

**SCIENCE  
GATE**  
Your Automation Partner



**SCIGATE AUTOMATION (S) PTE LTD**

No.1 Bukit Batok Street 22 #01-01 Singapore 659592

Tel: (65) 6561 0488

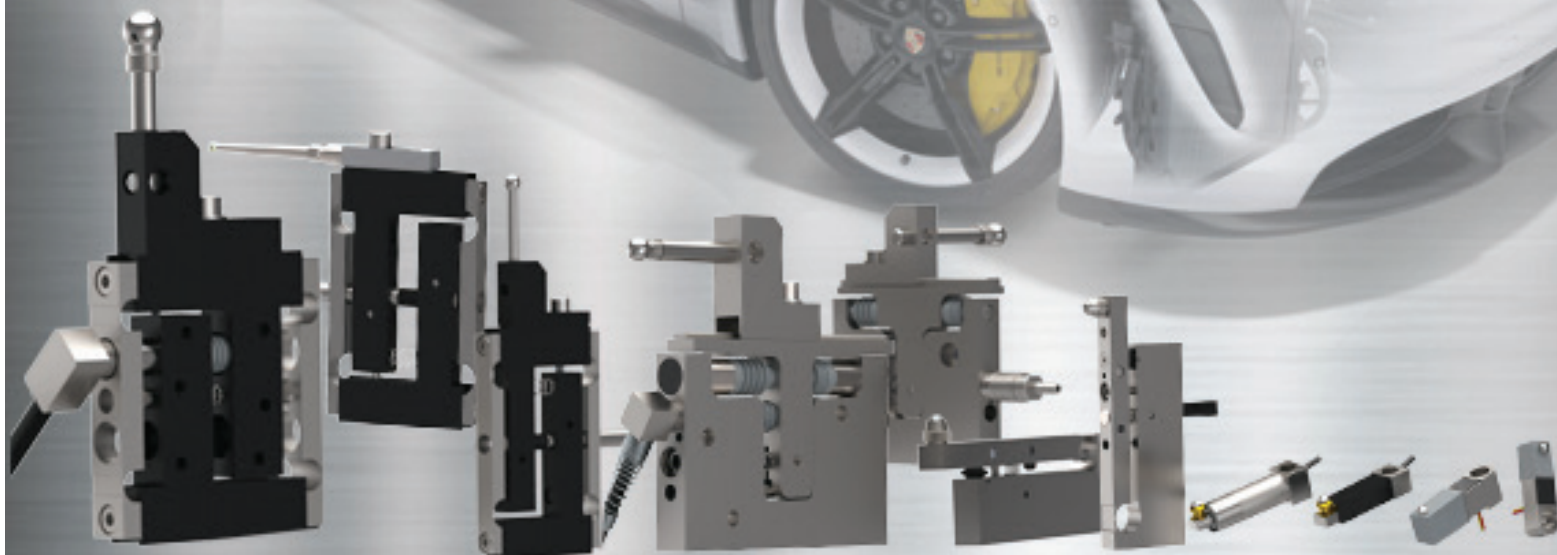
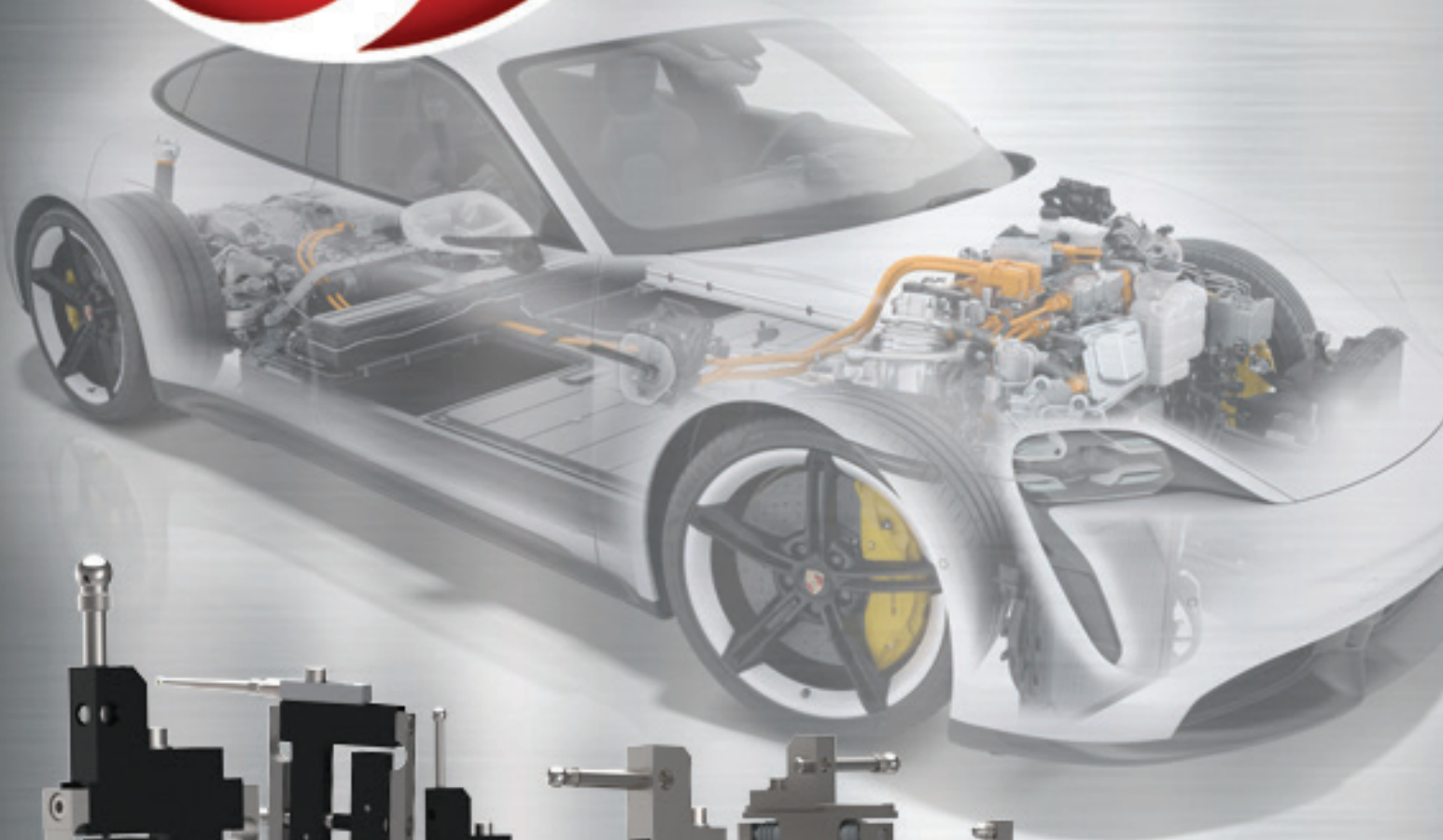
Fax: (65) 6562 0588

Email: [sales@scigate.com.sg](mailto:sales@scigate.com.sg)

Web: [www.scigate.com.sg](http://www.scigate.com.sg)

Business Hours: Monday - Friday 8.30am - 6.15pm

# Solartron Metrology



[www.solartronmetrology.com](http://www.solartronmetrology.com)



# Solartron products for EV manufacturing

## Brake components

- Rotors
- Calipers



## Regenerative braking

- Flywheel
- Clutch
- Rotor
- Bearings
- Housing



## Vehicle Motors

- Rotor
- Stator
- Housing



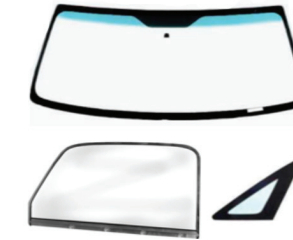
## Steering and Suspension components

- Steering knuckles
- Tie rods
- Steering shafts
- Idler arms
- Pinion gears
- Control arms
- CV joints



## Interior

- Displays
- Casing



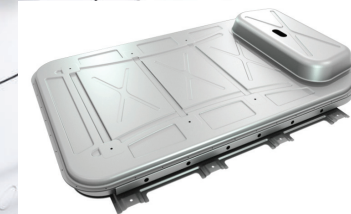
## Automotive glass/Optics

- Windshields
- Back glass
- Side glass
- Speciality glass
- Lights



## Bearings

- Taper bearings
- Ball bearings
- Roller bearings
- Bearing housings



## Battery Systems

- Cover and Case
- Separator
- Cell dimensions
- Cooling system



## eTransmission

- Housing
- Clutch
- Bearings
- Planetary gears



# Solartron products for EV manufacturing

## Gauge probes standard DP



- Measurement precision better than 0.1µm
- 0.5, 1, 2, 5, 10, 20 and 30 mm measuring ranges
- Standard pneumatic, spring push & vacuum actuation
- Range of tips available
- Excellent sideload capability

## Low tip force DT



- Measurement precision better than 0.1µm
- 2, 5, 10, 20 and 30 mm measuring ranges
- Pneumatic & spring push actuation
- Range of tips available

## Ultra low tip force DW



- Measurement precision better than 0.1µm
- 10mm measuring ranges
- Pneumatic & spring push actuation
- Nylon and Ruby tips available

## Compact narrow 6mm body probes D6P



- 6mm diameter body
- Measurement precision better than 0.1µm
- 2 and 5 mm measuring ranges
- Pneumatic & spring push actuation
- Range of tips available

## Compact narrow 3mm body probes D3P



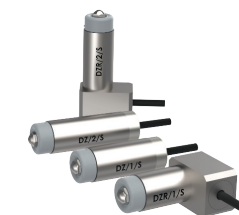
- 3mm diameter body
- Measurement precision better than 0.25µm
- Spring push actuation
- Excellent for measuring features close together

## Rugged probes D12P

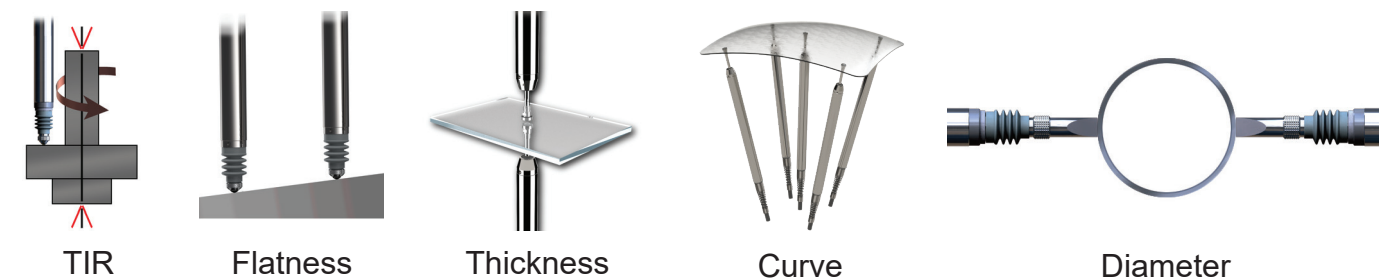


- Very tough for harsh environments
- Excellent sideload capability
- 2, 5 and 10 mm measuring ranges
- Measurement precision better than 0.1µm
- Range of tips available
- Spring actuation

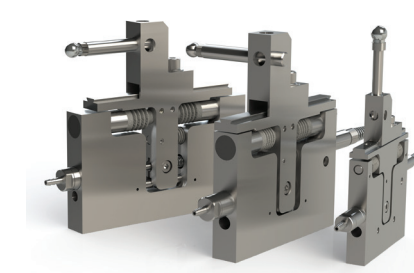
## Ultra short probes DZ



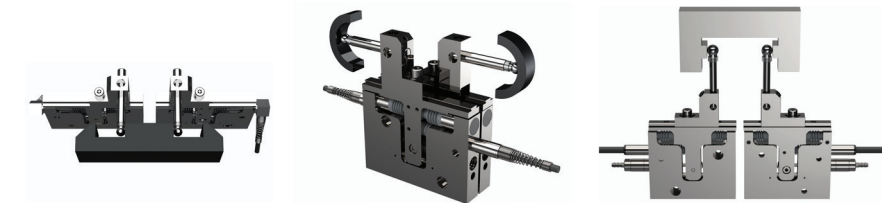
- Ultra short body length
- Ideal for measuring in small places
- 1 or 2 mm measuring ranges
- Measurement precision better than 0.1µm



## Block gauges DK

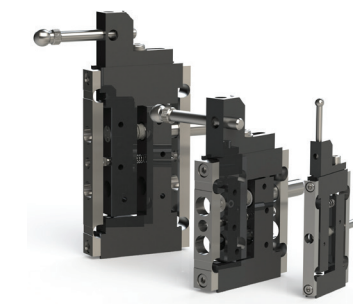


- Measurement precision better than 0.1µm
- Measurement range of 2, 5, 10mm
- Spring and pneumatic actuation
- Multiple configurations with top tools and tip holders

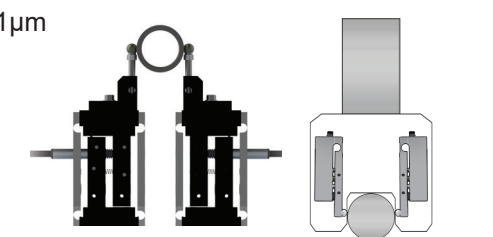


Diameter / Groove

## Flexures DU



- Measurement precision better than 0.1µm
- Measurement range of 0.5, 1, 2mm
- Spring and pneumatic actuation
- Width as thin as 4mm



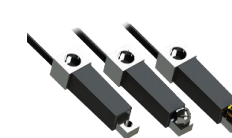
Bearing Rod diameter

## Single leaf flexures DUS



- Measurement precision better than 0.1µm
- Measurement range of 0.5mm
- Spring and pneumatic actuation

## Mini flexures DUSM

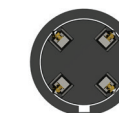


- Measurement precision better than 0.1µm
- Measurement range of 0.5mm
- Pneumatic & spring push actuation
- Nylon, Silicon Nitride and Ruby tips available

## Mini probe DM



- Measurement precision better than 0.1µm
- Measurement ranges of 0.5, 1mm
- Nylon and Ruby tips available



## Wireless bore gauge



- 10 mm and 6 mm diameter fixing threads
- Inductive Charging
- 10 hours typical battery life



## Solartron product opportunities for Regenerative Braking systems

A Regenerative Brake drives the traction motor to act as an alternator, and converts the kinetic energy produced by the rotation of the wheels into electrical energy. The converted electrical energy charges the Li-ion battery, which can help lower consumption in Hybrid Vehicles, reducing the carbon footprint. It can also increase the range of all-electric vehicles. Measurements are made of the Flywheel, Clutch, Rotor, Bearings, and Housing.

### Process Control Opportunities

- Gauging and process monitoring during the machining operations
- Hard gauging and mechanical fixtures for quality control
  - Brake drum (which is attached to wheels)
  - Friction lining
  - Controller
  - Electric Generator (DC Motor)
  - Linking mechanism



*Type of sensor:*

DKS/DK10

*Application:*

Diameter tolerancing and cylindricity

*Type of sensor:*

DJ/10/P

*Application:*

Casing measurements

*Type of sensor:*

Digital Optimum + Analogue Input Module

*Application:*

R&D: Connector repetitive action check in harsh environment conditions

R&D: Distortion analysis and characterization in high temperature environments

*Type of sensor:*

DP/10/S

*Application:*

In process sub-component pairing process. Probes positionned directly in assembly robots for time cycle optimization

*Type of sensor:*

DP/30/S + PLC Interface module

*Application:*

Carriage robots integrating gauging systems. Avoid line-side picking or gauging dedicated tools to save time cycle and increase productivity

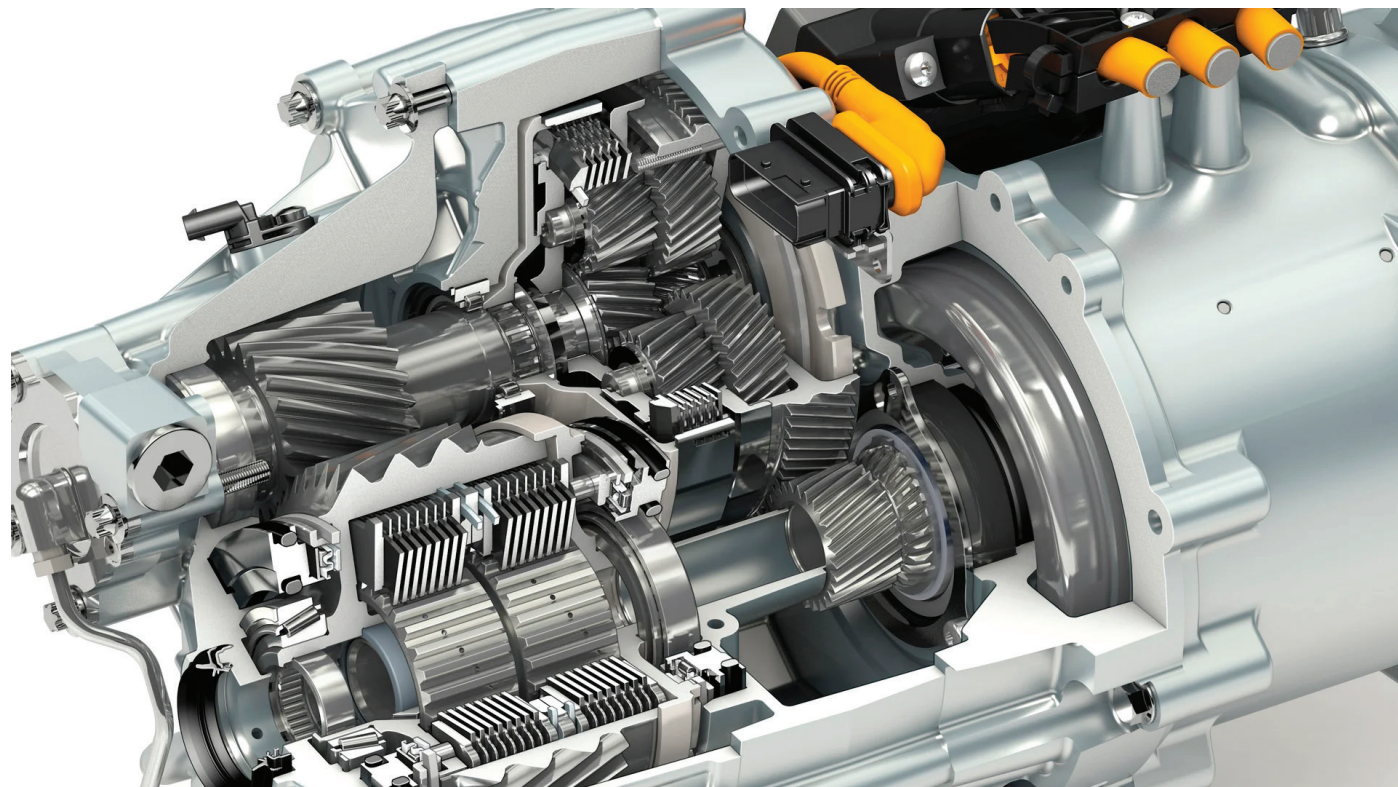


# Solartron product opportunities for Motor Rotor measurement

As the essential components of the electric motor, the rotor shaft and the complete rotor assembly are capable of high speeds and produce tremendous amounts of torque that the motor transmits downstream. For this reason, these components need to fit together precisely with very tight tolerances, thus making it very important to inspect each one for the highest quality.

## Process Control Opportunities

- Process control and monitoring in the turning and machining operations of the shaft
- Process control in the grinding operations
- Monitoring of the stamping process in the production of sheet metal stack position and dimensional accuracy of the rotor
- Radial distance of the rotor-stator assembly for high performance and efficiency of the motor
- Accurate measurement of the rotor bearing points as well as the splines on the shaft for form-fitting and friction-locked connection to the transmission
- A typical rotor measurement application includes dimensional measurement for form, size and position, mainly consisting of standard geometries and profile features. Key features to be measured include the diameter, roundness and concentricity of the rotor stack and shaft as well as the profile, flank line, tip and runout of the splines on the shaft



### *Type of sensor:*

DK5/DK10, DU/2/P, DUSM/05/S

### *Application:*

Diameter tolerancing and cylindricity

### *Type of sensor:*

DP/2P

### *Application:*

Casing measurements

Dimension measurements on metal layers, bars or sheets composing the rotor. Checking during the assembly process

### *Type of sensor:*

DP/10/S

### *Application:*

Shaft runout. Check the runout of shaft during rotation. Our Orbit dynamic mode will collect up to 4K of readings per second. It will help customers minimise the motor noise



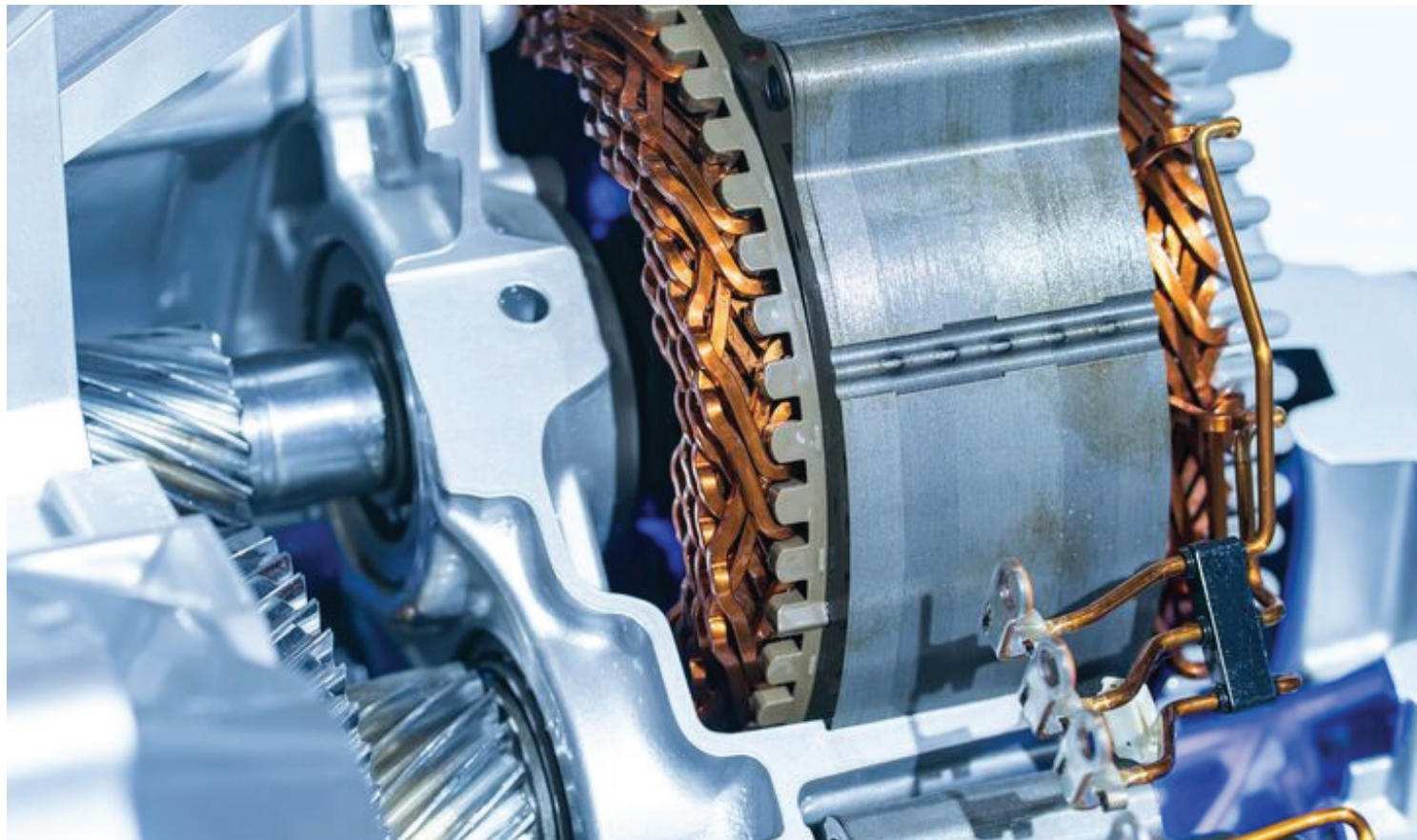
## Solartron product opportunities for Motor Stator measurement

Whatever the version of stator used, whether it be a wound or hairpin stator, there are opportunities to provide solutions for quality control throughout the whole manufacturing process.

The inspection process requires dimensional measurement, including size, form and position of the hairpin-stator assembly, which consists of 3D freeform and standard geometries. Among the key features to be measured are the profile form of the bent hairpin ends, the position of the hairpin ends in relation to the stator base datum, geometry of the welding points, the minimum radial and axial distance between the welding points and the maximum height of the welding points in relation to the stator base. The height and thickness of the insulation around the hairpins must also be captured, as well as the size and concentricity of the stator itself.

### Process Control Opportunities

- Process control and monitoring in the turning and machining operations
- Monitoring of the stamping process in the production of sheet metal stack
- Hard gauging or handheld gauging solutions for die-cast and machined components
- Precise positioning of each hairpin relative to the stator base
- The accurate application of insulating varnish around the ends of the welded hairpins
- Welding point geometry and distances
- The general stator and hairpin geometries



#### *Type of sensor:*

DJ/10/P+PIM

#### *Application:*

Die Casting measurements post moulding process and constant communication with PLC

#### *Type of sensor:*

DU/2/S

#### *Application:*

Wound or hairpin thickness measurement in process

#### *Type of sensor:*

DP/1/S

#### *Application:*

Insulation thickness checking in process

#### *Type of sensor:*

DP combination + USBMKII

#### *Application:*

Housing: Final dimensional inspection

#### *Type of sensor:*

DJ/12/P, DP/30/P + PIM ETHERNET IP - US - ORBIT

#### *Application:*

Rear Stator Housing. Profile measurement on main, top and side face

## Solartron product opportunities for Battery Tray and Cover measurements

The components of the battery pack housing, frame, tray and cover, represent very critical parts of the battery system due to the multiple functions they are required to perform. They must guarantee the integration of the pack into the car body, ensuring maximum structural resistance and mechanical protection to the battery cells, but with the lowest possible weight. The components must ensure the precise sealing of the pack, protecting the cells from water, humidity and external contaminants.

### Process Control Opportunities

- Electric Vehicle Battery Tray testing is a crucial element in the manufacturing process. Manufacturers need to develop a robust and reliable product, and the leak test process becomes an essential means of verifying the integrity of the product and, ultimately, the manufacturing process
- The Battery Tray's size and construction
- Ensuring the integrity of the cells for the life of the product
- Testing plates, tubes and complete cooling circuit with varying leak rates
- Testing the validity of circuit connections
- To measure hundreds of connection points, drilled holes, and dimensional features
- In line inspection of body and chassis structural parts of battery trays
- Battery Cell Stack reinforcement
- Battery tray assembly joins the sealed battery tray to its cover. The cover provides the final layer of protection for the batteries, preparing them to be installed in the vehicle
- Check for errors and quality at every step of the manufacturing process



#### *Type of sensor:*

DP/5/P

#### *Application:*

Gauging a prismatic cell: before putting all prismatic cells into the battery pack, each cell needs to be checked for width, length and height. The POS, NEG PIN height also need to be checked. All these measurements are to make sure these cells fit the pack case perfectly

#### *Type of sensor:*

AX/1/S

#### *Application:*

Cell thickness test under constant pressure. Cell thickness is critical to performance and the assembly process so it is important to check thickness under constant strain, meaning all readings are consistent

#### *Type of sensor:*

VG/10/SG, VG/20/SG

#### *Application:*

Robot Positioning: using robots to position cells in the correct location within the battery housing

#### *Type of sensor:*

Orbit PLC - DP/5/S + PIM

#### *Application:*

Mass production application: measuring anode and cathode dimensions and shapes in process. To secure and guarantee the quality of the battery assembly

#### *Type of sensor:*

G-type Sensors - VG/5/S

#### *Application:*

Lab and Test application: measuring battery expansion and contraction during charge and discharge

Charge and discharge behaviour characterization in standard and extreme environmental conditions

#### *Type of sensor:*

DP/30P, DP/10/P, DP/2/S, D6J/2/P, DP/20/P + USB MAKII

#### *Application:*

Battery Plate: measurement of diameters, distances and perpendicularity

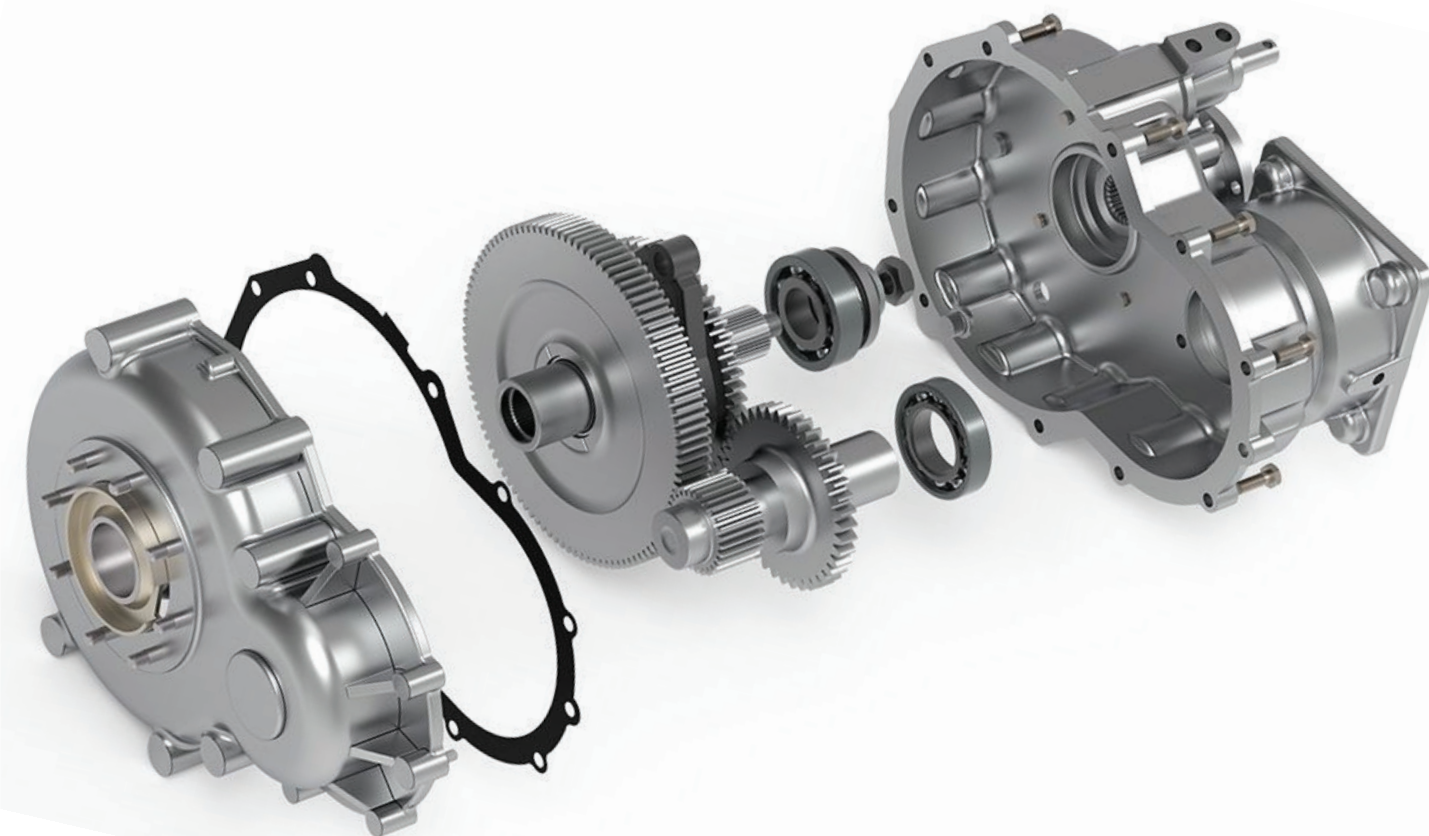


## Solartron product opportunities for Transmission (ePowertrain)

Electric transmissions are subject to several challenges and requirements. A combination of international regulations and consumer expectations is driving the demand for reduced noise on all drivetrain components. Further demand is driven by the growing trend towards EVs and HEVs, where noise from ICE is intermittent, or no longer present. The contribution of transmission noise to overall vehicle noise becomes dominant. What is true is that the number of gear wheels is significantly reduced in electric vehicles due to the use of one or two-speed reducers instead of the classic manual or twin-clutch gearboxes. In return, these are loaded with torque and RPM's not previously found in high-volume production.

### Process Control Opportunities

- Hard gauging and mechanical fixtures for quality control, machining and casting operations
- Process monitoring during cutting and grinding operations
- An angled design providing a much smoother and quieter operation. Because of this angled structure, precise measurement is required on the teeth of the gear



#### Type of sensor:

DK5/DK10

#### Application:

Bearing internal diameter tolerancing and cylindricity

#### Type of sensor:

DP/10/S

#### Application:

Gasket Sorter: during gear assembly, different thickness gaskets are needed to suit the gearbox. To ensure a perfect fit, the gearbox is measured first, and then a suitable gasket chosen

#### Type of sensor:

AS75, AX/1/S, AX/0.5/S

#### Application:

Bearing diameter tolerancing and cylindricity

#### Type of sensor:

DP/5/S

#### Application:

Final assembly process control for long-life gasket optimization. Synchronised tightening tools with torque compensation

#### Type of sensor:

DP/5/V

#### Application:

Ball diameter measurement plus circularity and roundness for high speed bearings

#### Type of sensor:

DP/2/P and LTH

#### Application:

Teeth min/max profiling and peak measurements

#### Type of sensor:

DJ/2/P

#### Application:

Gear alignment: perpendicularity and runout analysis pre process for transmission optimization

#### Type of sensor:

8 DK/5/P and 8 DP/10/P with OG4

#### Application:

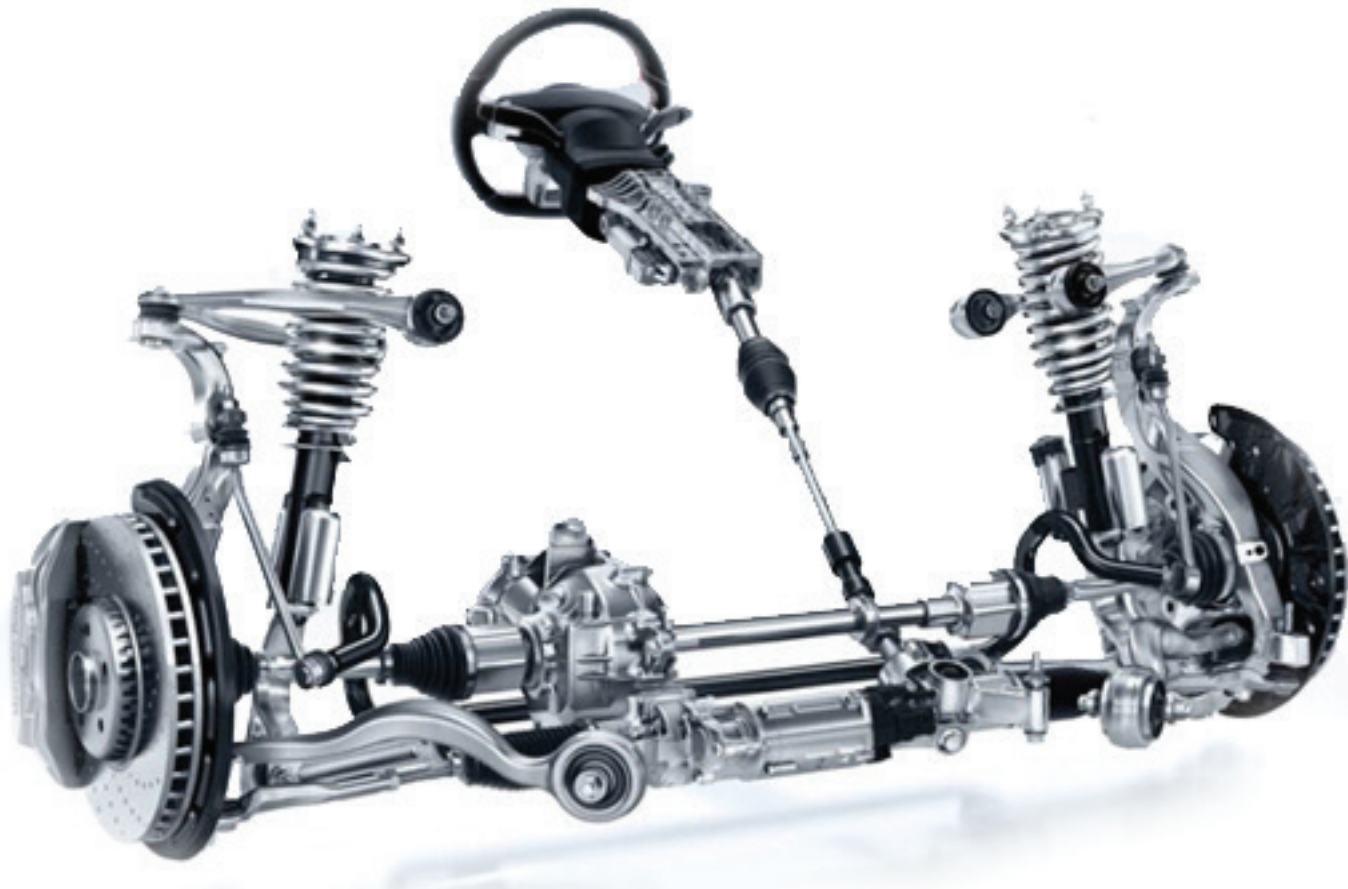
Measure diameter and distance on EV gear case



## Solartron product opportunities for Steering and Suspension components

In recent years, in order to reduce environmental pollution, electric vehicles have been studied and developed to improve vehicle efficiency. Much attention is also paid to perfect the design to improve the ride quality.

The steering and suspension is a complex system made up of a number of different components which connect the body of a car to the wheel. One of the most ground-breaking developments is to generate electricity from the suspension for hybrid and electric cars.



*Type of sensor:*

DK5/DK10

*Application:*

Diameter tolerancing and cylindricity

*Type of sensor:*

DZ/1/S, DP/2/S

*Application:*

Brake disc runout, thickness and diameter. Every brake checked 100% before assembly. DZ/1/S to check hole diameter, and DP/2/S to check runout and thickness

*Type of sensor:*

DP/2/S, DP/10/P

*Application:*

Shafts: diameter tolerancing and cylindricity

*Type of sensor:*

Digital S Series + AIM

*Application:*

Testing new suspension prototypes in race / rally constraints  
Aging control for durability during long and repetitive motion periods



## Solartron products for Automotive Glass and Optics manufacturing

Taking measurements of glass for automotive applications needs to be precise and delicate, to ensure no marring of the surface.

In the automotive industry, headlamps have gone from flat and square to various shapes that must tightly fit the lines of an automobile. These types of lamps require tighter manufacturing processes and tolerances that must now be checked before shipment to the auto assembly plant.

For these measurement checks, dial gauges can be slow cumbersome, and non-contact technologies lack the repeatability required.



*Type of sensor:*

Feather Touch & Ultra Feather Touch DT DW - Nylon Tips

*Application:*

Automotive Glass, Curvature, Critical Optics, 100% tested

Gauging probes can be positioned within a gauge to perform instantaneous repeatable checks at critical points on the glass profile. Soft Nylon tips are fitted to eliminate the possibility of scratching the surface. 100% testing is possible. Narrow diameter probes (D6T and D3T) can be used where measurements need to be made close together such as in the driver's main line of sight

*Type of sensor:*

Ultra Feather Touch

*Application:*

Gauging application: Head-Up Display specific measurement

*Type of sensor:*

Feather Touch Digital Probe + PLC Interface module

*Application:*

Automotive Head and Rear Light, Curvature and Shape 100% measurements in production with automated feedback for PLC

*Type of sensor:*

Feather Touch & Ultra Feather Touch DT DW - Nylon Tips

*Application:*

New intelligent light optics with shape lens measurements



## Solartron products for Automotive Interior

The interior of a vehicle requires a number of different glass materials, from anti-reflective displays for dashboard consoles to touchscreens able to detect the slightest of touches while providing resistance to fingerprints and smudges.



*Type of sensor:*

DP/5/S

*Application:*

In production: casing and sub-component assembly measurements

*Type of sensor:*

DP + Analog Input Module

*Application:*

Materials behavior and characterization. Aging test under UV exposure and extreme temperature

*Type of sensor:*

Ultra Feather Touch

*Application:*

Gauging application: touch screen size measurement

*Type of sensor:*

DP + Analog Input Module

*Application:*

Materials quality and characterization as textural and density properties for samples analyses

*Type of sensor:*

Digital S Series + Analog Input Module

*Application:*

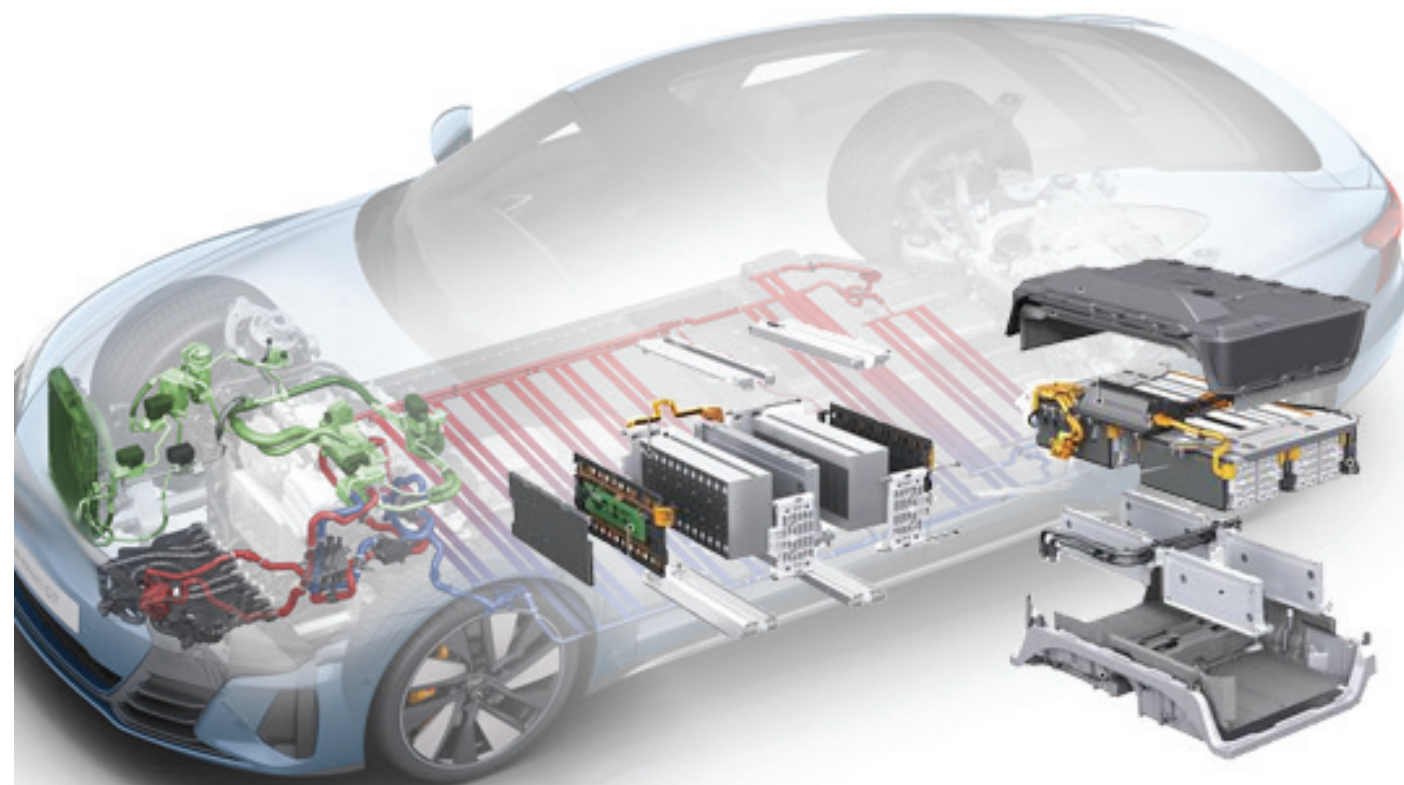
Safety components analysis. Force, shocks, vibrations and displacement analysis  
Aging control for durability during repetitive motion test



## Solartron products for Cooling System

Every electric car battery needs a cooling system. Batteries operate optimally at certain temperatures. Therefore, they were designed to only take certain temperature fluctuations.

Heat dissipation solutions with effective assembly of heat pipes and vapor chambers.



*Type of sensor:*

VG/10/SG, VG/20/SG

*Application:*

With robots: positioning cells to the correct location into the battery housing

*Type of sensor:*

Analogue Input Module + DP/10/S

*Application:*

Expansion and retract plus thermal and acoustic analyses on motors prototype

*Type of sensor:*

Analogue Input Module + DP/20/S

*Application:*

In production sample: expansion / shrinkage test on thermostat and heatsink

*Type of sensor:*

OPTIMUM

*Application:*

In production 4.0 Factory: mecatronic assistance in robotic exoskeletons for handling high weight devices safety. Integrating measurement systems components analysis

*Type of sensor:*

DT30/5/P + PLC Interface Module

*Application:*

In production application: screw presence and screw in-depth measurements

*Type of sensor:*

DT/2/S + PLC Interface Module

*Application:*

In process application: controlling dimensions in process fully sealed for harsh conditions

*Type of sensor:*

DP/2/S

*Application:*

In process 4.0 Factory: predictive breakage control for machining tools. Maintenance support process with software training



# Sales Offices

## UK (Headquarters and Factory)

Solartron Metrology  
Bognor Regis, West Sussex, PO22 9ST  
Tel: +44 (0) 1243 833 333  
Fax: +44 (0) 1243 833 332  
Email: [sales.solartronmetrology@ametek.com](mailto:sales.solartronmetrology@ametek.com)

## France

AMETEK SAS  
Solartron Metrology Division  
Elancourt, 78990 France  
Tel: +33 (0) 1 30 68 89 50  
Fax: +33 (0) 1 30 68 89 99  
Email: [info.solartronmetrology@ametek.com](mailto:info.solartronmetrology@ametek.com)

## Germany

AMETEK GmbH  
Solartron Metrology Division  
40670 Meerbusch  
Tel: +49 (0) 2159 9136 500  
Fax: +49 (0) 2159 9136 505  
Email: [vertrieb.solartron@ametek.com](mailto:vertrieb.solartron@ametek.com)

## North America

Solartron Metrology  
USA Central Sales Office  
Gastonia, NC 28054  
Tel: +1 800 873 5838  
Email: [usasales.solartronmetrology@ametek.com](mailto:usasales.solartronmetrology@ametek.com)

## China

AMETEK Commercial Enterprise (Shanghai)  
Co., Ltd  
Shanghai, 200131, China  
Tel: +86 21 5763 2509  
Email: [china.solartronmetrology@ametek.com](mailto:china.solartronmetrology@ametek.com)

## Japan

AMETEK-Japan  
Solartron Metrology Division  
Tokyo Office  
Shiba NBF Tower (1F, 3F)  
1-1-30, Shiba Diamon Minato=Ku, Tokyo, Japan  
(P.C.105-0012)  
Tel: +81 03 4520 6654  
Email: [Mamoru.hasegawa@ametek.com](mailto:Mamoru.hasegawa@ametek.com)

## Thailand

AMETEK - Thailand  
Solartron Metrology Division  
No.89/45 Moo. 15 Enterprise park  
Bangna-trad road, Bangkaew, Bangplee  
Samutprakarn, Thailand, 10540  
Tel: +66 2 012 7500  
Email: [hidenao.tanaka@ametek.com](mailto:hidenao.tanaka@ametek.com)

## Distributors

Solartron have 30+ distributors worldwide, see website [www.solartronmetrology.com](http://www.solartronmetrology.com) for your nearest distributor

## Precision Driven...

In the laboratory, on the shop floor or in the field, Solartron Metrology's products provide precise linear measurements for quality control, test and measurement and machine control. Solartron Metrology is a world leader in the innovation, design and manufacture of precision digital and analogue dimensional LVDT gauging probes, displacement sensors, optical linear encoders and associated instrumentation.



Solartron Metrology pursues a policy of continuous development. Specifications in this document may therefore be changed without notice.