, the WIKA group of companies has been further strengthened and the extensive portfolio has been extended to include the measurand force.

Therefore we can offer you, in the breadth and depth of selection, an outstanding range of measurement technology solutions for a wide range of different applications.

## Our production processes

We manufacture force transducers at facilities on three continents: an economically efficient operation with consistent quality and reliable service along the entire value creation and delivery chain. Depending on requirements, we make use of three important technologies: strain gauges, thin-film sensors and hydraulic force measurement technology.

## Our extensive portfolio

The product range includes tension and compression force transducers, shear and bending beams, platform load cells, load pins, tension links, ring and special force transducers as well as electronics and complete systems. In every individual geometry and size.



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