AKUSENSE

LITHIUM PROCESS

SENSOR APPLICATION
SOLUTIONS

For more product details
please scan the code

VISION OF AKUSENSE

TO SUPPORT
CUSTOMERS TO BE INDUSTRY LEADERS

COMPANY OVERVIEW

Shenzhen Akusense Technology Co., Ltd. is an innovation company specialized in industrial photoelectric sensors and deep learning technology, majorly focusing on manufacturing high precision positioning, deep learning, precision measurement, and obstacle avoidance sensors and providing related solutions. We provide precision intelligence and AI sensing technology for such industries as 3C electronics, new energy, semiconductor manufacturing process, medical electronics and service robotics.There are two brands serving the market,AKUSENSE and MEIJIDENKI.

Our Production and Research Team accounts for more than 30% of the total. The core team brings together a group of senior scientists and engineers who have been engaged in industrial sensors for 20 years. We have our own labs for precision optics and AI vision. As more than 10% of our annual revenue are invested in research and development each year, our new products are launched very fast. We are an intelligent sensor company with more than 120 core patents as well as many international certificates such as ISO 9001, ISO 14000, CE, UL, TUV and ROHS. Meanwhile, OEM and ODM services are available. With over 6,000,000 sensors being exported to more than 70 countries and regions throughout the world per year, Akusense is helping our customers to become the industry leaders from Smart Industry and IOT Field in the era of Industry 4.0.

18000+	200+	240+
Amount of users	Agent City Distribution	Partners

6 million+/year	70+	120+
Annual Sales	Country Distribution	Core patent

7
7 of China's top 10 industries are AKUSENSE users

+ Above statistics are as of April 2023

ADVANTAGE

Leading in independent technology and algorithms more than 20 years experience in the R&D team of industrial sensor experts.

Rich and mature product line and system, achieving precision+intelligence+quality+innovation.

Rich experience in application scenarios, 3C Industry+New Energy industry+Robot and AGV industry.

Support solution customization, technology training, sample trial, industry excellent experience.

QUALITY CONCEPT

DO IT RIGHT
AT THE FIRST TIME

INDUSTRIAL
CUSTOMIZATION EXPERT

Industrial sensors design
(Position detection, measurement, safety identification and diagnosis)

UL/CSA/CE standard requirements design

Adaptive displacement sensor design

High-precision analog sensors design

Product development process management and manufacturability design

SPECIALISING IN INTELLIGENT SENSING SOLUTIONS FOR LITHIUM-ION EQUIPMENT

Customised to your needs

Pre-engineered solutions are individually tailored to the specific application of your equipment, saving time and costs and guaranteeing optimum performance.
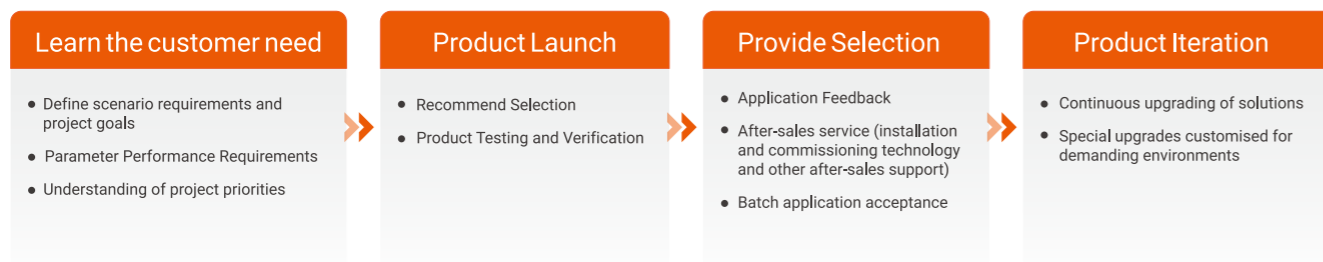
Complete service system

Our project team will co-operate with you from the collection of requirements to testing and validation, as well as after-sales service. The office network of 10+ cities (constantly expanding) ensures that we can respond quickly to the needs of users.
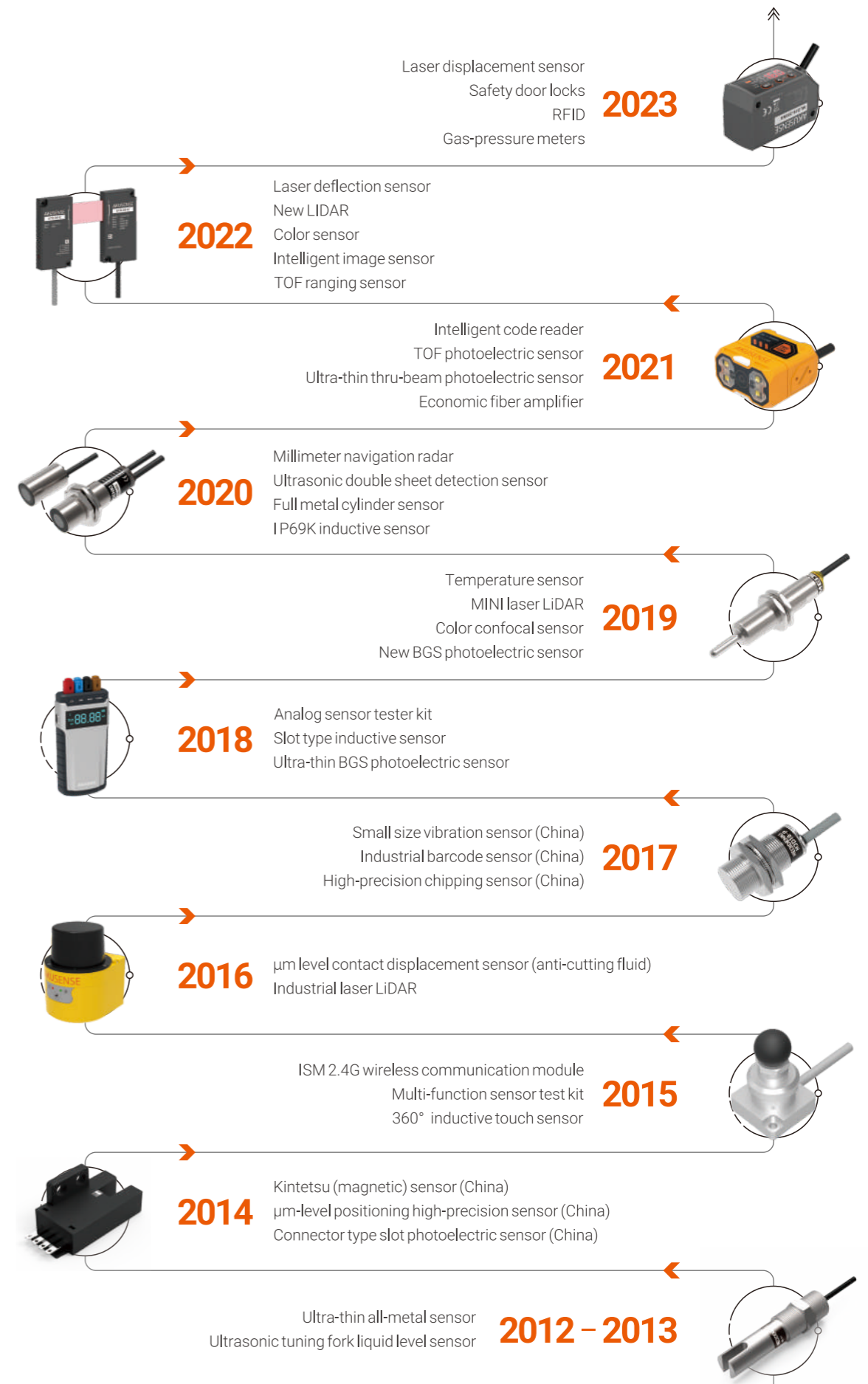
Rich industry experience

Rich product lines and project experience, as well as the hardcore R&D team of senior engineers at home and abroad, support the engineers to customise high-quality and efficient solutions for you, so that your equipment is more competitive in the market.
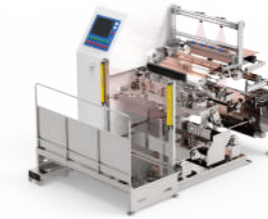
Your solution path

Learn the customer need	Product Launch	Provide Selection	Product Iteration
• Define scenario requirements and project goals • Parameter Performance Requirements • Understanding of project priorities	• Recommend Selection • Product Testing and Verification	• Application Feedback • After-sales service (installation and commissioning technology and other after-sales support) • Batch application acceptance	• Continuous upgrading of solutions • Special upgrades customised for demanding environments

DEVELOPMENT HISTORY

2023
Laser displacement sensor
Safety door locks
RFID
Gas-pressure meters

2022
Laser deflection sensor
New LIDAR
Color sensor
Intelligent image sensor
TOF ranging sensor

2021
Intelligent code reader
TOF photoelectric sensor
Ultra-thin thru-beam photoelectric sensor
Economic fiber amplifier

2020
Millimeter navigation radar
Ultrasonic double sheet detection sensor
Full metal cylinder sensor
IP69K inductive sensor

2019
Temperature sensor
MINI laser LiDAR
Color confocal sensor
New BGS photoelectric sensor

2018
Analog sensor tester kit
Slot type inductive sensor
Ultra-thin BGS photoelectric sensor

2017
Small size vibration sensor (China)
Industrial barcode sensor (China)
High-precision chipping sensor (China)

2016
μm level contact displacement sensor (anti-cutting fluid)
Industrial laser LiDAR

2015
ISM 2.4G wireless communication module
Multi-function sensor test kit
360° inductive touch sensor

2014
Kintetsu (magnetic) sensor (China)
μm-level positioning high-precision sensor (China)
Connector type slot photoelectric sensor (China)

2012 – 2013
Ultra-thin all-metal sensor
Ultrasonic tuning fork liquid level sensor

AKUSENSE

CONTENT
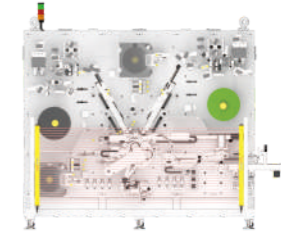
Sensor Selection on Lithium Devices
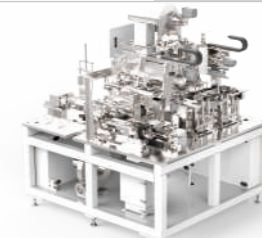
01 Lithium Coating Machine
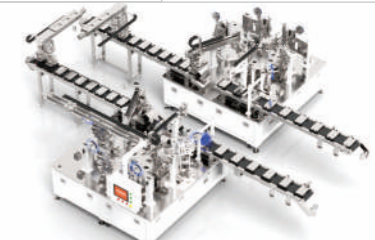
02 Lithium Winding Machine

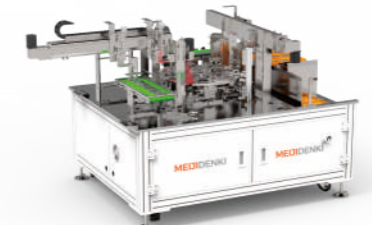**03** Lithium Laminating Machine

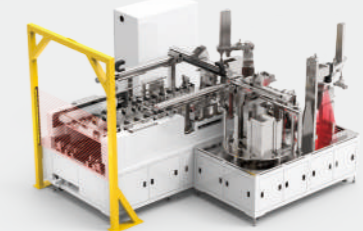**04** Lithium Wrapping Machine

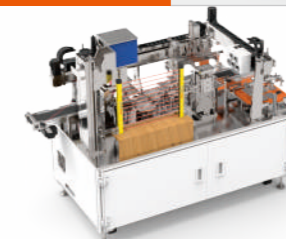**05** Lithium Tab Cutting Machine

06 Lithium Shelling Machine
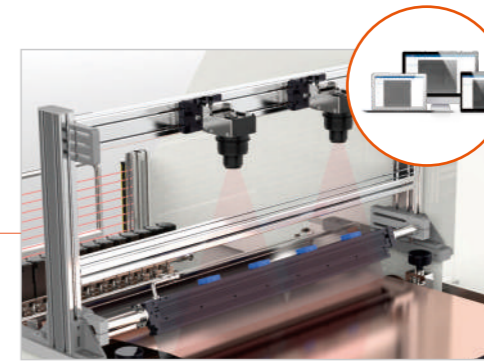
07 Lithium Laser Welding Machine

08 Lithium Smart Storage

Lithium Coating Machine

As the most basic and core part of cell manufacturing,coating machine plays a important role in maintaining the consistency and reliability of finished batteries.To guarantee the efficiency and quality of production,the machine is required to work with a high degree of smooth coating,and be able to change rolls automatically and speedily without stop.It would be more easy to achieve precise control of coating machines with the application of sensors.

Defect Detection on electrode

AI Image Recognition
MEIJI AIV Platform

• Four-pixel Extremely High Definition
• Pixel-level Detection and Edge Recognition

Color/Mark Positioning of electrode

Color/Mark Sensor
ESC Series

• Combine Color and Mark Modes of RGB
• Detect with High Sensitivity Even for Subtle Difference in Background Colors
• Digital Button Design for Sensitivity Adjustments
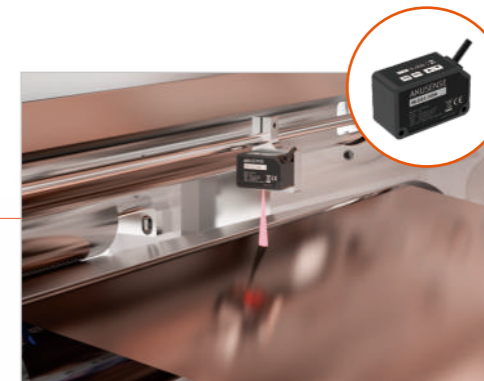
Detection of Coating Height

Laser Displacement Sensor
MLD23 Series

• International Advanced R&D Technology and Manufacturing Process, to Achieve Micron-level Detection with High Accuracy
• One-piece Structure, Compact Size, Simple Installation
• Linear Accuracy Reaches 0.01mm, Ultra-high Sensitivity with Stable and Precise Measurement Data
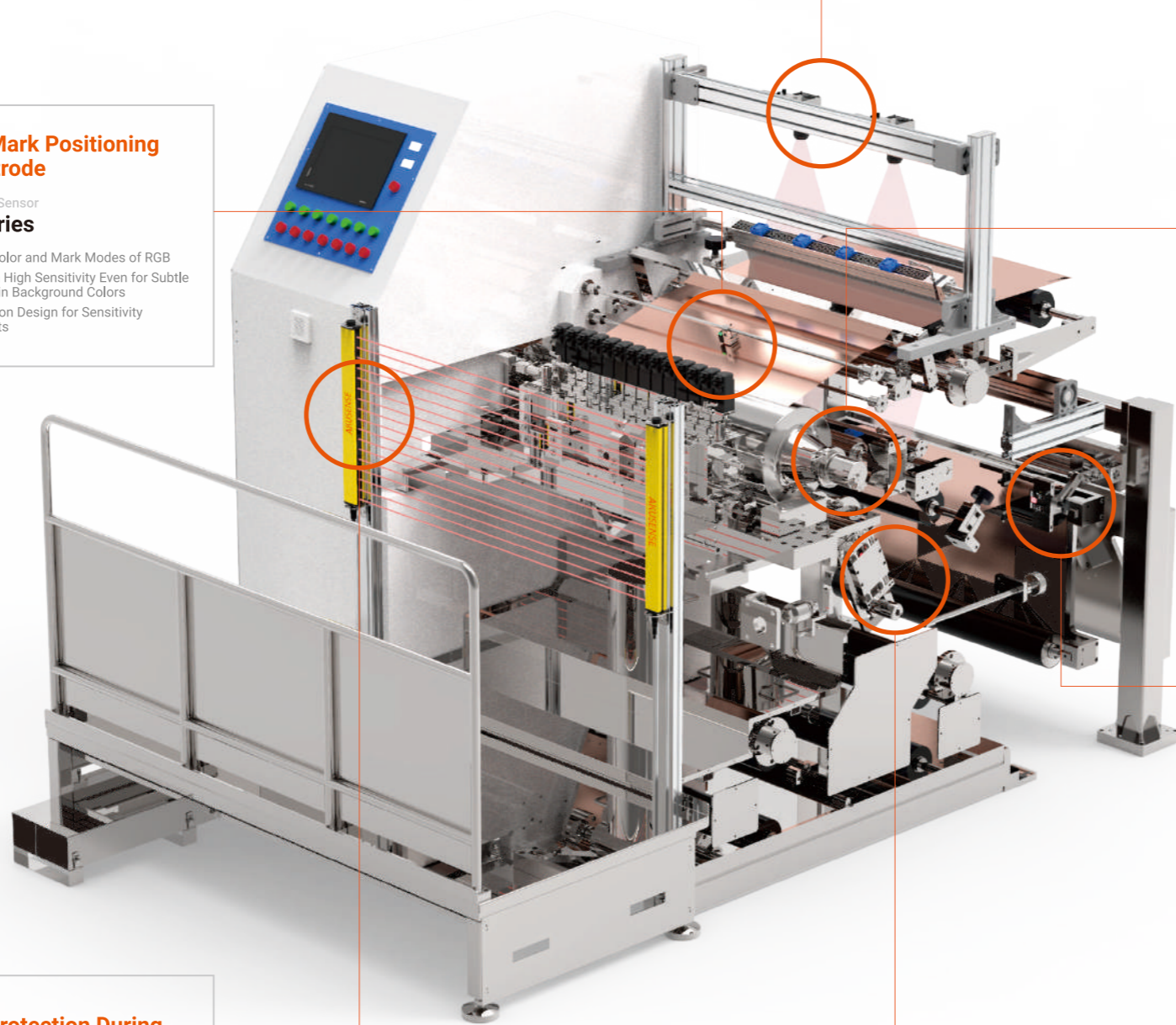
Real-time Monitoring on the substrate positioning of Positive and Negative Materials

Thru-beam edge Sensors
ETD-0612

• Repeat Accuracy Gets ±1um
• Laser Alignment Measurement Principle, Super Stable
• Integrate Width Mode with Edge Mode, no effect by object colors or materials.
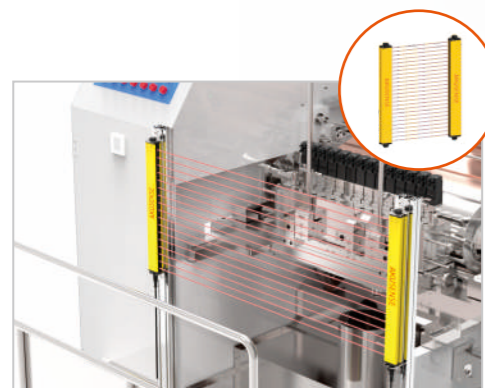
Safety Protection During Equipment Operation

Safety Light Curtain
SAF Series

• Detect Objects With Various Sizes,Such as Finger,Palm,Arm and ect.
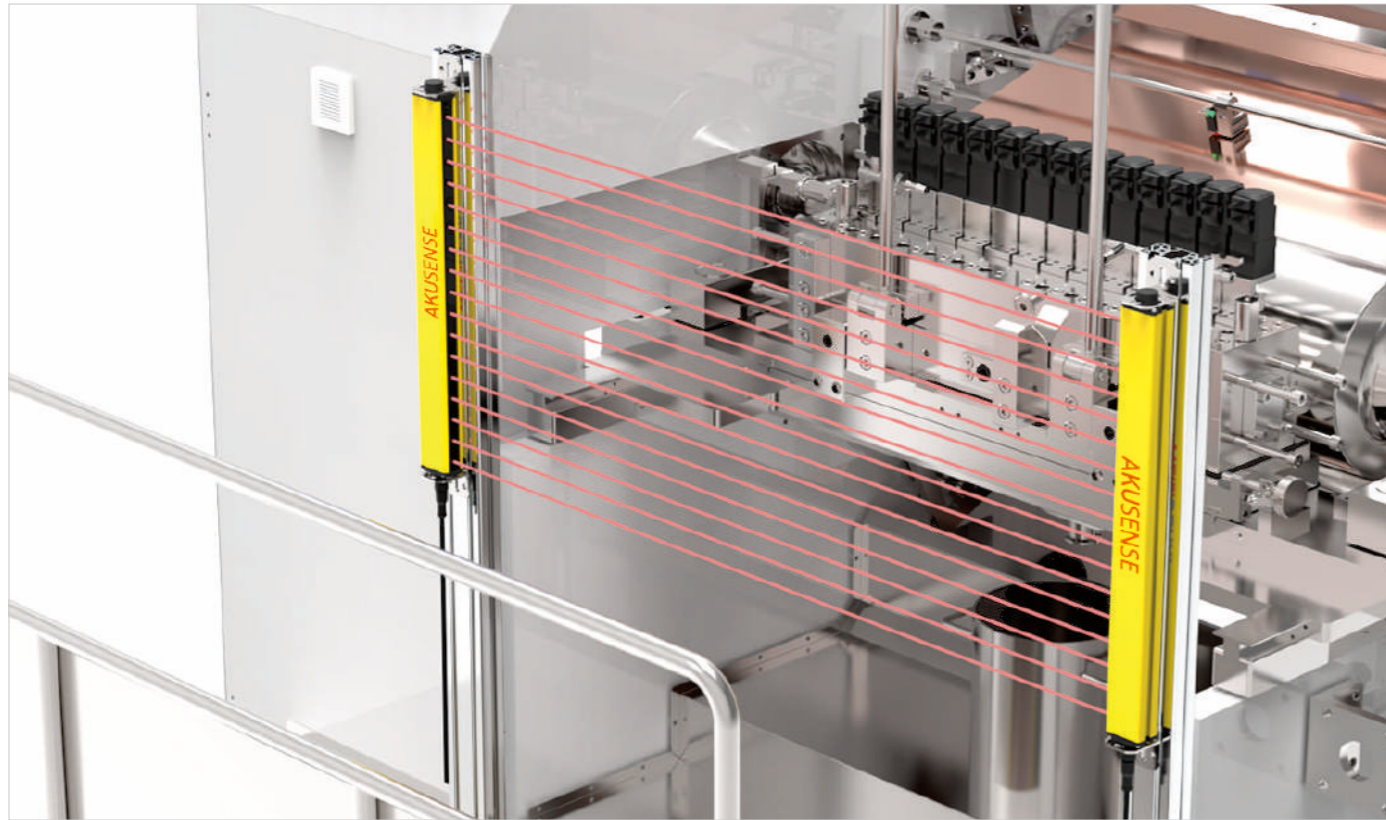• A Variety of Appearances and Sizes, Protective Heights, Detection Methods Are Available

motion limit detection of cylinder

Proximity Switch
TRN Series

• Ip67, excellent waterproof and oil-resistance performance
• Built-in indicator, easy to install and debug
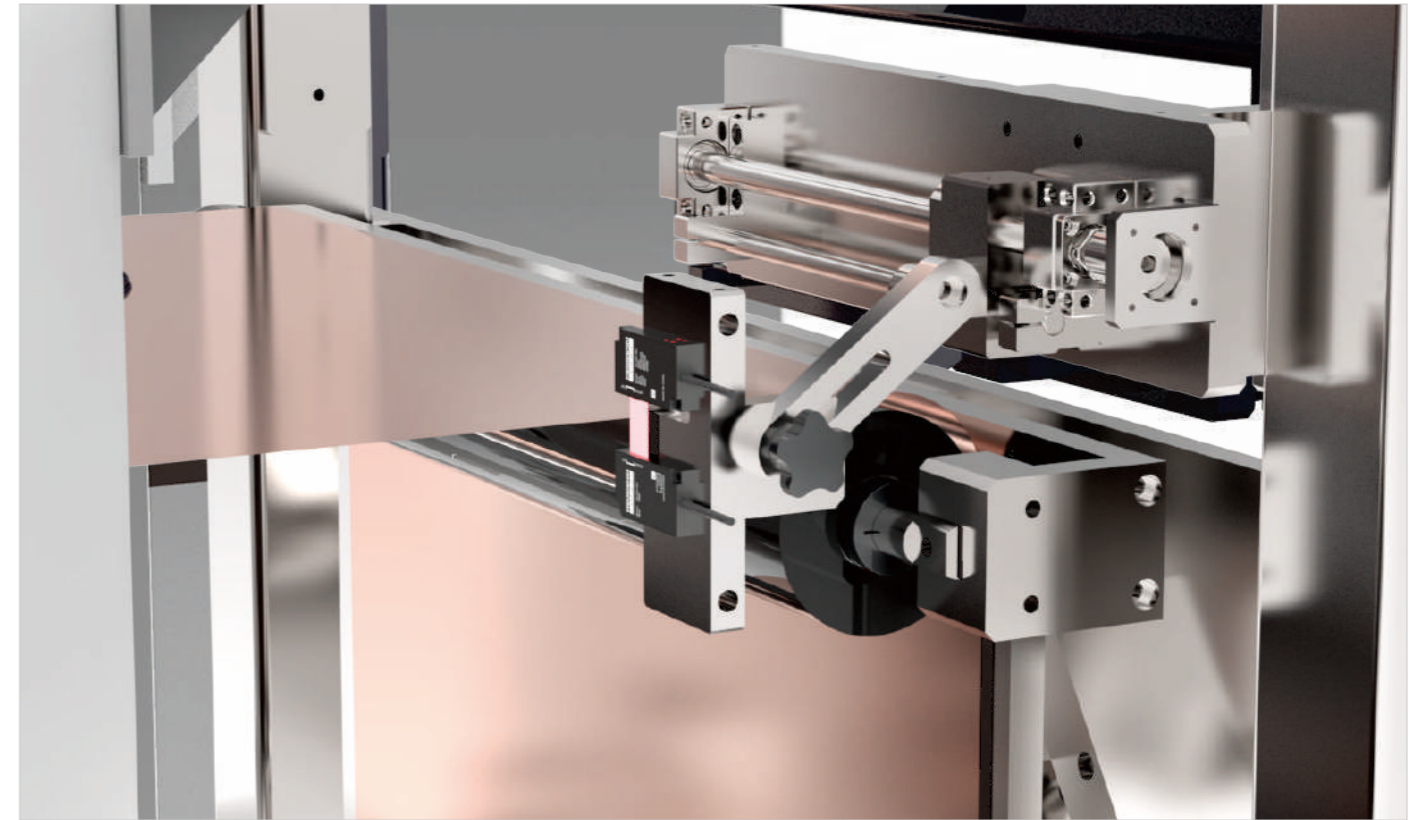
Safety Protection During Equipment Operation

Requirement:

During the process of coating for electrodes with positive and negative materials,it is necessary to stop members entering the areas and getting themselves into potential risks.

Solution:

SAF series,type 4 safety light curtain, PLE(safety level),a powerful guardian of industrial safety. Perfect auto-inspection function realizes complete auto-test including signal-output with great shock absorption performance.Suitable for high-speed stamping machines with long duration and high safety performance.

Real-time monitoring for the substrate position of Anode and cathode materials

Requirements:

In the coating process,it is required to take real-time monitoring on position deviation for the substrates of positive and negative materials, to avoid uneven coatings caused by deviation when they are on conveyors.

Solution:

ETD-0612, new laser deflection sensor, installed at the edge of the substrate, directly communicates with PLC via analog output; real-time monitoring of the left or right deflection of substrate edge,which can realize micron-level position measurement.Adopting the principle of laser area thru-beam detection, it covers a range up to 12mm wide.
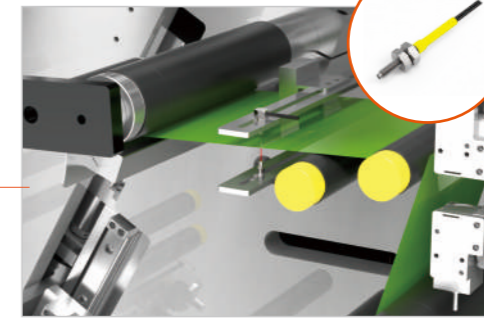
Lithium Winding Machine

Lithium-ion battery winding machine is used to wind lithium-ion battery cells. The winding machine has positive and negative feeding units, the part wound together by positive and negative poles is called winding needle. Important components of the lithium-ion battery winding machine include the frame, winding device, pole-piece supply device, auxiliary pressure-plate and cutting device, tape-supply device, electrical control and so on.

Monitoring on electrode and diaphragm transmission

Fiber Optic Amplifier and Fiber Optic Components
PG1+PD-32

- Fiber optic components with a full range of specifications, which can realize the replacement of the mainstream models in the market.
- Dual digital amplifiers with automatic light compensation for high precision.
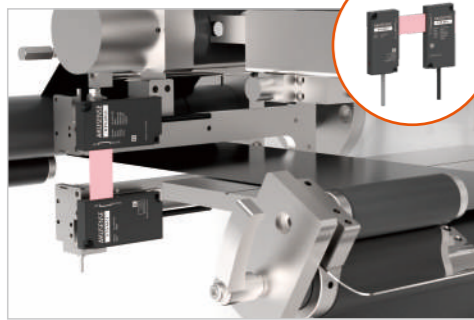
Diaphragm Transmission Deskew

Deskew Sensor
ETD-0612

- Repeat accuracy ±1um, high stability with laser thru-beam measurement.
- Designed with both width and edge detection modes for edge control and positioning.
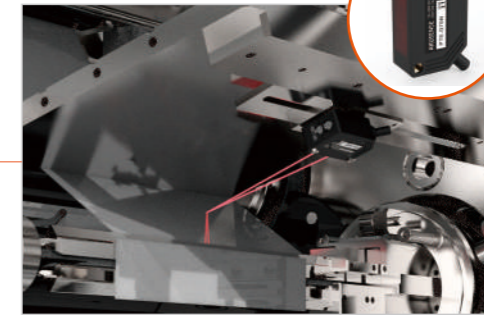
In-place Detection for Battery cell coil materials
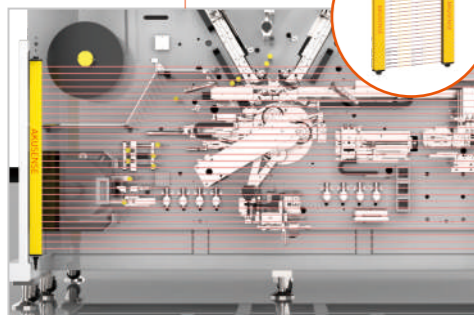
Square Photoelectric Sensor
PTE-D70N

- Response time < 1ms,Normal Open and Normal Close for Option
- Simple to install with M3 standard threaded holes

## cylinder module limit

Magnetic Sensors
MR-C8-U-S

- High positioning accuracy and great performance
- 5us extremely fast response time

Device Security Protection

Safety Light Curtains
SAF Series

- Type-4 safety certificate by TUV, greatly enhancing production safety
- Mechanical architecture design, compression resistance, anti-vibration, and shock resistance.
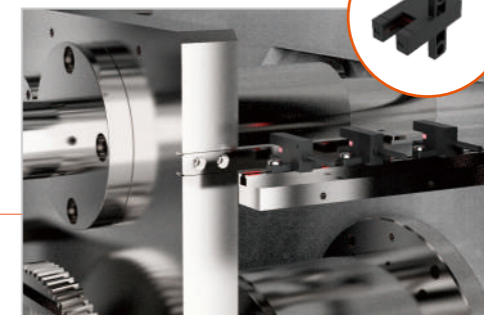
Motion Mechanism Limit

Slot Sensor
ST-303N-W

- Chip integrated design, repeatability up to 0.01mm
- Normally open and normally close, outputs can be switched with stable performance.

Monitoring on electrode and diaphragm transfer

Requirements:

During the production process of electrode winding, it is needed to take real-time monitoring on battery's positive and negative electrodes as well as diaphragm transfer,avoiding interruptions in following processes due to material shortages.

Solution:

Fiber optic sensors, installed above or below these materials, provide real-time monitoring and feed the signal back to the PLC for control; a variety of fiber optic components and dual digital amplifiers can be used together to meet the installation requirements for several workstations simultaneously.
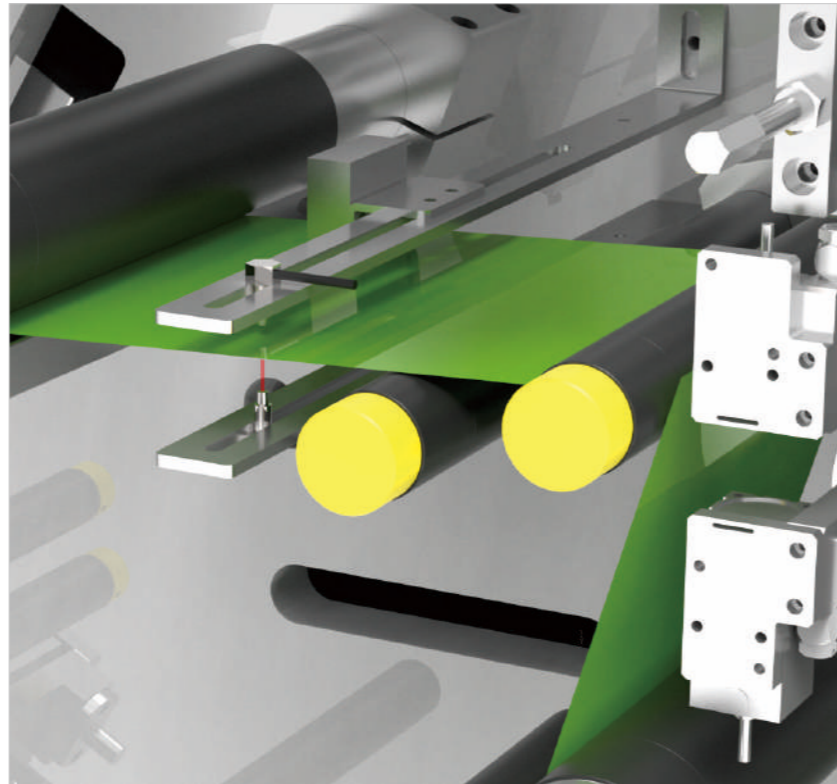
Motion mechanism limit

Requirements:

Real-time control of device motion and position limit.

Solution:

Akusense produces a wide range of slot sensors.With the design of chip integration, position control on devices taken with higher precision,as the repeat accuracy reaches 0.01mm.Various appearance designs and installation methods to meet the different needs of position measurement.
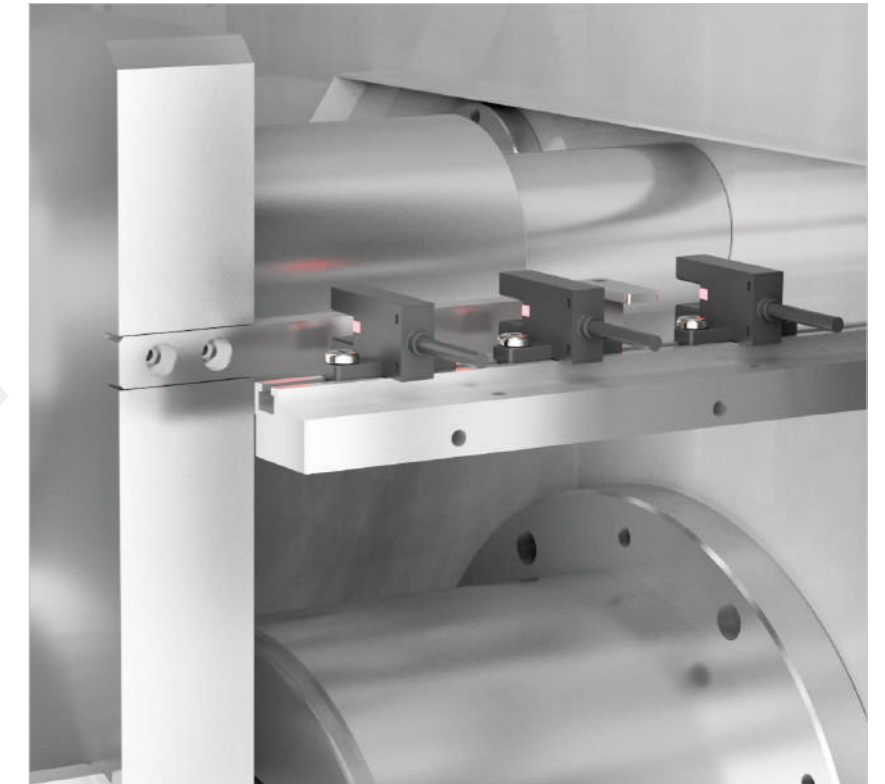
Transfer deflection of diaphragm

Requirements:

Real-time monitoring taken on winding machines to control the left or right deviation during the process of diaphragm transfer,and the deviation value will be released to the system designed,aiming to realize the positioning control precisely.The accuracy will be as high as silk-level to guarantee the consistency of the winding.
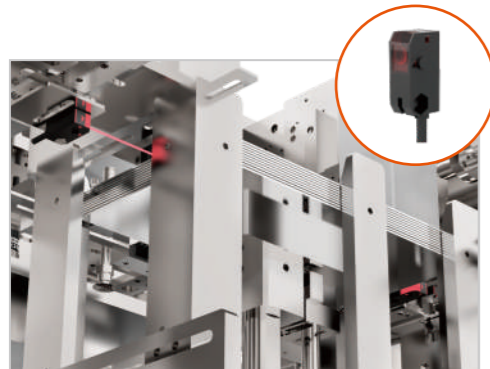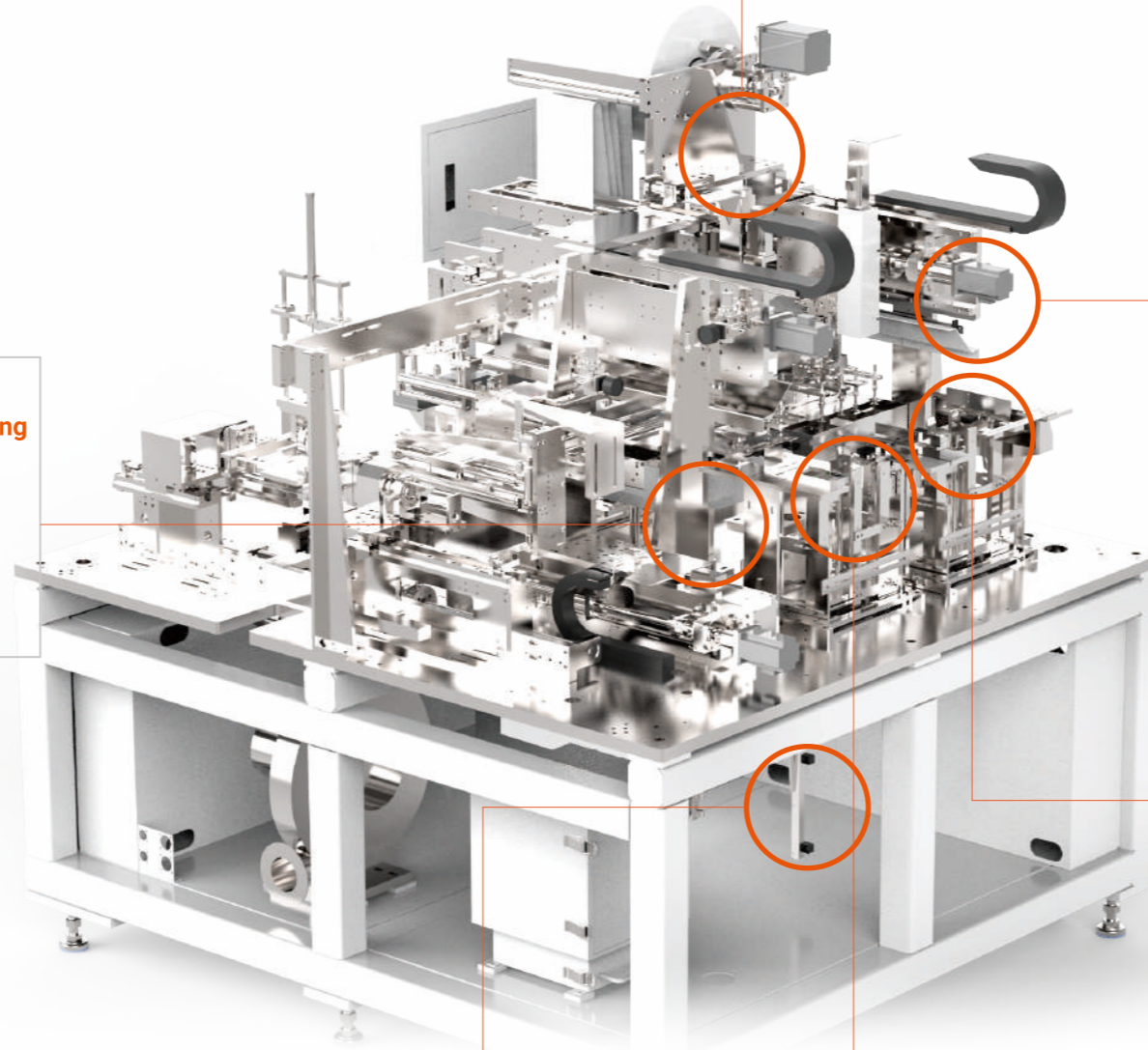
Solution:

The latest edge sensor ETD-0612 by Akusense adopts thru-beam reflection, achieving precision control as high as 1um. At the same time, this product outputs analog voltage signals to directly interact with the deflection system of equipment, realizing real-time control of diaphragm position.
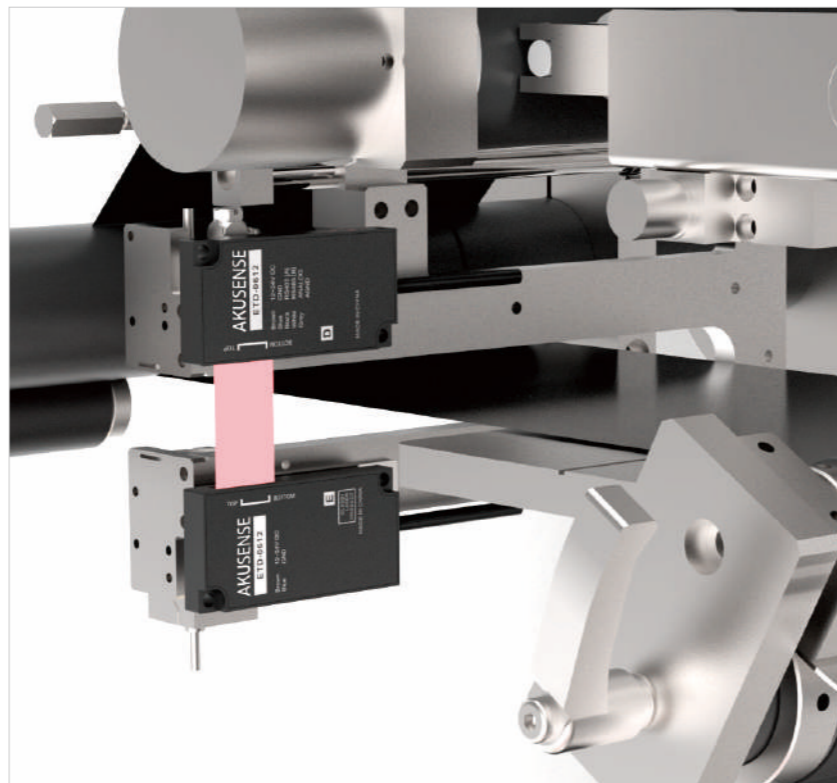
Lithium Laminating Machine

Lithium laminating machine is one of the key devices for battery production in this industry.It belongs to the middle process of manufacturing, specifically the electrode assembly process.Its main function is to assemble and stack the positive and negative electrodes of the lithium battery cell with the separator in a Z-shaped manner to form a small cell unit, and then stack and connect the small cell units in parallel to form a large cell.
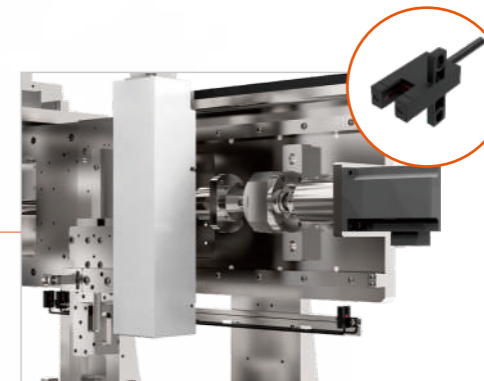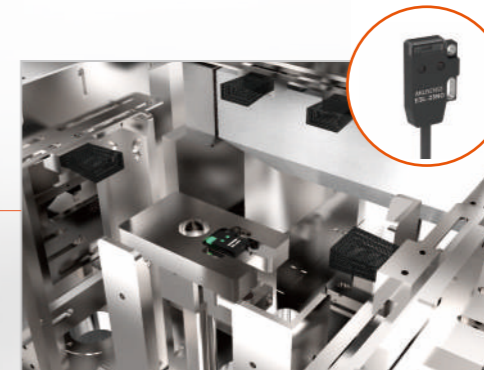
Residual Material Monitoring on diaphragm

Laser Displacement Sensor
MLD23 Series

• Ultra-fast computing and processing, with a response time of 1.5ms.
• High-resolution lens achieves a repeat accuracy of 0.01mm.

Mechanical limit

Slot Sensor
ST-303N-W

• High repeat accuracy achieves 0.01mm, normally open and close switchable.
• A wide range of options, including 12 different appearances such as F/T/R/L/K/T.

Battery electrode positioning

Thru-beam Photoelectric Sensor
PTJ Series

• L.on (light-on)/D.on (Dark-on) switchable, sensitivity adjustable;size as compact as a little finger
• Dual LED indicators, clearly recognize operating state

Residual material monitoring on electrode

Ultra-thin Photoelectric Sensor
ESL-25NO

• 3.5mm of thickness and saves installation space.
• IP67, excellent performance.

Material Box Limit Control

Square Proximity Sensor
TQF18-05NO

• High repeat accuracy <1.0% (Sr), switching frequency 1KHz
• IP67, effectively enhance product performance
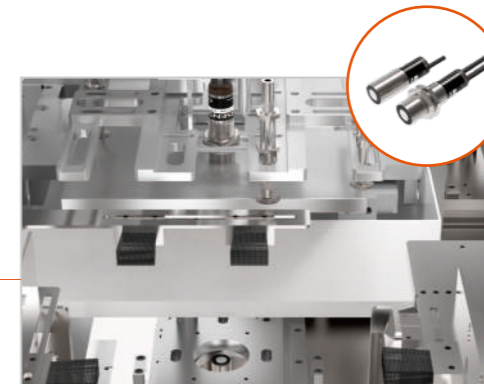
Single and double sheet detection for electrode

Single And Double Sheet Detection Ultrasonic Sensor
MUD Series

• 3 control input,choose related mode (thick/thin/standard) based on object thickness.
• Stably detect paper/metal/plastic/platinum/ silicon wafer/battery electrode.

Double sheet detection for electrode

Application:

It is required to detect the positive electrode and negative electrode in stacking machine before stacking, to avoid overlapping and causing the safety hazards in the cells.

Solution:

Akusense MUD series double sheet detection sensor. It stably detects single sheet or double sheet by using ultrasonic technology. In above application,MUD series sensor can detect the overlapping or shortage of the electrode according to the signal intensity of sound wave on the receiver. It supports multiple detection model and self learning. It is possible to teach in according to detected objects, allowing the sensor to detect single sheet or double sheet for various materials with various thickness.
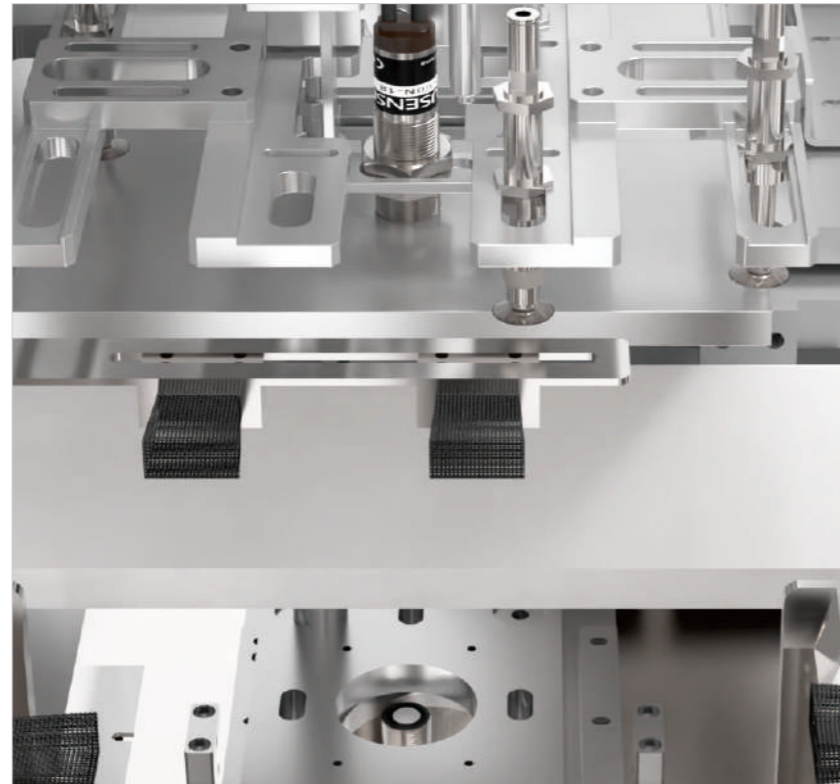
Surplus materials detection on diaphragm

Application:

It is required to detect the surplus material of the lithium battery diaphragm on the stacking machine. When the diaphragm material roll is almost run out of, the sensor will give signal to the equipment to response, reminding the operator to replace the material roll in Application time.

Solution:

Akusense MLD23 series displacement sensor Through triangulation method, the sensor can realize high precision detection. The max. sensing distance is 280mm, can meet diameter measurement requirements for diaphragm rolls in different specifications. Equipped with 0-5V voltage output and 4-20mA current output, the sensor can interact with the PLC to do real time detection.

Battery electrode positioning

Application:

To detect the position of positive and negative electrode in loading process. When electrode reach to the set position, the sensor will give signal to the robotic manIpulator tomaterial.

Solution:

PTJ series photo sensor can be installed on both sides of the workstation to do the task. The size is as big as a finger, which can be installed in compact space in loading station. It adopts invisible infrared light source, with no effect on the photo sensors and equipment operators.
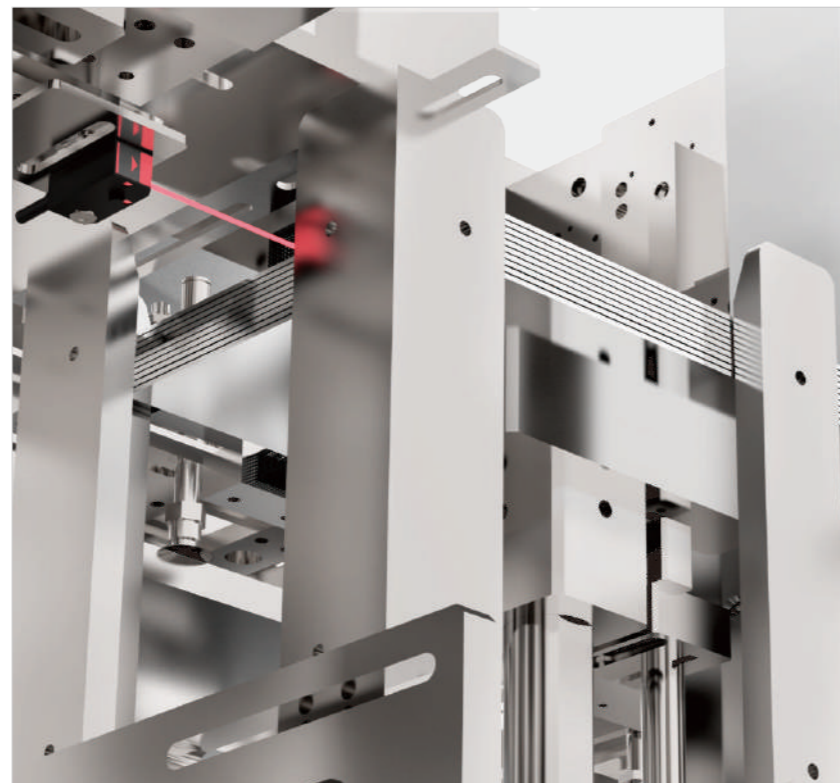
Lithium Coating Machine

In order to prevent surface scratches and leakage of lithium batteries during transportation and assembly, lithium battery coating equipment is generally used to wrap a layer of insulating film with one side adhesiveness on the surface of the battery, which can be waterproof and dustproof, for better protection on the battery.

Material detection on conveyor

BGS Diffuse Reflection Photo Sensor
ESB-V30N

- Infrared light source, strong anti-light interference capability
- Response time≤2ms

Gripping process

BGS Diffuse Reflection Photo Sensor
ESB-30N

- 15% black and white difference, any color background and object can be detected stably
- 6-turn potentiometer for fine adjustment of sensitivity

Surplus material detection on tape

Amplifier And Fiber Unit
PG1+PD-32

- 4 speeds for option
- Built-in light compensation, small hysteresis, dual output

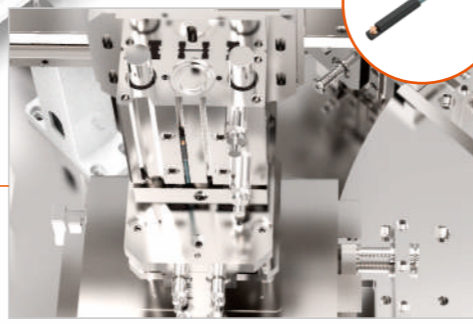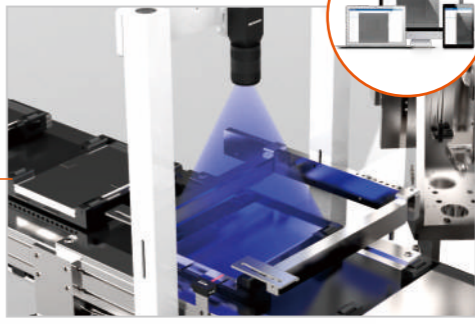## Mechanism positioning

Slot Sensor
ST-303N-W

- All-in-one design for chip, repeat accuracy is up to 0.01mm
- The slot is as deep as 8.5mm, preventing the object from hitting the bottom of the slot and causing hardware damage.
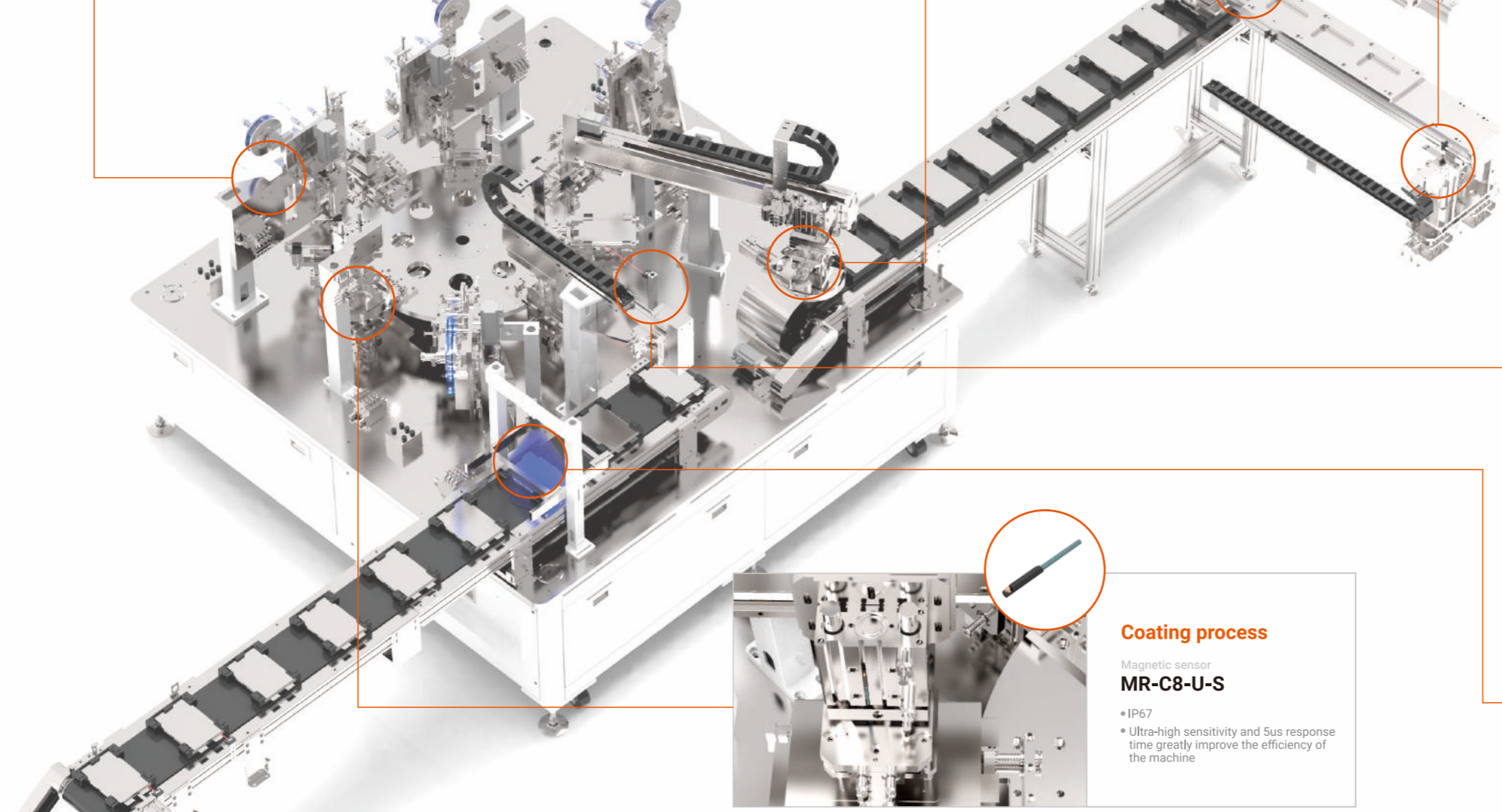
Turntable processing station

BGS Diffuse Reflection Photo Sensor
ESB-30N

- 15% black and white difference, any color background and object can be detected stably
- 6-turn potentiometer for fine adjustment of sensitivity

Coating process

Magnetic sensor
MR-C8-U-S

- IP67
- Ultra-high sensitivity and 5us response time greatly improve the efficiency of the machine

Defect detection

AI Image Recognition
MEIJI AIV Platform

- Process visualization, good product experience
- Test results are clear at a glance, fast project delivery

Defect detecion

Application:

Camera inspection is a key part of the quality inspection of the coating. At this station, the camera needs to detect defects for the coating. Those products with wrinkles, bubbles, scratches and other undesirable defects or products that do not meet the requirements will be recorded and pick out.

Solution:

When the bottom diffuse reflection photoelectric sensor ESB-V30N detects that the coated battery on the material tray is in place, it immediately triggers the vision camera to take pictures for comparison. The defective products are recorded and picked out. The meiji AIV system equipped with the camera has 100 million pixels of super image processing capabilities. It is easy to use and can complete the training and deployment of AI models with simple operations, and seamlessly connects with production line equipment.
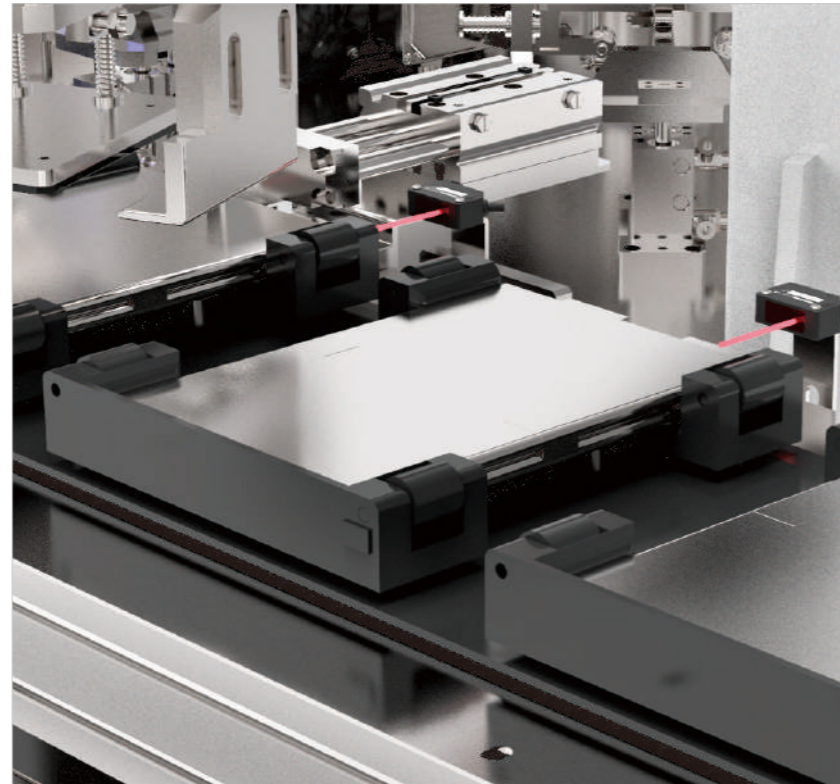
Turntable processing station

Application:

Each processing station on the turntable is equipped with a sensor to detect the position of the battery and perform coating processing.

Solution:

BGS diffuse photo sensor ESB-30N is installed on each turntable station. As it is not affected by any color and has superior mechanical properties, it can effectively solve the detection of material in place in multiple scenarios. Even if the background of the station is very complex, it can detect accuracy and stably.
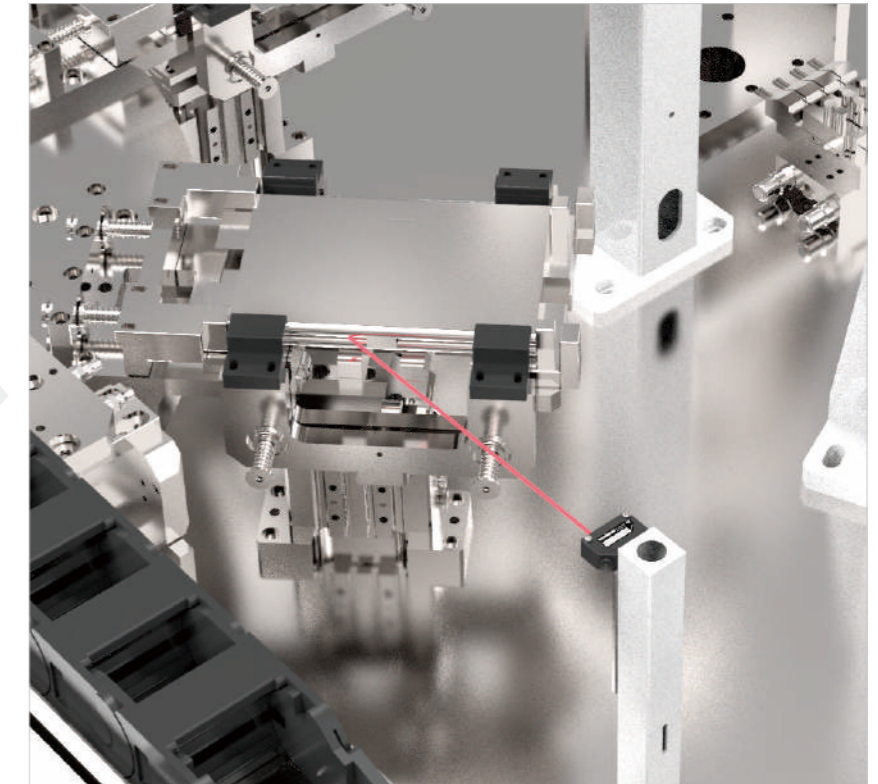
Wrapping station

Application:

When the lithium battery reaches the station, the sensor senses that the material is in place to drive the upper cylinder to compact the film.

Solution:

The ultra-high-precision magnetic sensor MR-C8-U-S can be installed here to detect the position of the cylinder and give a signal to retract the cylinder to proceed with the next operation; With high sensitivity and 5us response time,It can greatly improve the operating efficiency of the machine.
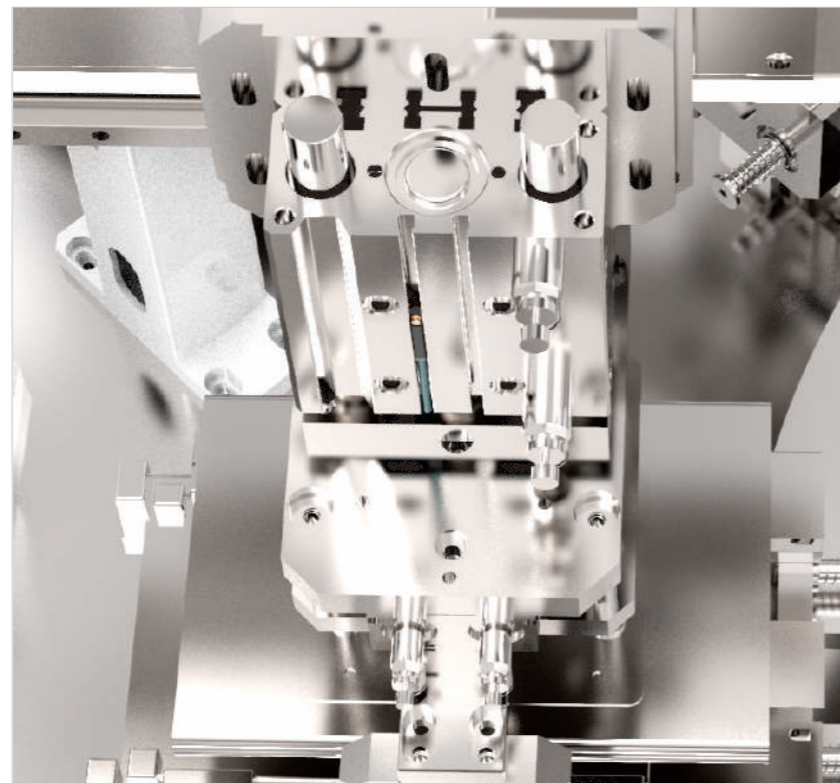
Lithium Tab Cutting Machine

In the production process of lithium-ion batteries, cell tab cutting is an important process. During the battery cell manufacturing process, due to the size differences between different tabs, the front ends of the tabs are uneven after pre-welding of the multi-layer tab stacks. In order not to affect the subsequent cover welding and other processes, the uneven tabs need to be cut. lithium-ion battery tab cutting equipment is created to fulfill this task.
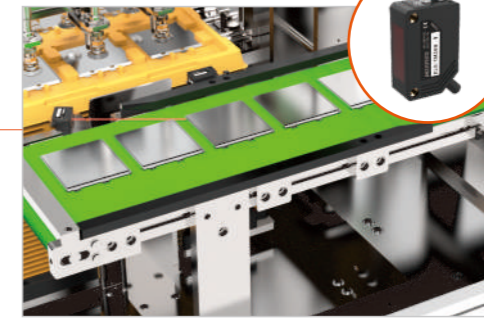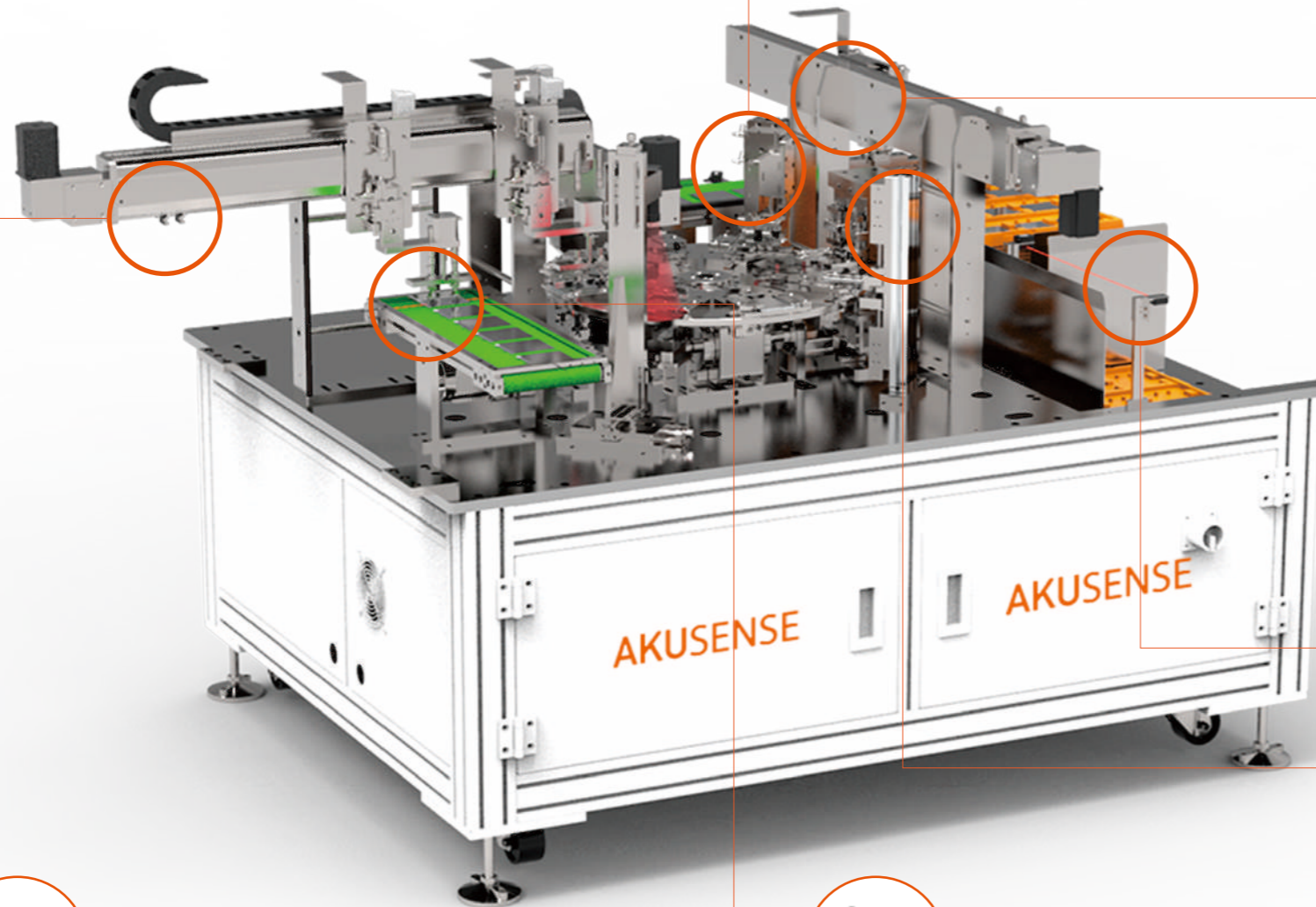
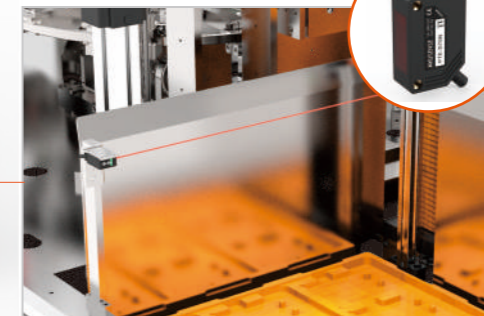## Gripping process

Laser Sensor
ELE-TM30N

- 30m sensing distance, with 1mm light spot at 500mm
- Classic square design, easy to use
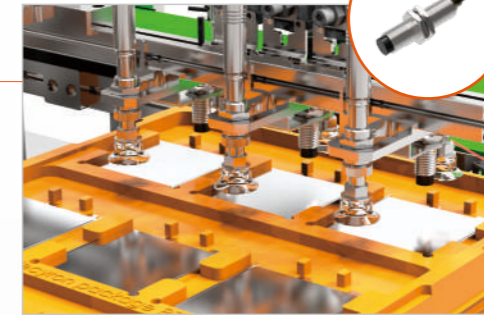
Detect the presence of cell
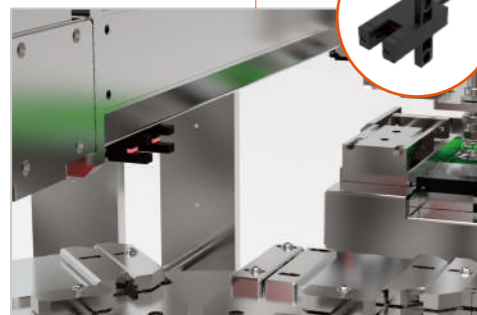
Proximity Sensor
TRN Series

- IP67
- Built-in clear indicator, easy to install and debug

## Material tray positioning

Photo Sensor
PTE-D70N

- Adopts advanced self-developed anti-interference algorithm with excellent stability
- Multi-view indicator display, trimmer for sensitivity adjustment, easy to use

## Control the origin position of the manipulator

Slot Sensor
ST-303N-W

- All-in-one design for chip, ensure the superior consistency
- Designed with line protection,reverse connection protection,overload protection, etc.
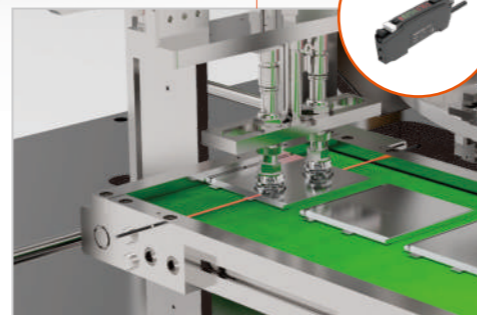
Cell detection in unloading process

Fiber Sensor
PE1+PD-32

- One button to teach-in, user-friendly
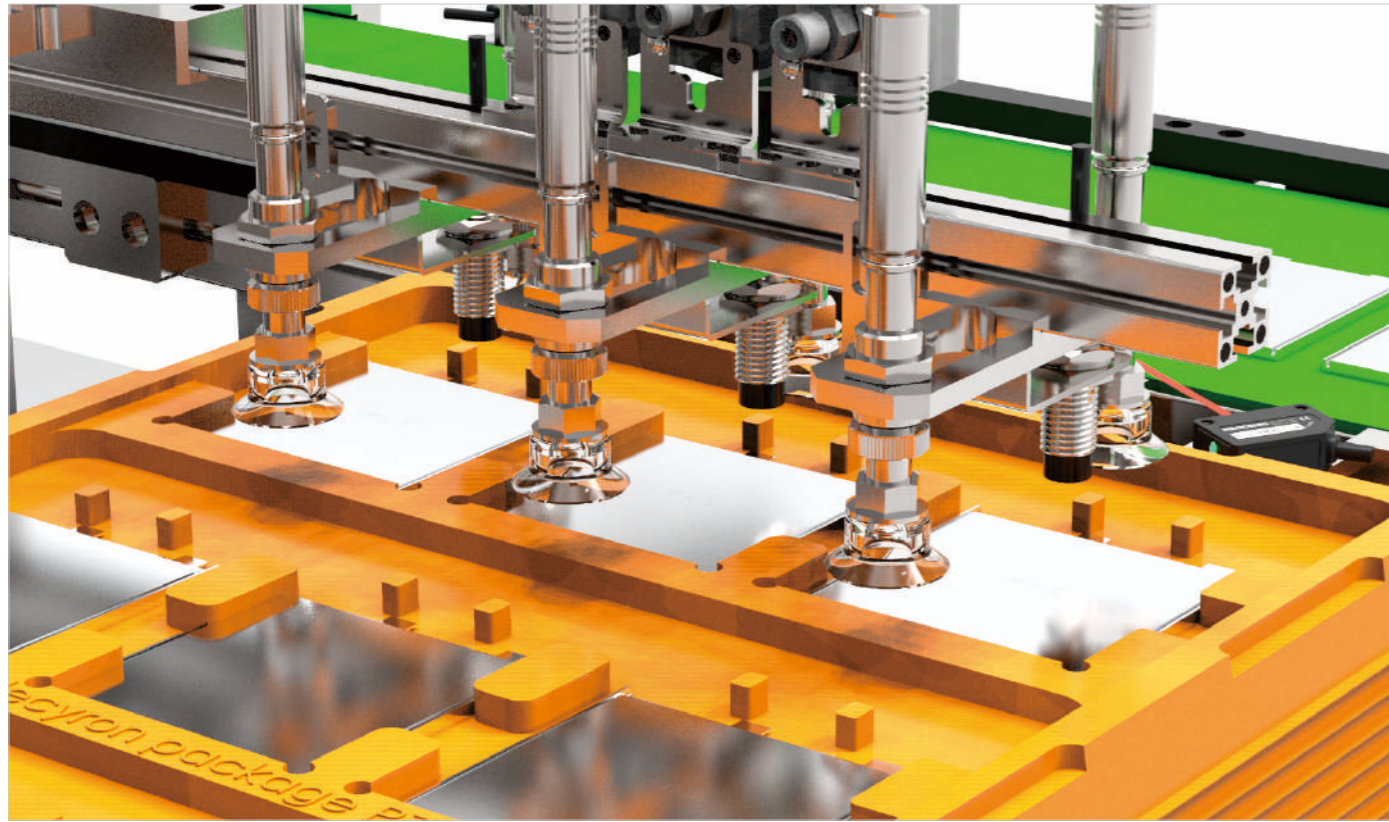- More stable high-speed mode greatly improve the accuracy
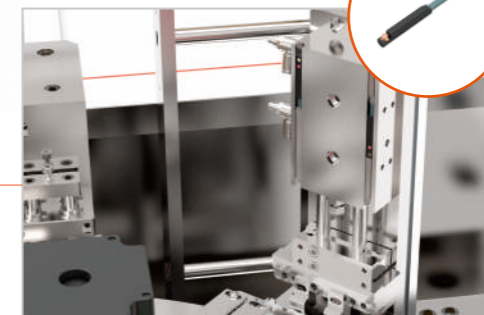
Mechanism positioning

Magnetic Sensor
MR-C8-U-S

- High accuracy, reliable performance
- 5us response time

Detect the presence of cell in materials tray

Application:

During the cutting process of battery tabs, it is required to detect the presence of batteries in the tray. When there are lithium battery core materials in the three adjacent bins in the three boxes on the material tray, the equipment controls the manipulator to grip materials directly above the material tray.

Solution:

In this process, the TRN series of inductive proximity switches can be used to detect the presence of battery cells. The sensor has 4mm sensing distance, and the attenuation on the battery core is not less than 1.5mm, which can meet the installation requirements on the manipulator of the robot; Akusense proximity switch equips international high-quality magnetic cores, ensuring excellent product performance and long-term stability.
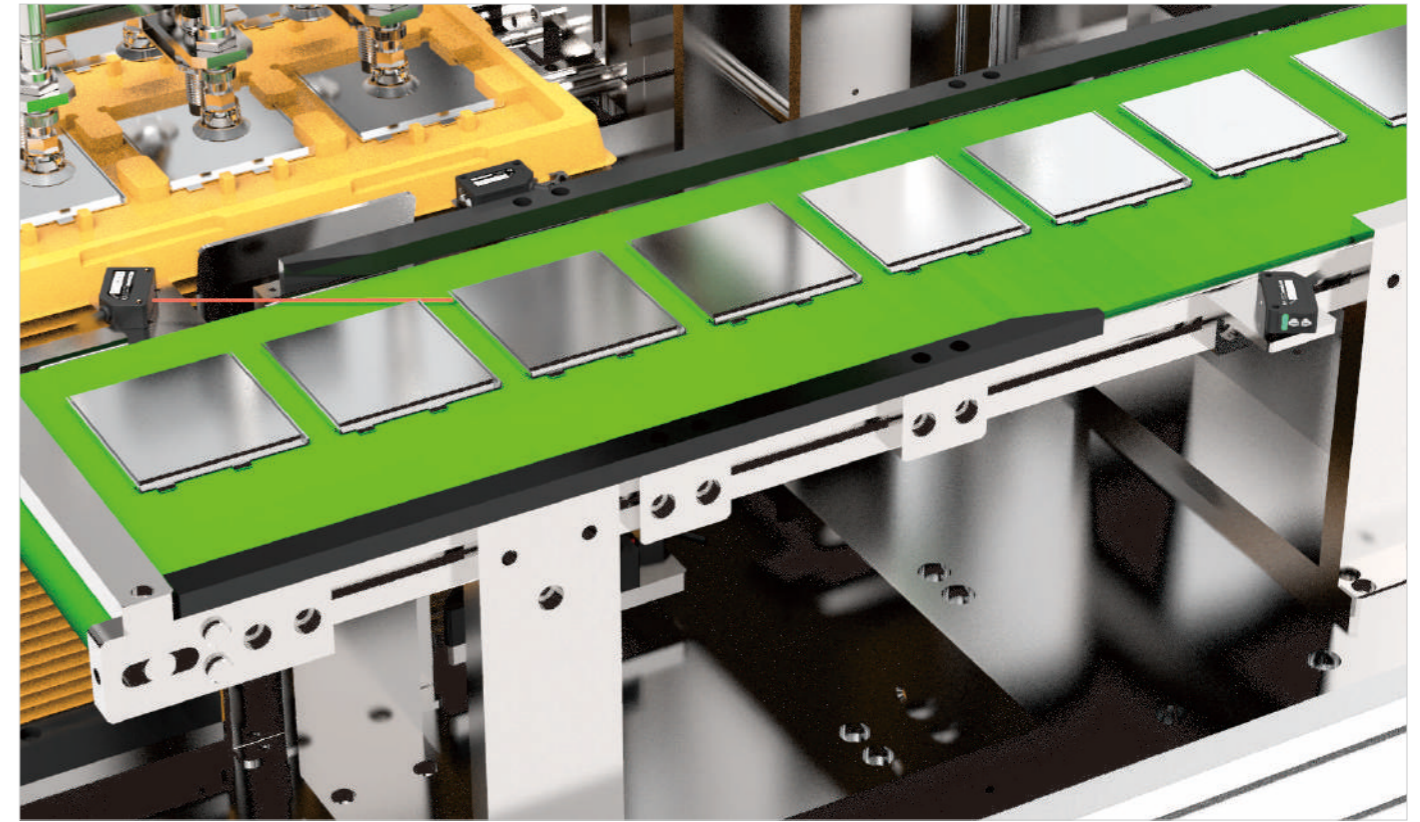
Gripping process

Application:

To detect the presence of the battery core on the feeding conveyor belt of the equipment.When the position sensor detects that the battery core has been transferred, the sensor will output a signal to drive the manipulator to grip the battery core for the next time.

Solution:

Akusense through-beam laser sensor ELE series uses laser light source, with a spot diameter as small as about 1mm, and can detect small cells with a thickness of only a few millimeters; The bright signal indicator light and adjustment trimmer make it easy-to-use. It is a very cost-effective solution.

Lithium Shelling Machine

This equipment is mainly responsible for the casing process of prismatic lithium-ion batteries. It is used to install the bare battery core into the aluminum shell, press-fit it flatly, and pre-weld the top cover of the battery core to the aperture of the aluminum shell.
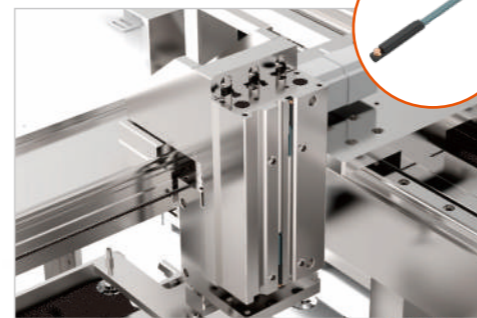
Station status monitoring

Magnetic Sensor
MR-C8-C-S

- IP67
- Ultra-high sensitivity and 5us response time greatly improve the efficiency of the machine
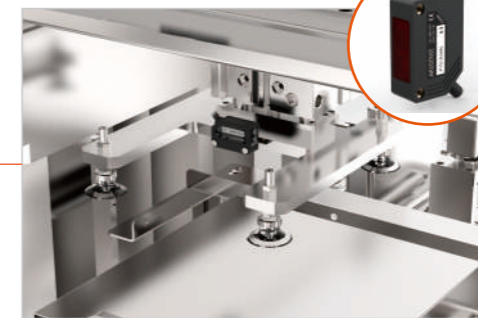
Aluminum shell dust removal

Convergent Reflection Photo Sensor
PTE-X09N

- Adopts advanced self-developed anti interference algorithm with excellent stability
- Multi-view indicator display, trimmer for sensitivity adjustment, easy to use
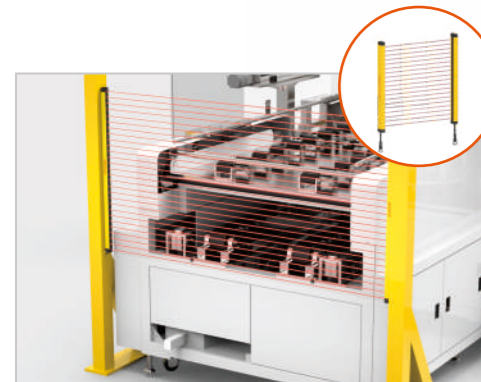
Area protection around manipulator

Safety Light Curtain
BZL Series

- Thin type safety light curtain, 1/2 smaller than ordinary light curtain, easy to install
- Millisecond response time, multiple beams and beam pitches for option
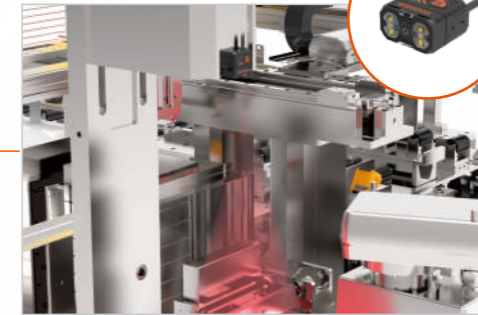
## Cover plate detection

Vision Sensor
VDS10 Series

- Liquid focus technology
- High-precision positioning algorithm and detection algorithm
- Modular solution with integrated light source
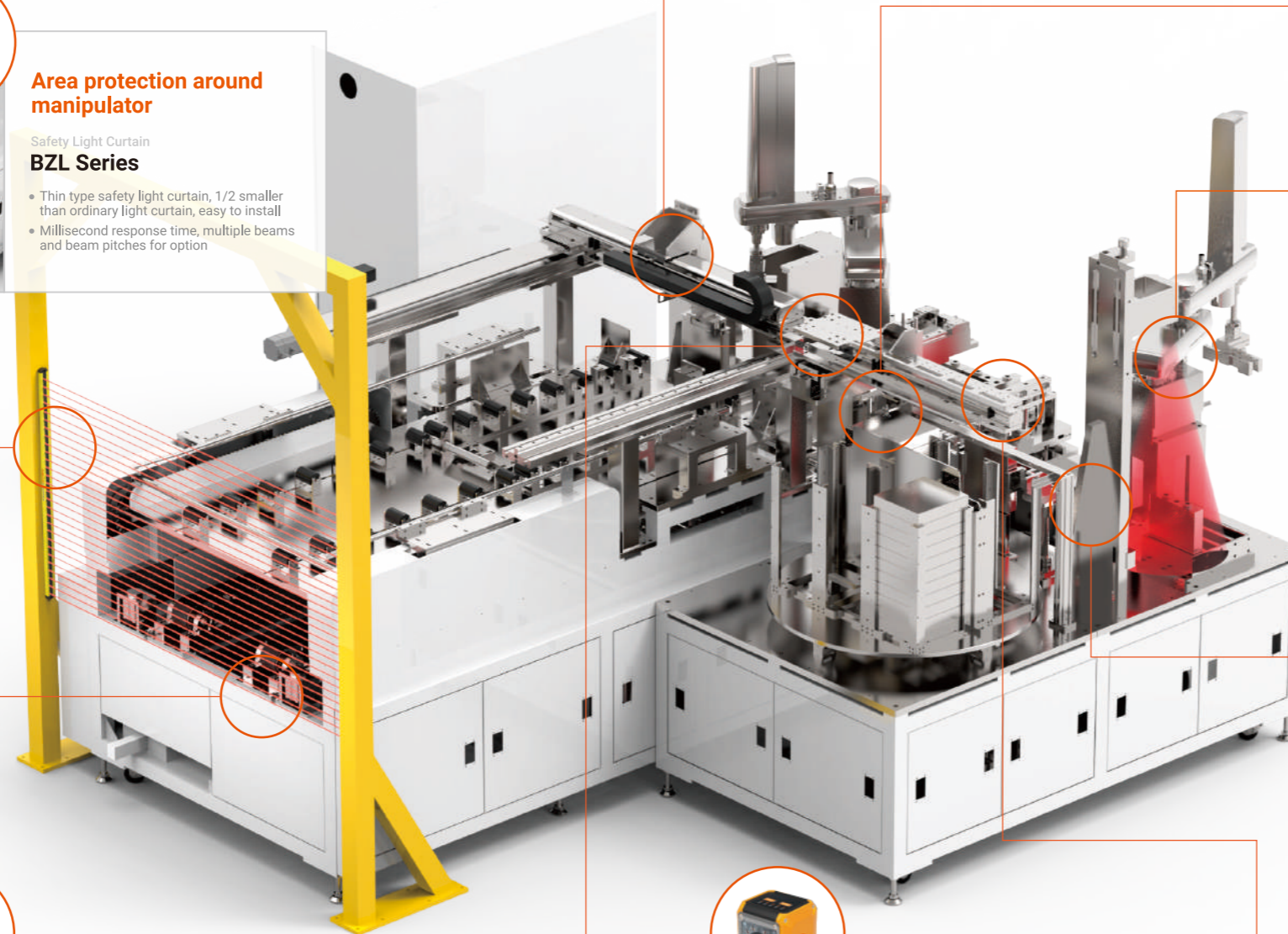
## Aluminum shell positioning

BGS Photo Sensor
ESB-V30N

- Excellent background suppression performance, not afraid of the influence of signal intensity reflected by the object
- Equipped with red light/infrared light source, modulated pulse light, strong anti-interference capacity
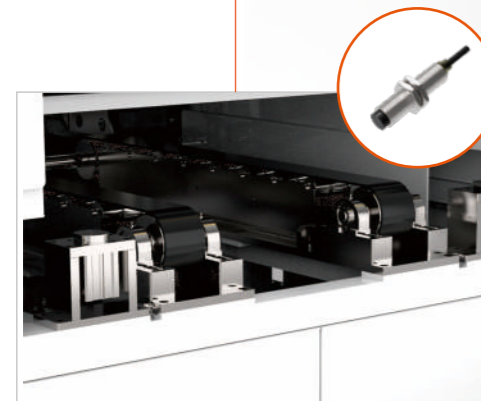
Trolley positioning

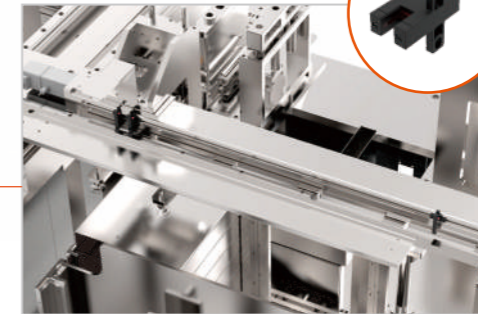Proximity Sensor
TRN Series

- IP67
- Built-in clear indicator, easy to use
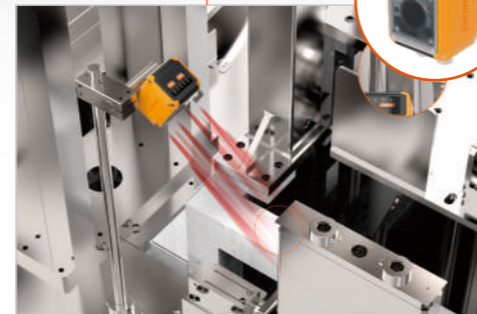
Battery shell laser carving code reading

Intelligent Code Reader
RCD-AI100-X Series

- Red, white and polarized light sources available
- Support high-density, short-range, medium-range, long-range code reading
- Ultra-high resolution, supporting ultra-small code reading

Mechanism transfer

Slot Sensor
ST-303N-W

- Repeat accuracy up to 0.01mm, supporting L.on/D.on
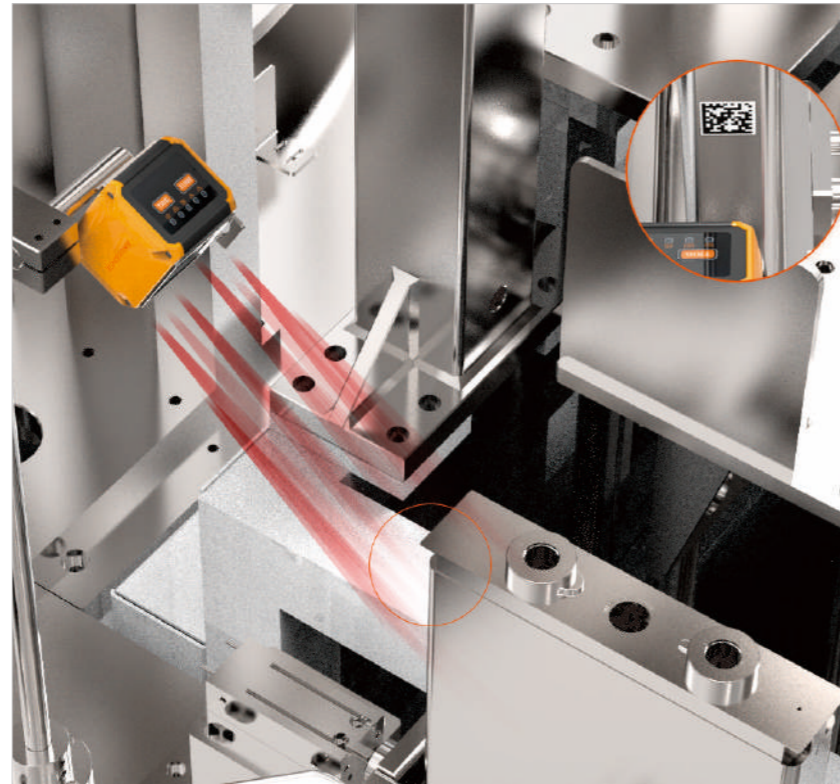- 12 shapes for option like F/T/R/L/K/T,etc.

Battery pack laser engraving QR code reading

Application:

A QR code,which contains the traceability information that needed to be read and saved is laser engraved on the surface of battery pack. Customer wants the sensor can not only stably recognize DPM code on a highly reflective surface in a fast and effectively (< 50ms) manner, he wants the sensor can detect as many codes as possible for there could be 2 or more codes on the production line at the same time, and to minimize future equipment upgrades.

Solution:

AKUSENSE's RCD serie code readers. Thanks to the lastest OCR recognition algorithm, RCD serires can detect QR codes on different materials and achieve high-speed reading regardless of whether the barcode is damaged or poorly printed.AKUSENSE Code readers offer a full range of industrial communication protocols including Ethernet, Modbus TCP, PROFINET, they can reade more that 9 major codes on the marlet from multi-angle at the same time. The readers also provide users with four groups of independent lights, making light intensity configuration possible, with all these features, RCD scanner easily meet customer's requirements.
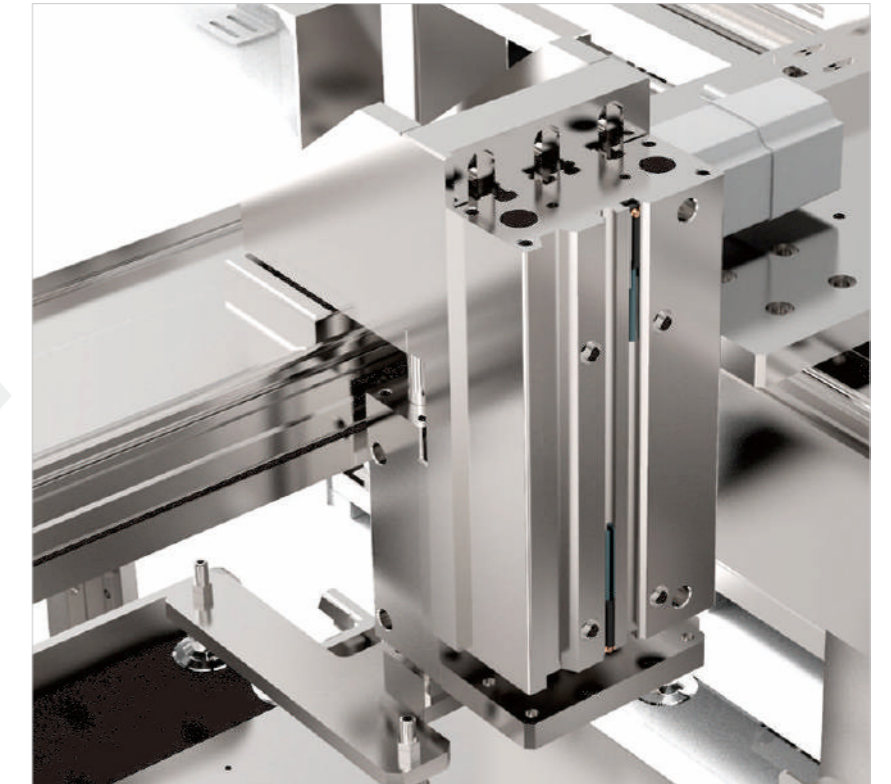
Area protection around manipulator

Application:

There are rapid movements of robotic arms in the loading area, which may pose threat to personal and equipment. The installation space is small, and regular-sized light curtain sensor can't meet the installation requirements.

Solution:

We offer ultra slim type light curtain sensor BZL to customer. With a 17.2mm thick aluminum alloy structure, the BZL light curtain not only saves installation space for customers, but also allows the sensor to operate stably even if it is impacted or collided. BZL sensor offers customer with millisecond-level response time, preventing incidency from happening at the very first time.

Piston movement monitoring

Application:

The high moving speed of piston inside the cylinder puts forward high standard to the reponse time and repeatability for the sensor.

Solution:

MR series cylinder sensors are used for theirs 4.5 mT sensitivity and 5 us repeatibility. They are directly mounted onto the cylinder and can be fixed to almost any T-slot, C-slot, U-slot,clean-line, tie rod, integrated profile or trapezoidal slot cylinder. AKUSENSE's also offer GF stengthen PBT housing material for demanding application environment.
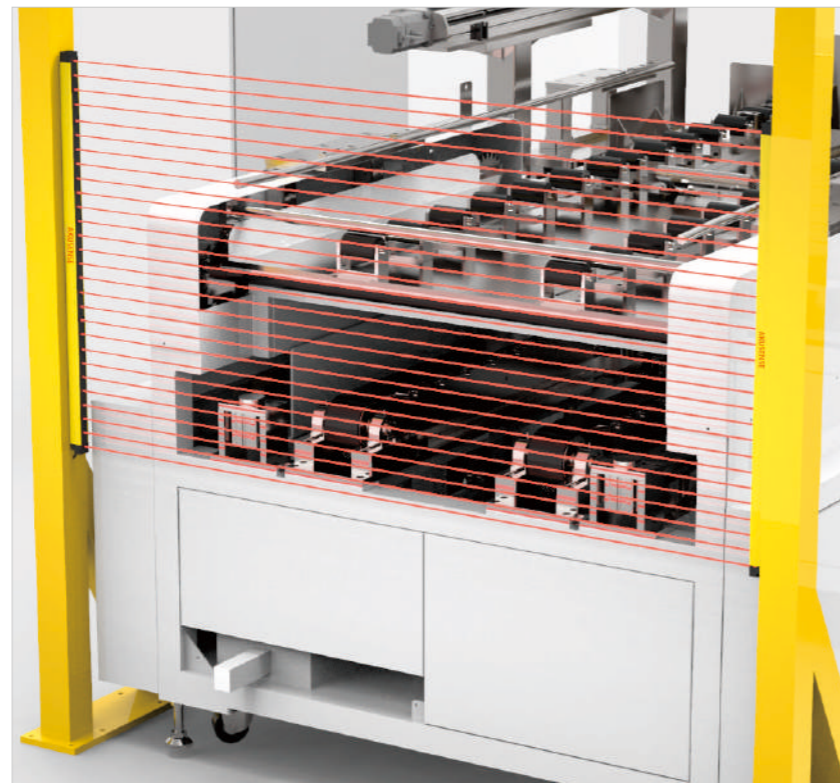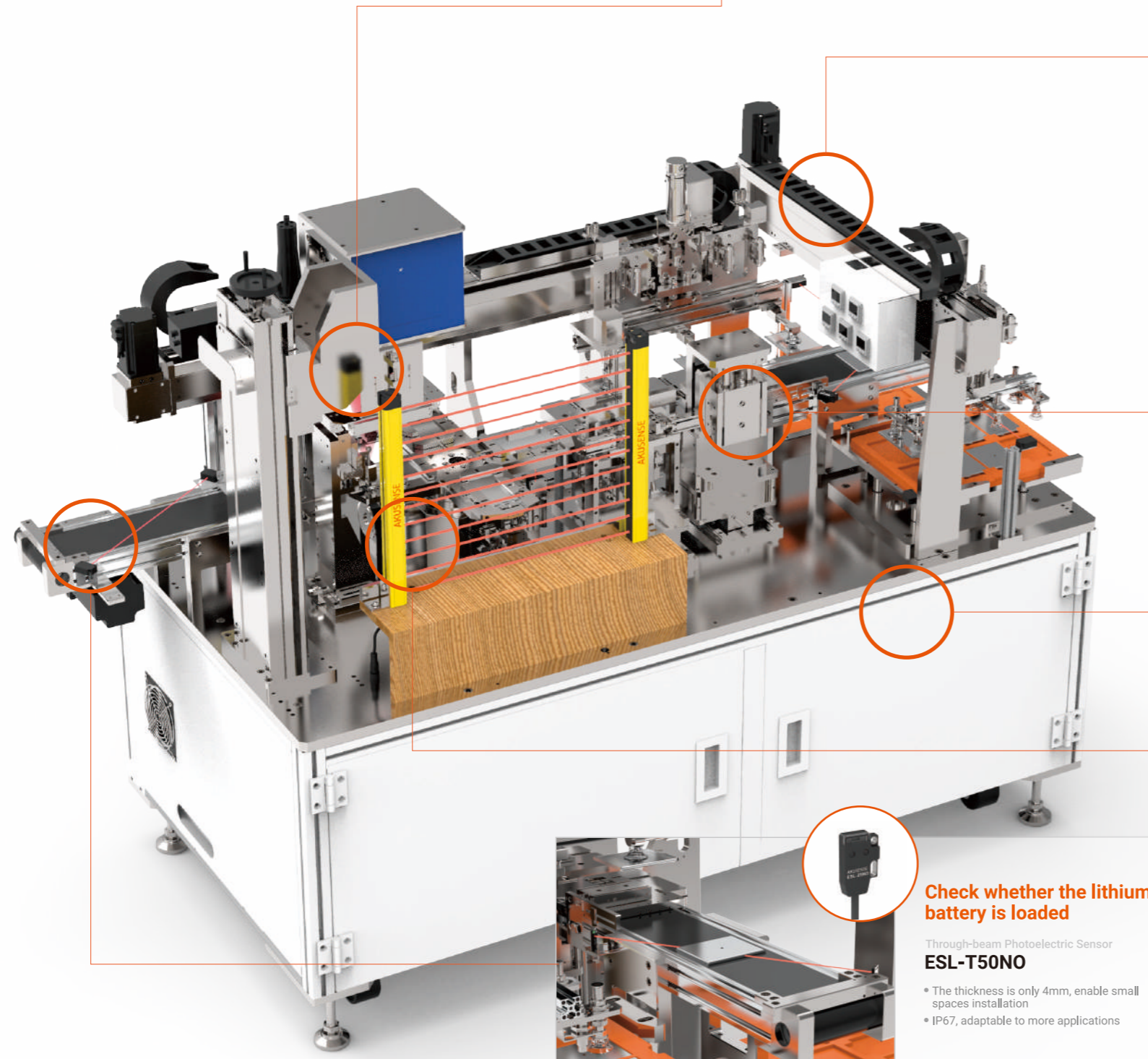
Laser welding machine

The quality of welding directly and highly affects the quality of Li-ion battery. As a high-precision, flexible and efficient welding method, laser welding can meet the welding requirements and thus become an important process in the battery manufacturing process.

Defects inspection after the welding process

AI Image Recognition Technology
MEIJI AIV Platform

- Visualizing training process, realizing consumer-grade product experience
- Test results are clear at a glance, quick delivery

Motion mechanism positioning

Slot Sensor
ST-303N-W

- Repeatability high up to 0.01mm, NO/NC switchable
- The slot depth is 8.5mm, effeectively prevent damage for happening

Piston positioning for cylinder

Magnetic Sensor
MR-C8-U-S

- High positioning accuracy, reliable performance
- 5us ultimate response time

Temperature monitoring for chiller

Temperature Sensor
TSS Series

- Suitable for small pipe and confined spaces
- -20~300℃ measuring range, fast response time

Check whether the lithium battery is loaded

Through-beam Photoelectric Sensor
ESL-T50NO

- The thickness is only 4mm, enable small spaces installation
- IP67, adaptable to more applications

Equipment safety protection

Safety Light Curtain
BSL Series

- Surport finger, palm, arm detection
- Various appearances, protection heights, and detection methods for optioin

Temperature monitoring for chiller

Application:

The temperature of the chiller is monitored in real time to provent the equipment from over heated, the detection accuracy is required to be 0.1°C, and the detection temperature ranges from5~+35°C; the available installation space of the equipment is small.

Solution:

TSP series temperature sensor. With a thin probe,the sensor is able to measure -30~ +150°C for liquids and gases; TSP offers differnt probes lengthincluding 25mm and 100mm for option.
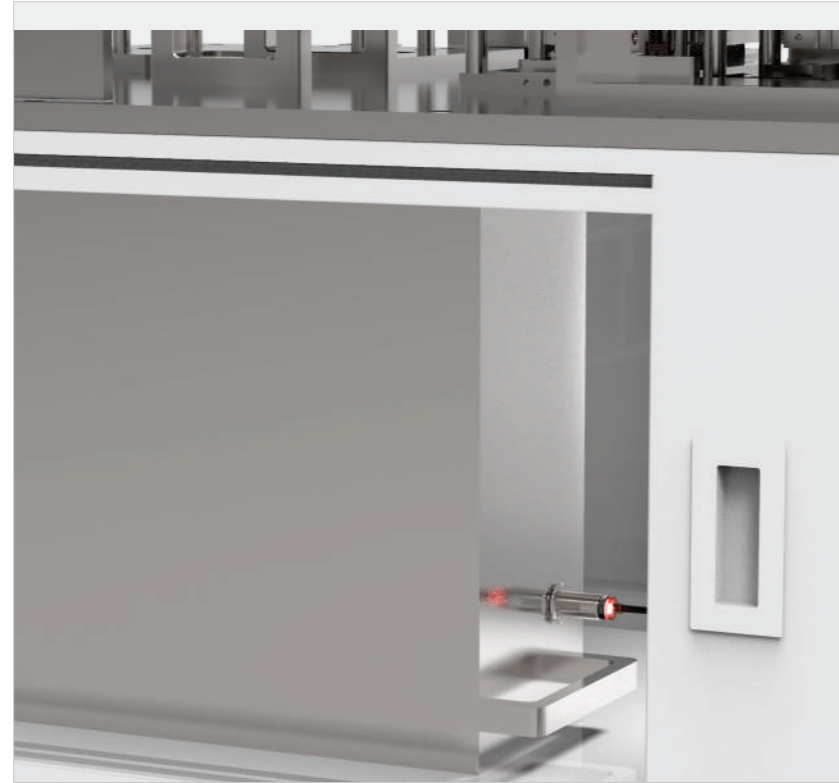
## Check whether the lithium battery is loaded

Application:

The installation space is limited, and jitter will occur during the operation of the equipment. Therefore, the customer requires that the sensor should not only be small in size, but also shock resistance. In addition, the color of lithium battery varies, hence detection is required to be unaffected by the color; in order to meet the high volume production requirement, the sensor response time should be less than 2ms.

Solution:

Ultra-thin thru-beam photoelectric ESL sensor is offered. Along with good shock performance, the sensor is able to detect li-ion batteries of any shape, color, and material. Coupling with its ultra-thin body and < 1.2 ms response time , it can easily meet customer requirements.
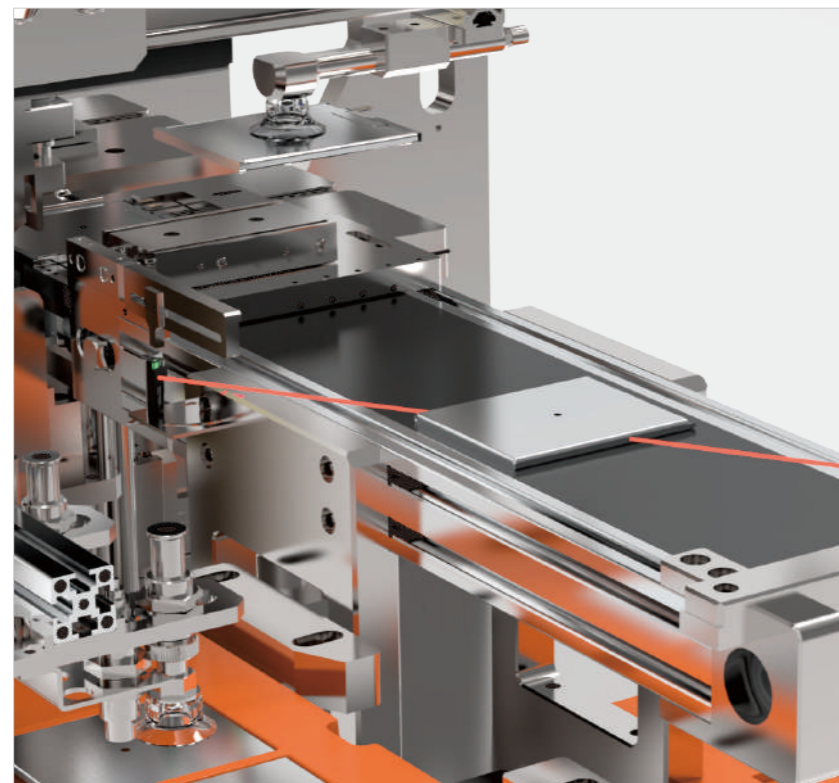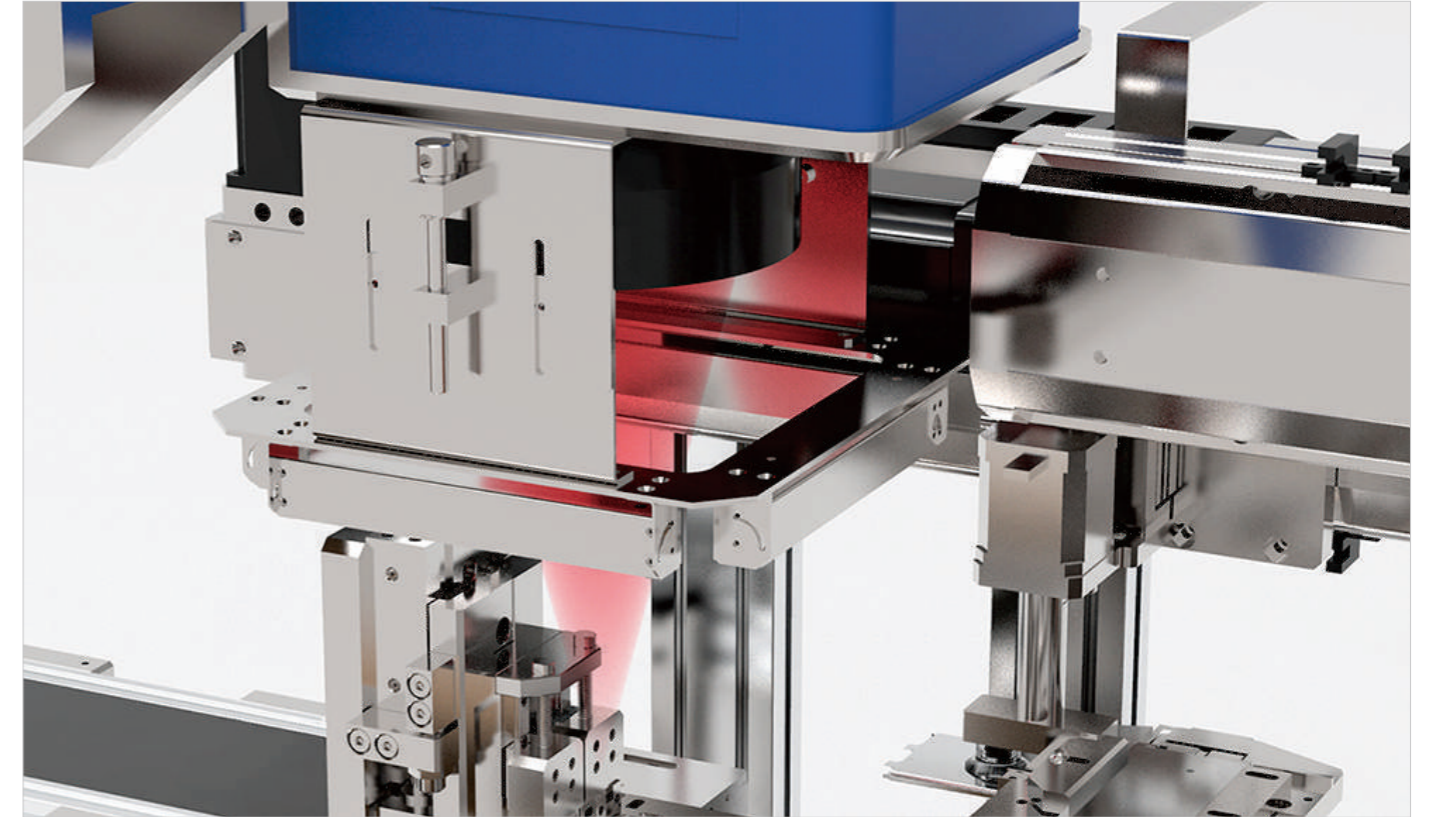
Defects inspection after the welding process

Application:

Common welding issues like carcks, porosity, pentration and fusion, undercut will affect the quality of battery, while the problems are difficult to indentified by contraditional vision algorithum.

Solution:

The MEIJI AIV platform is used to independently train AI algorithms for complex scenarios such as material tracking, defect location, counting, and multi-category appearance defect detection.AKUSENSE AIV provides extremely fine recognition capabilities. It can learn the marked structure information of the target through self-coding, and identify 4 to 5 pixel densities that cannot be recognized by ordinary algorithms; it also has super model parallel processing capabilities, can perform image processing on multi-card machines, can process 4 times the field of view of a normal network, and can process a single image with up to 100 megapixels, achieving 15+ defect detection with 99%+ accuracy.

Smart warehousing

In order to build smart factories, improve the condition of raw material storage and transportation, reduce losses caused by misoperation during the sorting process, and improve operational efficiency, smart logistics systems are urgently needed.
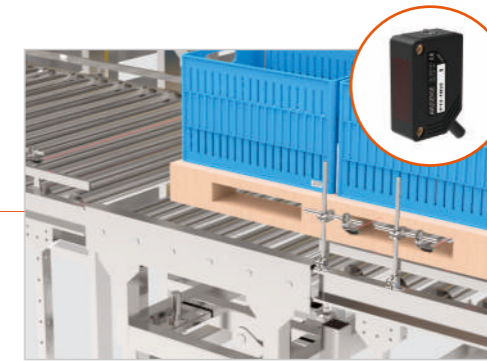
Position limitation

Through-beam Photoelectric
PTV-TM20AP

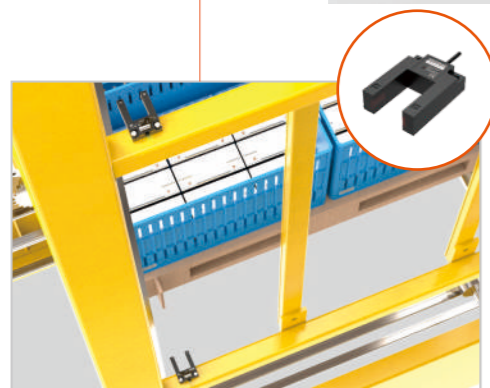• Anti-interference
• Large beamwidth, easy to install and adjust
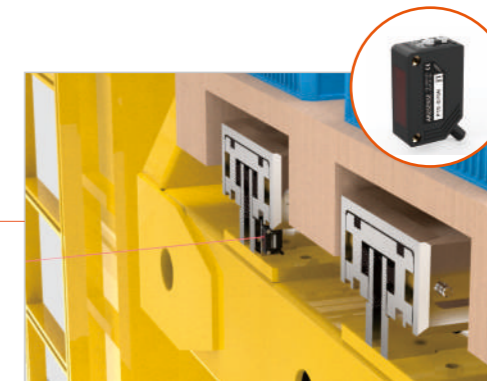
DPresence/absence detection

Photoelectric Sensor
PTE-D70N

• Adopts advanced anti-interference algorithm, featureswith excellent stability
• Response speed <1ms, 5~1000mm sensing range.

Obstacle avoidance for stacker

2D Lidar
AS-31C

• 270°scanning within 20 meters, angular resolution 0.12°
• Dirt,light, rain immuned.

Shuttle positioning and speed limitation

Slot Sensor
KIM30-0304P-J

• 30mm slot width, response speed ≤0.6ms, can detect opaque objects above φ2mm
• Good anti-interference performance and good stability

AGV obstacle avoidance

2D Lidar
AS-33C

• 270°scanning within 10 meters range
• Equipped with self-diagnosisfunction and abnormal alarm function
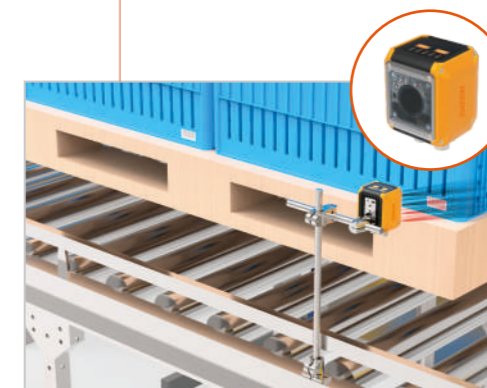
Production traceability

Smart Code Reader
RCD-AI100-X Series

• Red, white and polarized lightsources available
• Long reading range
• Super high resolution, supports ultra-small code reading

AGV navigation

Application:

During the transportation process, the AGV needs to choose its own transportation path. This application requires lidar detection accuracy within centimeters, and the ability to detect multiple targets at the same time, and to set the detection area arbitrarily.

Solution:

AKUSENSE obstacle avoidance Lidar AS-31C adopts TOF principle to monitor the distance between the stacker and obstacles, thereby achieving precise obstacle avoidance or positioning. AS-31C offer 270°scanning angle in 20m range for option. With 0.12°angular resolution, 30Hz scanning frequency, 0.05°resolution, and 1cm error, AS-31C can be adapted to various detection scenarios.
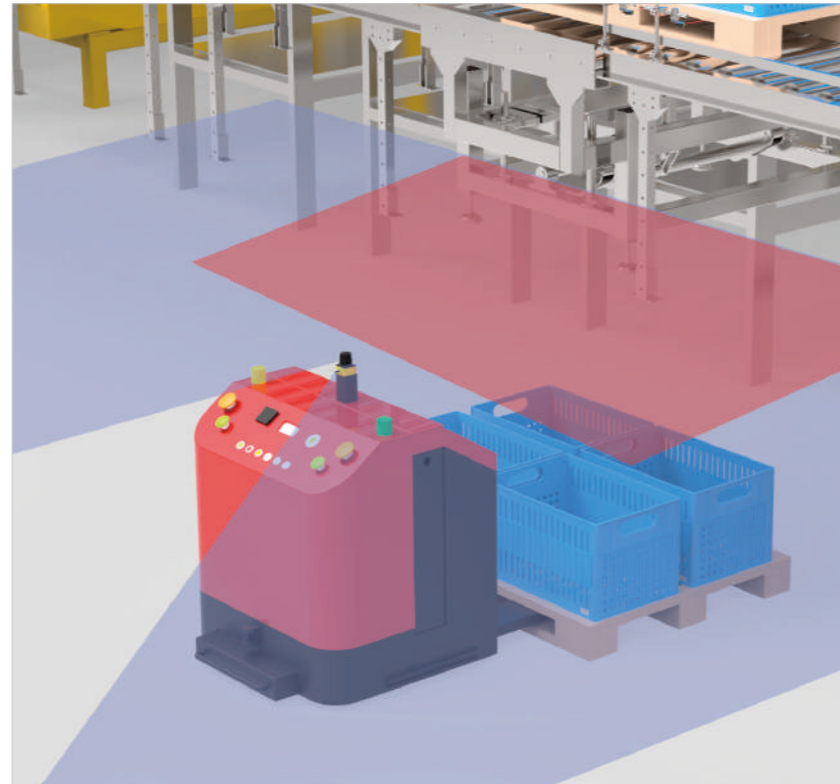
Production traceability

Application:

From the moment batteries enter the warehouse, manufacturing information needed to be read and stored for subsequent traceability and control.

Solution:

The RCD-AI100-X smart code readers offer megapixels and 16 flexible light tuning solutions. It has outstanding code reading performance for highly reflective objects like battery. The RCD-AI100-X series also equipped with deep learning algorithms and networking functions, stable reading can still be achieved even if the barcode is dirty, blurred, scratched, etc.
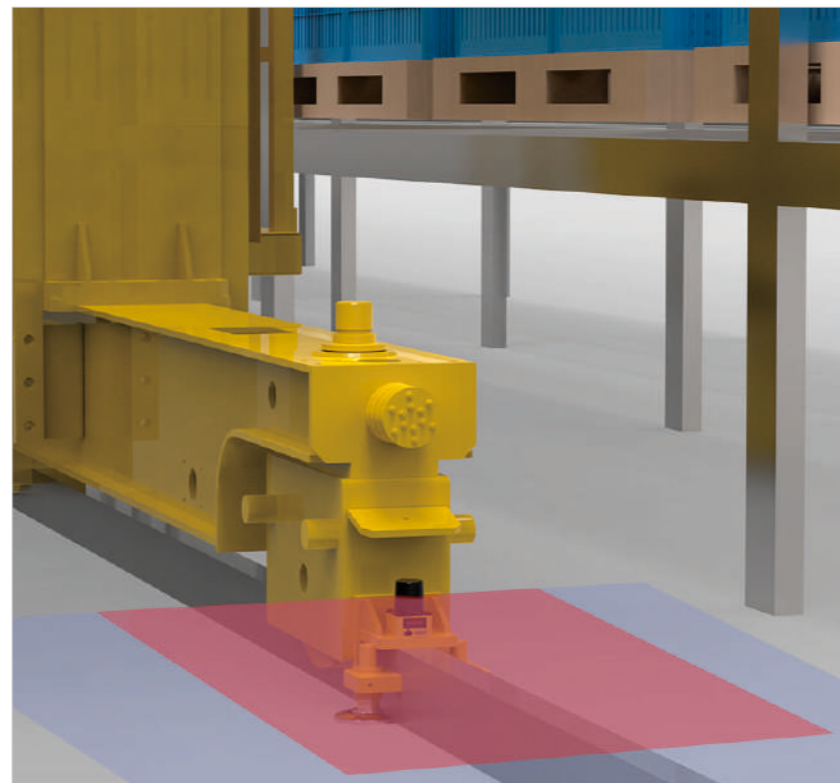

Obstacle avoidance for stacker

Application:

Electrolyte filled battery needs to be transported and place statically to make the electrolyte to be fully infiltrated. The transportation process needs to pass through a stacker, where Lidar is needed for collision prevent.

Solution:

The stacker is equipped with 2d Lidar AS-33C to prevent collision from happening.AS-33C supprots 3 areas monitoring in a single channel (64 channels in total).The software provided by AKUSENSE can display the status information of objects within the measurement range of the detection sensor in real time and give alarm signals (attention, early warning, alarm); AS-33C can perform 270° detection within a 10-meter scanning range, and also has equipment self-testing functions to meet application needs.
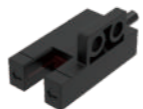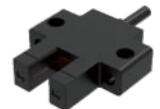
Fiber optic amplifier

Model	PG1-N/P	PE1-N/P	PC1-NH/PH/NH2/PH2	PC3-NPH/NPH2
Image				
Light source	Red,4-elements LED	Red modulated light 630nm	Red LED 660nm	Red LED 660nm
Power	12~24V DC±10%	12~24V DC	12~24V DC	12~30V DC±10%
Switching mode	–	L.on / D.on switchable	L.on / D.on switchable	L.on / D.on switchable
Output mode	NPN or PNP open collector	NPN or PNP open collector	Single/dual channel NPN or single/dual channel PNP	Integrated dual output, NPN / PNP switchable
Response time	SHP: 13μs,FINE: 30μs, SUPR: 100μs,MEGA: 200μs	160us (1-HS)/320us (2-FS)/ 960us (3-ST)/1.92ms (4-LG)/ 3.84ms (5-PL)	16μs/22μs(1-HS)，70μs(2-FS) 250μs(3-ST)，500μs(4-LG) 1ms(5-PL)，2ms(6-UL)，8ms(7-EL)	16μs,70μs,250μs,500μs, 1ms,2ms,8ms
protection degree	–	IP50	IP50	IP54
Application cases	Lithium Winding Machine P12; Lithium Wrapping Machine P20; Lithium Tab Cutting Machine P24			

Slot type

Model	SF-302N/NA/P/PA-W	ST-303N/NA/P/PA-W	SR-304N/NA/P/PA-W	SL-305N/NA/P/PA-W	SK-306N/NA/P/PA-W	SY-307N/NA/P/PA-W
Image						
Detection distance	5mm (slot width)					
Detection of standard objects	Opaque objects over 1.2*1.8mm					
Repeatability	Below 0.03mm					
Output mode	NPN or PNP open collector					
Response frequency	3KHz					
Protection degree	IP50					
Application cases	Lithium Winding Machine P12; Lithium Laminating Machine P16; Lithium Wrapping Machine P20; Lithium Tab Cutting Machine P24; Lithium Shelling Machine P28; Lithium Laser Welding Machine P32					

Fiber Components

Model	PD-32	PD-42	PD-62	PD-C310-35FA
Image				
Detection method	Diffuse reflection	Diffuse reflection	Diffuse reflection	Diffuse reflection
Size	M3	M4	M4	M3
Minimum bending radius	R15	R15	R15	R15
Detection distance	With PC1:120mm With PG1:60mm	With PC1:120mm With PG1:45mm	With PC1:350mm With PG1:150mm	With PC1:220mm With PG1:90mm
Application cases	Lithium Winding Machine P12; Lithium Wrapping Machine P20; Lithium Tab Cutting Machine P24			

Wide slot type

Model	KIM30-0304N/P-J
Image	
Detection method	Thru-beam
Detection distance	30mm
Current consumption	≤15mA
Response time	≤0.6ms
Light source	Infrared 940nm (modulated)
Protection degree	IP65
Application cases	Lithium Smart Storage P36

PTE Series

Model	PTE-D70N/P	PTE-X09N/P	PTE-R200N/P	PTE-TM10NO/PO	PTE-TM10AN/AP
Image					
Detection method	Diffuse reflection	Convergent reflective	Retro-reflection	Thru-beam	Thru-beam
Detection distance	5~1000mm	5~140mm	2m	10m	10m
Spot size	about φ50mm / 1000mm	about φ9mm / 140mm	φ50mm / 2m	Opaque objects over φ12mm	Opaque objects over φ12mm
Response time	<1ms	<1ms	<1ms	3.3ms	3.3ms
Light source	Red LED 623nm (modulated)	Red LED 623nm (modulated)	Red LED 623nm (modulated)	Red LED 623nm (modulated)	Red LED 623nm (modulated)
Protection degree	IP65	IP65	IP65	IP65	IP65
Application cases	Lithium Winding Machine P12; Lithium Tab Cutting Machine P24; Lithium Shelling Machine P28; Lithium Smart Storage P36				

ESL Series

Model	ESL-25NC/NO/PC/PO	ESL-T50NC/NO/PC/PO	ESL-TM01NC/NO/PC/PO
Image			
Detection method	Convergent reflective	Thru-beam	Thru-beam
Detection distance	2~25mm Non-adjustable	500mm non-adjustable	1m Non-adjustable
Detecting object	50*50mm white card	φ2mm opaque	φ2mm opaque
Response time	≤1.2ms	≤1.2ms	≤1.2ms
Light source	Infrared LED 950nm (modulated)	Infrared LED	Red light
Protection degree	IP67	IP67	IP67
Application cases	Lithium Laminating Machine P16;Lithium Welding Machine P32		

PTJ Series

Model	PTJ-T80NO/NC/PO/PC-I	PTJ-T150NO/NC/PO/PC-I
Image		
Detection method	Thru-beam	Thru-beam
Detection distance	80cm non-adjustable	150cm non-adjustable
Detection of standard object	Opaque objects over φ6mm	Opaque objects over φ6mm
Response time	3.3ms	3.3ms
Light source	Infrared LED 850nm (modulated)	Infrared LED 850nm (modulated))
Protection degree	IP64	IP64
Application cases	Lithium Laminating Machine P16	

ESB Series

Model	ESB-S10N/P	ESB-15N/P	ESB-30N/P	ESB-V30N/P	ESB-C20N/P
Image					
Detection method	Diffuse reflection-BGS	Diffuse reflection-BGS	Diffuse reflection-BGS	Diffuse reflection-BGS	Diffuse reflection-BGS
Detection distance	5~100mm	5~150mm	0 to 300mm (White non-glossy paper)	10~300mm	10~200mm
Spot size	About φ1.5mm/10cm	About φ9mm/15cm	About φ16mm/30cm	--	About φ12mm/200mm
Response time	≤2ms	5ms	≤2ms	<1ms	≤2ms
Light source	Red LED small spot 623nm (modulated)	Red LED small spot 623nm (modulated)	Red LED small spot 623nm (modulated)	Red LED small spot 940nm (modulated)	Red LED small spot 623nm (modulated)
Protection degree	IP65	IP65	IP65	IP65	IP65
Application cases	Lithium Wrapping Machine P20;Lithium Shelling Machine P28				

PTV Series

Model	PTV-D30N/P	PTV-D70N/P	PTV-X09N/P	PTV-TM20NO/PO/NO/PO	PTV-T500N/P
Image					
Detection method	Diffuse reflection	Diffuse reflection	Convergent reflective	Thru-beam	Thru-beam
Detection distance	10-300mm	5-1000mm	5-140mm	20m Non-adjustable	5m
Light source	Infrared LED (940nm modulation)	Infrared LED (940nm modulation)	Infrared LED (940nm modulation)	Infrared LED (940nm modulation)	Infrared LED (940nm modulation)
Response time	<1ms	<1ms	<1ms	<5ms	<5ms
Load current	<100mA	<100mA	<100mA	<100mA	<100mA
Protection degree	IP65	IP65	IP65	IP65	IP65
Application cases	Lithium Smart Storage P36				

ELE Series

Model	ELE-B15N/P	ELE-D40N/P	ELE-RM05N/P	ELE-TM30N/P
Image				
Detection method	Diffuse reflection-BGS	Diffuse reflection	Retro-reflection	Thru-beam
Detection distance	1~15mm	40cm	5m	30m
Spot size	about φ1. 5mm/15cm	about φ1. 5mm/40cm	about φ20mm/5m	about φ60mm/30m
Response time	≤2ms	≤2ms	≤2ms	≤2ms
Return range	≤5%SN	≤20%SN	≤20%SN	≤20%SN
Protection degree	IP65	IP65	IP65	IP65
Application cases	Lithium Tab Cutting Machine P24			

ESC/ESE Series

Model	ESC-18N/P	ESE-10N/P
Image		
Detection method	Diffuse reflection	Diffuse reflection
Detection distance	18±2mm	10mm±3mm
Spot size	φ6mm/18mm	1x5mm(setting distance:10mm)
Response time	Mark mode:H1/0.25ms,H2/0.5ms,L/1.2ms Color mode:H1/0.8ms,H2/1.6ms,L/4ms	Mark mode:0.5ms; Color mode:2ms
Light source	RGB three-colour light source	Red/blue/green composite LED (peak throw wavelength: 625nm/470nm/525nm)
Protection degree	IP67	IP67
Application cases	Lithium Coating Machine P08	

TRN Series

Model	TRN6.5-02NO	TRN08-02NO	TRN12-04NO	TRN18-08NO	TRN30-15NO
Image					
Mounting	Unshielded	Unshielded	Unshielded	Unshielded	Unshielded
Detection distance	2mm±10%	2mm±10%	4mm±10%	8mm±10%	15mm±10%
Size	φ6. 5	M8	M12	M18	M30
Switching frequency	2KHz	1KHz	800Hz	500Hz	150Hz
Repeatability	< 1. 0%(Sr)	< 1. 0%(Sr)	< 5. 0%(Sr)	< 1. 0%(Sr)	< 1. 0%(Sr)
Protection degree	IP67	IP67	IP67	IP67	IP67
Application cases	Lithium Coating Machine P08; Lithium Tab Cutting Machine P24;Lithium Shelling Machine P28				

TQ Series

Model	TQF17-05NO	TQF18-05NO	TQF18C-05NO
Image			
Mounting	Shielded	Shielded	Shielded
Detection distance	5mm±10%	5mm±10%	5mm±10%
Size	Q17	Q18	Q18C
Switching frequency	1KHz	1KHz	1KHz
Repeatability	< 1. 0%(Sr)	< 1. 0%(Sr)	< 1. 0%(Sr)
Protection degree	IP67	IP67	IP67
Application cases	Lithium Laminating Machine P16		

MLD Series

Model	MLD21-100/220/500A-485	MLD23-30/100/200N
Image		
Reference distance	100/220/500mm	30/100/200mm
Detection distance	65~700mm	25~280mm
Linear accuracy	±0.1% / ±0.2% / ±0.3%	±0.1% / ±0.2%F.S.
Repeatability	70µm/200µm/300µm/600µm	10µm/70µm/200µm
Light source	Laser CLASS 2	Red Semiconductor Laser Wavelength: 655nm 1mW Class2
Protection degree	IP67	IP66
Application cases	Lithium Coating Machine P08; Lithium Laminating Machine P16	

ETD Series

Model	ETD-0612
Image	
Detection method	Thru-beam
Measurement range	Edge mode: ±6mm; Width mode: 12mm
Spot size	–
Linear accuracy	±0.12% F.S. (when setting distance 20mm); ±0.28% F.S. (when setting distance 100mm)
Repeatability	1µm (at a setting distance of 20mm); 2.5µm (at a setting distance of 100mm); 5µm(at the setting distance of 500mm)
Protection degree	IP50
Application cases	Lithium Coating Machine P08; Lithium Winding Machine P12

AS Series

Model	AS-31C	AS-32C	AS-33C
Image			
Laser spot	7*3mm	4.5*2mm	–
Scanning angle range	270°	270°	270°
Scanning frequency	10Hz/15Hz/20Hz/25Hz/30Hz	10Hz/15Hz/20Hz/25Hz/30Hz	25Hz
Scanning angle resolution	0.12°/0.18°/0.23°/0.35°	0.12°/0.18°/0.23°/0.35°	0.5°
Detection distance	0.1m~20m (70% reflectivity)	0.1m~20m (70% reflectivity)	10m (70% reflectivity) 4m (10% reflectivity)
Data sampling rate	30KHz	30KHz	18KHz/54KHz
Application cases	Lithium Smart Storage P36		

MR Series

Model	MR-C7-S/N	MR-C8-C/U-S/N
Image		
Applicable slot type	C type	C+U type
Detecting magnetic poles	N-pole and S-pole models available	N-pole and S-pole models available
Magnetic sensitivity	4.5~6mT	4.5~6mT
Response time	5ms	5ms
Output method	NPN Normally Open (N.O.) (ON for proximity)	NPN Normally Open (N.O.) (ON for proximity)
Protection degree	IP67	IP67
Application cases	Lithium Winding Machine P12; Lithium Wrapping Machine P20; Lithium Tab Cutting Machine P24; Lithium Shelling Machine P28; Lithium Laser Welding Machine P32	

MUD Series

Model	MUD-60N/P-18-GL
Image	
Detection distance	30~60mm
Blind spot	5mm in front of the transmitter and receiver
Angle deviation	±45° from vertical
Transducer frequency	400kHz / 200kHz
Response time	2.5ms in autorun mode / 6.5ms in autorun mode
Protection degree	IP65
Application cases	Lithium Laminating Machine P16

BSL/BZL/SAF Series

Model	BSL Series	BZL Series	SAF Series
Image			
No. of optical axes	4~32 axes	6~32 axes	4~72 axes
Protection height	90~1240mm	50~1240mm	130~3000mm
Protection distance	123.1~1273.1mm	0.3~3m	0.1~40m
Optical axis spacing	30/40mm	10/14/20/25/30/40mm	10/20/30/40mm
Response time	≤20ms	≤15ms	≤20ms
Protection degree	IP65	IP65	IP65
Application cases	Lithium Coating Machine P08; Lithium Winding Machine P12; Lithium Shelling Machine P28; Lithium Laser Welding Machine P32		

TSP Series

Model	TSS-20300A/V1/V2	TSS-100A/V1/V2
Image		
Measurement range	-20℃ ~ 300℃	0℃ ~ 100℃
Temperature Accuracy	± 2% of the measured value	± 2% of the measured value
Repeat Accuracy	± 1% of the measured value	± 1% of the measured value
Resolution	1°C	1°C
protection degree	IP65	IP65
Dimension	67*18mm,M18 thread	67*18mm,M18 thread
Application cases	Lithium laser welding machine P32	

Sensor Parameter

VDS10 Series

Model	VDS10 Series
Image	
Resolution	1280×800(HxV)
Maximum capture frame rate	60
Shutter	Global shutter
Pixel Size (μm)	3×3
Target Size	1/4"
Light source	Unpolarised red light/unpolarised white light/polarised red light/polarised white light
Application cases	Lithium Coating Machine P08; Lithium Tab Cutting Machine P24; Lithium Shelling Machine P28;

RCD-AI100 Series

Model	RCD-AI100-X Series	RCD-AI100-S Series
Image		
Resolution	1280×800	1280×800
Read Maximum Speed	60pcs/second	60pcs/second
Pixel size	3 um x 3 um	3 um x 3 um
Focusing Method	Mechanical Focus	Liquid Focus / Manual Focus
Light source	Unpolarised red light, unpolarised white light, polarised red light, polarised white light	Unpolarised red light, unpolarised white light, polarised red light, polarised white light
Identifiable coding	one-dimensional code; Code 39,Code93,Code128,EAN-8,EAN-13, Interleaved 2 of 5,UPC;two-dimensional barcode: QR code,DataMatrix	one-dimensional code：Code 39,Code93,Code128,EAN-8,EAN-13, Interleaved 2 of 5,UPC; two-dimensional barcode：QR code,DataMatrix
Application cases	Lithium Shelling Machine P28;Lithium Shelling Machine P36	