The Quality Connection
| The LEONI Group                                      | 4 |
| Business Unit Industrial Solutions                   | 5 |
| Business Activity Robotics                           | 6 |
| Machine perception – Overview                        | 7 |
| advintec TCP calculation and calibration of robotic tools and fixtures | 8 |
| Automatic absolute calculation of robotic tools and fixtures | 9 |
| 3D-/5D-/6D calibration                                | 16 |
| Types of installation                                |  |
| advintec 6D laser measurement                        |  |
| advintec 6D laser measurement – Overview             | 17 |
| Unracking                                           | 18 |
| Gripper measurement                                  | 20 |
| Part location                                        | 21 |
| Machine vision systems                               |  |
| Standard solutions with advintec Vision System       | 22 |
| Turnkey custom solutions                             | 24 |
| Services                                             | 26 |
| Robotics expertise – Worldwide                       | 27 |
The LEONI Group
Cable expertise for all kinds of industrial markets

LEONI is a leading supplier of cable systems and related services for the automotive industry and various other industrial sectors.

Our group of companies employs more than 75,000 people in 32 countries. Corporate vision, highest quality and innovative power have made us one of the leading cable manufacturers in Europe. LEONI develops and produces technically sophisticated products ranging from wire and optical fibers to cables through to complete cable systems and also offers the related services.

Moreover, the product portfolio comprises strands, standardised cables, hybrid cables, glass fiber as well as special cables, cable harnesses, wiring systems components and fully assembled systems for applications in various industrial markets.

Your markets – our strength.

As diverse as our product and service range are the markets and sectors LEONI is supplying. We focus our activities on customers in the fields of Automotive & Commercial Vehicles, Industry & Healthcare, Communication & Infrastructure, Electrical Appliances and Conductors & Copper Solutions.

We are among the leading European suppliers in the Communication & Infrastructure market to which at LEONI as a cable manufacturer also belong activities in the fields of Infrastructure & Data Communications, Industrial Plant Projects, Solar & Windpower, Energy & Telecommunications, Irradiation Cross-Linking and Traffic Engineering. Our customers benefit worldwide from innovative as well as reliable and long-lasting products of high quality. LEONI – we create the best connection for your future.

For further information www.leoni.com
Industrial Solutions – our activities
in the industrial business

Global presence. Innovative products, engineering and logistic services. Technological and quality advantage.

In our worldwide competence centers, LEONI develops and manufactures standardized and custom cables and cable systems supported by the highest level of industrial engineering and service. Our products are readily available through LEONI’s best-in-class sales organization through our global network located in nearly 50 facilities worldwide.

Business Unit Industrial Solutions has proven its industrial competency to machine-, line- and plant-builders as well as robot and measurement device manufacturers around the world. Whether your organization is a global OEM or tier supplier, let your partners at LEONI help solve your most difficult industrial design and equipment challenges.

Engineering, Products, Services – LEONI is your professional system supplier.

The best solution for our partners is what we specialised in – in a multifaceted market.

LEONI offers you an extensive range of products and services, which meets the multifaceted requirements of the market not only in its breadth, but also in its depth.
Business Activity Robotics is active throughout the world and uses its extensive product and production know-how and high level of system expertise to offer a comprehensive range of products and services for the industrial robotics market. The portfolio built around the dresspack system is a world leader. Furthermore, standard and customer-specific special cables and their assembly, polyurethane hoses, secondary welding cables, calibration and calculation systems for robotic tools and fixtures in up to six dimensions, systems for 6D laser measurement that are used for unracking, gripper measurement and part location applications and industrial machine vision systems are also provided. Another focus area is PLC and robot programming, as well as automation systems training. Competence in system business is particularly underlined by the range of robotic function packages supplied to customers ready for integration.

We serve a wide range of industries, such as:
- Automotive industry
- Aerospace industry
- Metal processing
- Plastics processing
- Timber processing
- Paper processing
- Food industry
- Other aspects of mechanical engineering

You will be impressed by our services. Many years of worldwide experience have made us experts. We work closely together with our customers, catering to their individual needs with the support of professional project management and sophisticated logistics concepts. We can draw up solutions that are perfectly tailored to your needs, particularly in the following applications:
- Spot welding
- Laser applications
- Gluing
- Handling
- Painting
- Drilling
- Gas shielded welding
- Riveting
- Stud welding
- Polishing
- Grinding
- Tool and robot calibration
- Machine vision
- and many more

Robotics – a challenging field in which you can fully rely on us.

Reduce your down time.
Our product range in the field of machine perception comprises calibration and calculation systems for robotic tools and fixtures in up to six dimensions as well as systems for 6D laser measurement that are used for unracking, gripper measurement and part location applications. These systems feature an independence of robot types, standardisation, scalability and ease of use. Furthermore we offer machine vision systems including installation services, bus integration, standardisation services and feasibility studies.
Automatic absolute calculation
of robotic tools and fixtures

To avoid time-consuming program modifications during plant extension or new tool setup work, we offer absolute initial calibration as part of an automated process. This keeps follow-up teach-ins to a minimum. The process involves the tool being moved to the centre of the photoelectric barrier, so as to generate the tool data. Only the tolerance zone (in which the tool is permitted to move) and the starting point of the calibration need to be taught-in to the system. Once complete, the robot moves the tool within the defined tolerance zone and calibrates itself automatically with the aid of the supplied program. The advantages here include the high level of precision and the automated, standardised and reproducible procedure, which is able to eliminate the kinds of human errors that occur with conventional manual calibration. In addition, initial calibration is also both rapid and cost-effective.

Mobile calibration case for the initial calibration of unknown tools and fixtures (TCP & Base)
Flexible, mobile calibration for unknown tools and fixtures is now also possible with our mobile calibration case. Ideal for use when setting up new production lines.

Calibration case contents:
- Precision laser sensor
- TCP controller
- Cable set
- Power supply unit
- Tripod for secure placement of the mobile sensor
- Data interface to robot control
- Software package

Order no. TCP0029

advintec TCP calculation and calibration of robotic tools and fixtures
advintec TCP calculation and calibration of robotic tools and fixtures

3D-/5D-/6D calibration
Applicable for all robot brands

Our calibration system – everything from one source

The challenge
Continually securing the correct operating position for fixtures and robotic tools such as welding torches and milling tools.

The solution
The advintec TCP tool calibration system calibrates the tool or fixture electronically in up to six dimensions. The processing position is automatically corrected by the measured variations and ensures that the tool always operates at the correct position. advintec TCP is a high-precision calibration system that can be used for all robot types and most robotic tools, making it independent of specific manufacturers.

Your benefit
Correction takes place directly and automatically in the ongoing production process.

Advantages at a glance
- Automatic absolute calculation of robotic tools and fixtures
- Auto-commissioning and ease of use
- Simplified Integration in the production line due to small footprint
- Robust sensor available in three sizes
- Multi-sensor-system (connection of additional sensors possible)
- Connection of the calibration system to the robot controller, i.e. the calibration procedure takes place in an evaluation unit and transfers correction values to the robot controller
  - High process reliability
  - No additional PC's required
  - Logging of calibration data
  - Data evaluation possible at all times
- Automatic correction of the trajectory due to wear and tear or tool-replacement and no failures caused by positioning factors
  - 100 % quality assurance
- Reduction of costs
  - Prevents the production of defective parts
  - Reduces scrap and rework
  - Short setup times

advintec TCP – Calculation and calibration of robotic tools and fixtures in up to 6 dimensions
Our measuring devices for machines and robots ensure that each production step is executed exactly in the way it was intended. Nothing is left to chance during production. Measuring devices will, if necessary, correct the control program to ensure that each part leaves the production line as planned.
Integration of advintec TCP in the production process

- uncomplicated
- reduction of robot programming to a minimum
- speedy installation
- easy set-up
- logging of calibration-data: regular data evaluation possible at any time
- no additional PCs required

Scope of supply:
1. TCP sensor
2. TCP controller
   >> Cable set (5 m): power cable, sensor cable, bus cable set
   >> Robot program examples
   >> Documentation on CD

Not included:
3. Robot controller
4. Robot
The advintec TCP calibration system is a multi sensor system, i.e. up to three sensors can be connected to one controller.

**Sensors**

**advintec TCP sensors**

are available in three sizes (internal dimensions)

- **Order no. TCP0008**: 120 mm x 120 mm
- **Order no. TCP1008**: 240 mm x 240 mm
- **Order no. TCP2008**: 300 mm round

**advintec TCP precision laser sensors**

are available in two sizes (internal dimensions)

- **Order no. TCP3008**: 120 mm x 120 mm
- **Order no. TCP4008**: 300 mm round

**Dimensions**

Six dimensions

- **A** = Rotation around Z axis
- **B** = Rotation around Y axis
- **C** = Rotation around X axis

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>3D</th>
<th>5D</th>
<th>6D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibration time</td>
<td>3 sec. complete</td>
<td>9 sec. complete</td>
<td>15 sec. complete</td>
</tr>
<tr>
<td>- 2D calibration</td>
<td>6 sec. complete</td>
<td>5D calibration</td>
<td>6D calibration</td>
</tr>
<tr>
<td>- 3D calibration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>2 or 3 translations</td>
<td>5 (3 translations, 2 rotations)</td>
<td>6 (3 translations, 3 rotations)</td>
</tr>
<tr>
<td>Fields of application</td>
<td>Arc welding, stud welding, spot welding, laser welding, tig welding, gluing, milling</td>
<td>Gripper calibration, fixture calibration, power train applications, high precision applications</td>
<td></td>
</tr>
</tbody>
</table>
The TCP system is generally applicable for all rotation-symmetric and non-rotation-symmetric tools. For special applications we offer you optional technology packages.

TCP software sealant nozzle (hook nozzle)

This software add-on was developed specifically for the calibration of sealant nozzles with special geometries (hook nozzles) for hem sealing. Very precise determination of position and orientation of TCP incl. supervision of nozzle geometry / material build-up at the nozzle.

TCP software stud welding

This software add-on was developed specifically for the calibration of stud welding tools with a foot. Automated calibration of stud welding head. Exact determination of tool axis along the linear side (5D calibration of TCP). Automatic differentiation between stud retainer and support leg.

TCP software tandem torch

Both welding wires can be calibrated simultaneously.

TCP software milling / drilling

Automated calibration of milling tools and drill bits including tool breakage detection and diameter supervision. Ideal for use with spindles with automatic tool changers. Stores the dimensions of multiple tools and verifies whether the correct tool is loaded in the tool changer.

TCP software cutting tools / blades

Enables a 6D calibration of cutting blades such as deburring knives and ultrasonic knives. Exact calibration of the TCP position, orientation and cutting direction.

TCP software gripper / fixtures

Automated 6D calibration of robot gripper. Ideal for exchangeable grippers and high-precision applications such as engine and gearbox assembly. Compensation of temperature drift.
### Technical data of advintec TCP sensors

**at 20 °C / 24 V DC**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor type</td>
<td>2 channel infrared 880 nm, pulsed at 2kHz</td>
</tr>
<tr>
<td>Interface</td>
<td>Serial or field bus (DeviceNet, Profinet, Interbus etc.)</td>
</tr>
<tr>
<td>Calibration accuracy</td>
<td>0.02 mm</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP67</td>
</tr>
<tr>
<td>Smallest detectable object</td>
<td>0.7 mm</td>
</tr>
<tr>
<td>Dirty surroundings</td>
<td>Yes</td>
</tr>
<tr>
<td>Casing</td>
<td>Aluminium</td>
</tr>
<tr>
<td>Automatic correction of tool data</td>
<td>Yes</td>
</tr>
<tr>
<td>CE mark</td>
<td>Yes</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>10 – 34 V DC</td>
</tr>
<tr>
<td>Connections</td>
<td>IBS connector, 5 pin, PE advance conn.</td>
</tr>
</tbody>
</table>

### Technical data of advintec TCP precision laser sensors

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
<th>300 mm round</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor type</td>
<td>2 channel red light laser pulsed at 3kHz, laser class 1 (IEC 60825-1)</td>
<td>2 channel red light laser pulsed at 3kHz, laser class 1 (IEC 60825-1)</td>
</tr>
<tr>
<td>Interface</td>
<td>Serial or field bus (DeviceNet, Profinet, Interbus, etc.)</td>
<td>Serial or field bus (DeviceNet, Profinet, Interbus, etc.)</td>
</tr>
<tr>
<td>Calibration accuracy</td>
<td>0.02 mm</td>
<td>0.02 mm</td>
</tr>
<tr>
<td>Smallest detectable object</td>
<td>0.1 mm</td>
<td>0.2 mm</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP67</td>
<td>IP67</td>
</tr>
<tr>
<td>Dirty surroundings</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Casing</td>
<td>Aluminium</td>
<td>Aluminium</td>
</tr>
<tr>
<td>Automatic correction of tool data</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CE mark</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>10 – 34 V DC</td>
<td>10 – 34 V DC</td>
</tr>
<tr>
<td>Connections</td>
<td>IBS connector, 5-pin, PE advance conn.</td>
<td>IBS connector, 5-pin, PE advance conn.</td>
</tr>
</tbody>
</table>
### Order numbers advintec TCP-system

<table>
<thead>
<tr>
<th>TCP System</th>
<th>advintec TCP-3D</th>
<th>advintec TCP-5D</th>
<th>advintec TCP-6D</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCP-3D Sensor + INI</td>
<td>TCP0001</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>DeviceNet</td>
<td>TCP0002</td>
<td>TCP0002 + TCP0009</td>
<td>TCP0002 + TCP0010</td>
</tr>
<tr>
<td>PROFIBUS</td>
<td>TCP0003</td>
<td>TCP0003 + TCP0009</td>
<td>TCP0003 + TCP0010</td>
</tr>
<tr>
<td>INTERBUS</td>
<td>TCP0004</td>
<td>TCP0004 + TCP0009</td>
<td>TCP0004 + TCP0010</td>
</tr>
<tr>
<td>PROFINET 2 Port</td>
<td>TCP0005</td>
<td>TCP0005 + TCP0009</td>
<td>TCP0005 + TCP0010</td>
</tr>
<tr>
<td>Ethernet IP</td>
<td>TCP0006</td>
<td>TCP0006 + TCP0009</td>
<td>TCP0006 + TCP0010</td>
</tr>
<tr>
<td>RS 232</td>
<td>TCP0007</td>
<td>TCP0007 + TCP0009</td>
<td>–</td>
</tr>
</tbody>
</table>

### Order numbers of spare parts advintec TCP

- Replacement sensor 120 mm x 120 mm: TCP0008
- Replacement sensor 240 mm x 240 mm: TCP1008
- Replacement sensor round 300 mm: TCP2008
- Replacement sensor laser 120 mm x 120 mm: TCP3008
- Replacement sensor laser round 300 mm: TCP4008
- TCP-Software 5D: TCP0009
- TCP-Software 6D: TCP0010
- Milling: TCP0011
- X mode stud welding: TCP0012
- Ext. Z-mode hook nozzle: TCP0013
- TCP-Hardware E/A Interface: TCP0014
- Power supply cable 5 m: TCP0015
- Sensor cable 5 m: TCP0016
- Fieldbus DeviceNet male: TCP0017
- Fieldbus DeviceNet female: TCP0018
- Fieldbus PROFIBUS male: TCP0019
- Fieldbus PROFIBUS female: TCP0020
- Fieldbus INTERBUS male: TCP0021
- Fieldbus INTERBUS female: TCP0022
- Fieldbus PROFINET: TCP0023
- Fieldbus Ethernet IP: TCP0024
- Terminating resistor DeviceNet: TCP0025
- Terminating resistor PROFIBUS: TCP0026
- Pedestal steel: TCP0027
- Pedestal aluminum: TCP0028
- Calibration case: TCP0029

We also offer corresponding trainings and services. Please contact us for your individual offer.
Cleaning, anti-spatter spraying, wire cutting and tool calibration in 10 seconds*: All in one system.

Our calibration system advintec TCP is also applicable for automated torch calibration. Automated torch calibration and correction of the TCP in 2D, 3D or 5D incl. wire centricity check. The calibration system can be integrated directly into the torch cleaner. As an option, it can take over the control of the torch cleaner via an integrated I/O module.

Field of application

Arc welding

Maximum diameter of the torch

35 mm

Bigger diameters on request.

Contact us for an individual offer.

Advantages at a glance

- Shorter cycle times due to short distances
- Cost reduction
- No decentralised I/O modules required as the cleaner is actuated by the calibration system controller, which makes it fieldbus-capable
- One-stop installation, on-site commissioning and service
- Only one stand required as the measurement system is attached directly to the torch cleaner.
- Small footprint due to the compact design
- Easy to use

* According to customer’s wishes. Longer spraying times possible at any time.
Types of installation
inline and permanent or temporary

Aside from stationary installation the TCP sensors can be robot guided. This enables a permanent calibration of fixtures (bases). In addition, we offer you a mobile system, which is delivered in a case and can be used for mobile calibration needs – everywhere and any time.

Calibration – inline and permanent

Exemplary set-up with **stationarily mounted TCP sensor** for calibration of robotic tools

Exemplary set-up with **robot guided TCP sensor** for calibration of fixtures

Calibration – temporary

Exemplary set-up with **mobile TCP sensor** for calibration of robotic tools and fixtures
Advantages at a glance

- High precision 6D laser measurement without technical aids or reference parts
- Corrections of processing position take place directly and automatically within ongoing production process
- Eliminates manual program corrections
- Scalability and standardisation
- Simple to integrate and use
- Simple commissioning via supplied robot program
- High tolerance to ambient light
- Measurement time starting from 3 sec. (depending on configuration and application)
- Increase of plant availability and quality assurance of products
- Cost savings compared to conventional mechanical systems

advintec 6D laser measurement calibrates grippers, fixtures and locates parts in robotic applications inline and thereby extends the range of options for machine perception. It can also be used as crash recovery system in order to re-calibrate tools and fixtures after collisions. During gripper measurement it ensures the precise calibration of grippers or gripped parts for precision handling, e.g. for power-train applications, such as engine and transmission parts. Precisions laser sensors secure that changes in the gripper or in the part location are detected at an early stage and are corrected inline.

Due to the modular set-up the calibration system can be adapted to the corresponding application and consists of advintec controller, sensor interface, sensors (laser point, laser line or infrared sensor etc.) and cable set.

As a standard we use laser triangulation sensors. The system is expandable, i.e. multi sensor capable.

Triangulation sensor

The standard laser sensor is available for different ranges:

<table>
<thead>
<tr>
<th>Type of measurement</th>
<th>Measuring range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20 mm</td>
</tr>
<tr>
<td>Laser optic triangulation</td>
<td></td>
</tr>
</tbody>
</table>

| Start of measuring range | 30 mm | 45 mm | 50 mm |
| End of measuring range   | 50 mm  | 95 mm | 150 mm |
| Resolution               | 10 μm  | 25 μm | 50 μm  |
| Laser protection class   | Class 2 acc. to DIN EN 60825-1:2008.05 |
| Protection class         | IP67   |
| Weight                   | Approx. 83 g |
Unracking

The challenge
In modern production plants it is often necessary to extract parts (body side panels, roofs, hoods and similar parts) that are then delivered in bins for further processing in a fully automated fashion. To this end, industrial robots are mostly used. If the part is not exactly located where expected, the robot cannot continue its operating cycle.

The solution
- guidance of the robot via an electronic part calibration system
- 6D calibration of the part position (translation and rotation) by means of laser or infrared sensors integrated within the gripper – direct connection with robot controller via field bus
- automated adjustment of pick position – online

The laser detects features such as curves or edges.
### Integration

**Scope of supply:**
1. Sensors installed in gripper
2. Sensor interface
3. advintec controller
   - Cable set (5 m): power cable, sensor cable, bus cable set
4. Robot program for calibration
5. Commissioning and training

**Not included:**
1. Robot
2. Robot controller

### Technical data of the LEONI unracking solution

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor type</td>
<td>Laser class 2 875 nm + ultrasonic</td>
</tr>
<tr>
<td>Interface</td>
<td>Field bus (DeviceNet, Profibus, Profinet, Interbus, etc.)</td>
</tr>
<tr>
<td>Calibration accuracy</td>
<td>0.1 mm</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP65/67</td>
</tr>
<tr>
<td>Dirty surroundings</td>
<td>Yes</td>
</tr>
<tr>
<td>Dimensions</td>
<td>6 (3 translations + 3 rotations)</td>
</tr>
<tr>
<td>Automatic correction</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Field of application**

Unracking of side panels, roofs, bonnets (hoods) or similar parts
The challenge
To measure grippers or gripped parts for precision handling, e.g. for power-train applications, such as engine and transmission parts. Also applicable as crash recovery system.

The solution
- 6D laser measurement of grippers / gripped parts using stationary sensors
- Changes in the gripper / part position are detected early and corrected online. This avoids collisions and optimises precision positioning

The laser detects geometrical features of the gripper.
Part location

The laser detects features such as holes, edges, curves or surfaces.

The challenge
To ensure the correct processing position of parts for precision applications such as handling, welding, sealing, milling etc.

The solution
- 6D laser measurement of the position of parts and fixtures
- The robot path is automatically corrected according to part position to ensure processing always takes place in the correct location
Standard solutions with advintec Vision System

Overview

The advintec Vision System is an extremely compact, easy to handle, universal vision system for industrial robot applications with two-dimensional or three-dimensional vision requirements (including ultrasonic sensor).

The system is controller based and equipped with a standardized interface. The sensor can be mounted on the robot arm or in a stationary position. Depending on the application, a combination with further sensors is possible, e.g. ultrasonic, IR or laser.

Fields of application

- 2D / 3D robot guidance
- Defect detection
  - Inspection of the surface quality of an object (i.e. cracks, porosity, voids etc.)
- Assembly verification
  - Verifying the presence of objects
- Part identification
  - Identifying the correct part is present, e.g. datamatrix, OCR etc.

Advantages at a glance

- Multi sensor configuration without PC
- Simplified integration in the production line due to the small footprint
- No cabinets required
  - All components = IP67 protection class
- Reduced integration costs and low maintenance costs
- Auto-commissioning functionality with auto-calibration and teach functionality
- Direct interface to the robot controller via standard field bus without special protocols
  - High process reliability
  - No additional PC required
  - Data logging
  - Saving of fault images
  - Short processing times
- 100 % quality assurance, which means higher process reliability and productivity through the reduction of position related faults
- Easy to handle for operators and maintenance staff
**advintec Vision System**

![Diagram of advintec Vision System with a robot controller and fieldbus connections to a camera system.]

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## Technical Data advintec Vision System

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resolutions (CCD)</strong></td>
<td>CCD 640 × 480 px (1/4&quot;)</td>
</tr>
<tr>
<td><strong>Speed</strong></td>
<td>Max. 50 insp./sec.</td>
</tr>
<tr>
<td><strong>Fault image memory</strong></td>
<td>32 8 4</td>
</tr>
<tr>
<td><strong>Number of jobs (products)</strong></td>
<td>Up to 255 on the device (can be exchanged via the process interface)</td>
</tr>
<tr>
<td><strong>Features per job</strong></td>
<td>32</td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td>Web interface (live image, job switching, display fault image)</td>
</tr>
<tr>
<td><strong>Setup</strong></td>
<td>Ethernet (10 Base-T / 100 Base-TX)</td>
</tr>
<tr>
<td><strong>Process interface</strong></td>
<td>Serial or field bus (DeviceNet, Profinet, Interbus, EtherNet/IP etc.)</td>
</tr>
<tr>
<td><strong>Casing</strong></td>
<td>Aluminium, IP67</td>
</tr>
<tr>
<td><strong>CE-Mark</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Operating voltage</strong></td>
<td>18-30 V DC</td>
</tr>
<tr>
<td><strong>Connections</strong></td>
<td>M12 connector</td>
</tr>
</tbody>
</table>

---

### Calibration modes

- **Selectable dimensions**
  - 2D
  - 3D
  - Multiple sensors

- **Additional modes**
  - Robot guidance
  - Inspection
  - OCR
  - Datamatrix / barcode

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06. 2016 | www.leoni-industrial-solutions.com
Turnkey custom solutions
Overview

We were the first machine vision integrator to be named by the AIA as a Certified Systems Integrator (CSI), and we have more advanced-level Certified Vision Professionals (CVP) than any other company.

Using our in-house machine vision development lab and highly qualified engineering team, LEONI Vision Solutions regularly solves industry’s most difficult machine vision inspection, assembly and verification applications.

LEONI vision solutions engineers start with in-depth front-end analysis to build a well-informed foundation for the vision solution design. Then we design, integrate, commission and support a custom solution using the best machine vision hardware and software for your application – not our partner’s software or a preferred hardware provider.

Certification

- **CSI**
  The North American machine vision standards and trade association, AIA (Automated Imaging Association), has evaluated our depth of expertise and industry experience and certified we meet the highest standards for a machine vision integrator.

- **CVP**
  LEONI vision solutions has a reputation of being at the forefront of machine vision technology. As a result, LEONI Vision Solutions’ engineers have been certified at the Advanced Level by the AIA. The CVP program requires that vision professionals retest every three years to maintain their certification.

Advantages at a glance

- More advanced-level certified vision professionals (CVP) on staff than any other machine vision integrator
- **Certified school of learning and training** by the state of Michigan
- **ISO 9001-certified** machine vision design methodology means we’re efficient, cost-effective, and reliable
- Risk analysis up front; no change directions mid-solution
- **Agnostic approach** to machine vision software and hardware
- Reduction of hard tooling and labor costs
- Improvement of quality and reduction of scrap

We were the first machine vision integrator to be named by the AIA as a Certified Systems Integrator (CSI), and we have more advanced-level Certified Vision Professionals (CVP) than any other company.
Robot guidance
Vision-guided robotics adapt to changing parts on the fly.
The LEONI vision solution determines the location and orientation of the unloaded dunnage trays. This offset information is sent to the robot that will be used to adjust the part locations accordingly. The vision solution is also responsible for counting connecting rods and placing them into the empty dunnage trays.

System Advantages:
- Minimal part fixturing needed
- Significant labor reduction as parts do not need to be handled by personnel
- The same solution can handle multiple components in random order
- Switching between products is now automatically controlled and very fast
- Easily adapts to variations in dunnage and fixtures
- High residual value, even if production is changed

Defect detection
In-line system finds defects while inspecting overall metal quality based on porosity in cast and machined parts.
The machined material turns bright white while turning the porosity a very noticeable dark contrast. The vision solution is also inspecting the size and distance between the pores.

System Advantages:
- The inspection is run in-line, which means if any defect is found, the part can be taken out of production before any extra cost is added
- Runs parallel to other operations, requiring minimal process time
- The solution is very accurate, finding pores down to 0.03 mm
- Quality personnel can change the parameters of the pore inspection without changing the overall inspection

Part identification
AutoID track and traceability delivers lean operations, regulation compliance, and liability protection. The LEONI vision solution reads the text string and produces a score to verify the data is correct. The vision solution can also use 1D barcodes or 2D matrix codes to confirm part identification.

System Advantages:
- Full-scale traceability of manufacturing/assembly processes allows manufacturers to locate defective parts and quarantine them before they are shipped to a customer
- Monitor and improve workflow
- Improve profitability by decreasing scrap
- Error proof the manufacturing process

Assembly verification
This in-line vision solution designed for a seat manufacturer inspects molds on a moving conveyor to check for the presence and location of multiple colored wires, felt pads, Velcro strips, and plastic tabs with an accuracy down to +/- 2 mm and mold-to-mold variance of 10 mm. After inspection, the vision solution tells a nearby PLC whether or not to pour foam material into the mold cavities based on pass/fail criteria. Specific challenges included the depth of the mold, which varied by 350 mm, requiring the camera system to have a minimum depth of field of +/- 175 mm, as well as imaging wires of various colors located in front of colored backgrounds where the background color was unknown prior to inspection.

System Advantages:
- By providing system manuals and in-depth system training, plant personnel are able to maintain the vision solution themselves without having to rely on a separate company
- Cutting down the need for QA personnel to manually inspect the product for defects allows a reduced labor force
- The robots will not pour material into molds that do not have the proper components in the right locations, therefore reducing the amount of scrap and saving money
Services

Measurement concept
We analyse the process conditions and work with the customer to develop an application-specific solution model to ensure optimum measurement, in the form of a feasibility study. Depending on the level of complexity – or at the customer’s request – an on-site test installation then follows, whose results we discuss with the customer. Findings from the test installation are analysed by our experienced team and accounted for appropriately in the final measurement concept.

Installation
To ensure that the final system runs as smoothly as possible, it is especially important that customers can rely on professional installation services. We install our sensor technology as required, either on stationary systems or robotic tools or grippers, and we also handle all of the cabling work. If special attachment components are needed, then we manufacture these for our customers.

Commissioning
During standard commissioning, our team of specialists performs commissioning of measurement functionality based on the documentation. This includes verifying settings while also ensuring the optimum level of system functionality. If required, we can also integrate our measurement system into customer PLCs (i.e. plant logic). The controller is integrated into the respective fieldbus and our software package is interfaced with the customer’s robot code – i.e. our software is modified to suit customer-side programming standards.

Product training
Our product training sessions are conducted by experienced Service Technicians with extensive expertise in production processes. We also offer customer-specific training tailored to plant operators, maintenance staff and commissioning personnel.

System integration
We offer our customers a complete package of services for system integration: from the preparation of the measurement model and installation to commissioning and subsequent product training, we are responsible for every step of system integration.
LEONI Industrial Solutions – centres of competence

**Germany**
LEONI elocab GmbH
LEONI protec cable systems GmbH

**France**
LEONI CIA Cable Systems S.A.S.

**Great Britain**
LEONI Tailor-Made Cable UK Ltd.

**Spain**
LEONI Systems Spain, S.L.

**Czech Republic**
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**Canada**
LEONI Elocab Ltd.

**USA**
LEONI Engineering Products & Services, Inc.

**India**
LEONI Cable Solutions (India) Private Limited

**China**
LEONI Cable (China) Co., Ltd.

**Japan**
LEONI Wire & Cable Solutions Japan K.K.

**Singapore**
LEONI (SEA) Pte. Ltd.

**South Korea**
LEONI Wiring Systems Korea, Inc.

You can find the contact details of our international partners on www.leoni-industrial-solutions.com
Find out more

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