**THE PRINCIPLE** - INLINE PROCESS CONTROL + AI

Sensor measures directly ahead of the controlled application.

**THE PROPERTIES** - INLINE PROCESS CONTROL + AI

Robot guidance and process control through VISIONSCANNER2.

**CONTROL YOUR PROCESS OR PATH APPLICATION**

Whether adhesive application, brazing or welding. Control your application tailored to your needs. Therefore use the arbitrary process parameters (e.g., effective gap area or width of the gap) to control the volume of adhesive or filler metal.

Guide and control your path application process through the assist of INLINE PROCESS CONTROL by AI. Whether adhesive application, brazing process or welding application, VISIONSCANNER2 identifies precisely any correction and process data and communicates these real time to the robot.

- 6D correction through continuous recording of the predetermined geometry for guidance.
- Real time correction through continuous generation of measuring data every 12 ms.
- Compensation of part position and tolerances.
- Additionally integrated process control system through configurable process parameters (e.g., area between gaps).
- Control system for avoidance of swing up.
- Orthogonal orientation of tool to application path.
- Compensation of application indolence through predetermined distance of sensor to application and accurate adjustment per parameter of software.
- Low maintenance: In case of a defect sensor, a simple exchange (see “commissioning and maintenance”) is required.

**COMPENSATION OF PRODUCTION PART TOLERANCES AND POSITION**

Guide your robot and attached tool with preceding VISIONSCANNER2. Position and tolerances of the production part are compensated in real time.

6D correction through continuous recording of the predetermined geometry for guidance.

Real time correction through continuous generation of measuring data every 12 ms.

Compensation of part position and tolerances.

Additionally integrated process control system through configurable process parameters (e.g., area between gaps).

Control system for avoidance of swing up.

Orthogonal orientation of tool to application path.

Compensation of application indolence through predetermined distance of sensor to application and accurate adjustment per parameter of software.

Low maintenance: In case of a defect sensor, a simple exchange (see “commissioning and maintenance”) is required.
AI+VISIONSCANNER2 is being delivered with multiple measuring tools. Thereby it solves most of your measuring tasks already.

**POSITION**
E.g. increase the positioning accuracy of your production process.

**RELATION TWO POINTS**
100% checks of important dimensions of your product.

**AREA**
E.g. regulation of adhesive load during application.

**ANGLE**
Secure e.g. the quality of your bending process.

**GAP**
Track e.g. the accuracy of assembling automotive closures into a car body.

**YOUR TASK**
We develop customized solutions for your needs.

**CONTACT US!**

The strength of AI+ INLINE PROCESS CONTROL is its ability for integration. We offer multiple industrially standardized interfaces.

The PC requires the technology option KUKA RobotSensorInterface (RSI) for real-time control of the process.

--- Software products or software options which need to be installed on a robot or PC.

<table>
<thead>
<tr>
<th>Robot Manufacturer</th>
<th>Supported Controllers</th>
<th>Mandatory Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>KUKA</td>
<td>KRC2, KRC4, VRKRC2, VRKRC4</td>
<td>KUKA.Ethernet KRL, XML</td>
</tr>
<tr>
<td>Stäubli</td>
<td>S7</td>
<td></td>
</tr>
<tr>
<td>FANUC</td>
<td>RJ30B, RJ30A, RJ30B</td>
<td>Siemens Socket Messaging, RJ40B User Socket Messaging</td>
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<tr>
<td>ABB</td>
<td>IRC5</td>
<td>PC-Interface Option 618-1</td>
</tr>
<tr>
<td>YASKAWA</td>
<td>DX200</td>
<td>MotoPlus</td>
</tr>
<tr>
<td>Comau</td>
<td>CS5</td>
<td>PBL2 Read/Write on TCP/IP</td>
</tr>
</tbody>
</table>

--- Automation Interface TCP/IP Interface

--- Robot Interface Interface
Configure; Visualize & Control Tasks

Put your measuring, control or robot guidance task in effect within shortest time. Therefore a fully integrated, graphical user interface is at your disposal. Programming skills are not required. Keep the system under control and use data from a previous period for analysis.

Live View
Configure your measuring tasks online based on live data.

Graphical Parameter Setting
Fast and precise system configuration through intuitive graphical setting of parameters.

Difficult Object Properties & Environmental Conditions

AI° VisionScanner2 uses multiple mechanisms to ensure a robust profile reading. Thereby it is perfectly applicable also to difficult measuring tasks in today’s production environments.

1. Bandpass Filter
Reduction of system errors incidence of extraneous light.

2. Robust Extraction of Laser Line
Automatic resolution of ambiguity by reflection or scattered light. Extraction of the laser line simultaneously between light and dark lines.

3. Preprocessing of Profiles
Morphological filter for elimination of flaw.

4. Dynamic Adjustment of Light Exposure
Verification of line intensity in a defined area of the measuring location. Adjustment to optimal illumination also for scanning processes.

Database of Defect Characteristics
Control and optimize your measuring tasks offline based on saved measuring data.

Measuring and Control Data
The graphical visualization offers a simple overview over measuring and control data.

Commissioning & Maintenance

Within only a few steps AI° VisionScanner2 is fully integrated into the automation environment. Next to simple mechanical and electrical setting, the development has been carried out specifically in regards to network configuration and creation of measuring programs.

1. Mechanical Integration
For repeatedly accurate mounting, VisionScanner2 is positioned through two centered bushes.

2. Network Cable
VisionScanner2 is being configured through network interface, but also connected to the superordinate controls system (PLC) or a robot.

3. Control Cable
The sensor is being powered through a control cable. The digital input and output plugs ensure a very simple integration into the automation environment and the trigger inputs and outputs allow for a synchronized set up with multiple sensors.

4. Serial Number
At setup or exchange of the sensor, just select the sensor with its dedicated serial number. The network configuration of the specific sensor is automatically adjusted to preset configuration.

5. Configuration
After mechanical and electrical commissioning of the automation environment, measurement tasks can be created. The integrated automation interface can be configured. Now, measuring tasks can be triggered by the superordinate system and measuring and control data can be drawn. Extended feature is the process data interface, which allows for control of the measuring process and specifically the quality of the product being measured.
**TECHNICAL DATA**

**Sensor Technology**
- CMOS Sensor

**Reading speed**
- up to 500 Hz

**Measuring accuracy**
- ± 0.2 % of measuring field, depending on feature and surface property

**Laser**
- Laser Class 1 at 660 nm

**Lifetime laser**
- 40,000 h (independent from cycle of operation)

**Interface**
- Fast Ethernet 10/100 Mbit, Half-/Full-duplex, Auto negotiation

**Power supply**
- 24 V DC, max. 400 mA

---

**MEASUREMENT RANGE**

<table>
<thead>
<tr>
<th>Distance (mm)</th>
<th>45</th>
<th>25</th>
<th>50</th>
<th>60</th>
<th>48</th>
</tr>
</thead>
</table>

**FIELD OF VIEW**

<table>
<thead>
<tr>
<th>Start (mm)</th>
<th>60</th>
<th>80</th>
<th>40</th>
<th>30</th>
<th>23</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle (mm)</td>
<td>90</td>
<td>190</td>
<td>58</td>
<td>38</td>
<td>30</td>
</tr>
<tr>
<td>End (mm)</td>
<td>120</td>
<td>300</td>
<td>75</td>
<td>45</td>
<td>0</td>
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</table>

**RESOLUTION**

<table>
<thead>
<tr>
<th>Resolution (mm/px)</th>
<th>0.1</th>
<th>0.15</th>
<th>0.05</th>
<th>0.03</th>
<th>0.01</th>
</tr>
</thead>
</table>

---

**connNECTIONS**

<table>
<thead>
<tr>
<th>Pin-No.</th>
<th>Signal</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OUT 2</td>
<td>Digital output 2</td>
</tr>
<tr>
<td>2</td>
<td>TRIG IN</td>
<td>Trigger input</td>
</tr>
<tr>
<td>3</td>
<td>OUT 1</td>
<td>Digital output 1</td>
</tr>
<tr>
<td>4</td>
<td>OUT 3</td>
<td>Digital output 3</td>
</tr>
<tr>
<td>5</td>
<td>IN 2</td>
<td>Digital input 2</td>
</tr>
<tr>
<td>6</td>
<td>OUT 4</td>
<td>Digital output 4</td>
</tr>
<tr>
<td>7</td>
<td>GND, RV</td>
<td>Ground, 0 V power supply</td>
</tr>
</tbody>
</table>

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**RESOLUTION in px**

<table>
<thead>
<tr>
<th>Resolution in px</th>
<th>Reading Speed in Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>1280 × 64</td>
<td>500</td>
</tr>
<tr>
<td>1280 × 128</td>
<td>336</td>
</tr>
<tr>
<td>1280 × 256</td>
<td>181</td>
</tr>
<tr>
<td>1280 × 512</td>
<td>93</td>
</tr>
<tr>
<td>1280 × 768</td>
<td>63</td>
</tr>
<tr>
<td>1280 × 1024</td>
<td>50</td>
</tr>
</tbody>
</table>

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**Camera**

<table>
<thead>
<tr>
<th>Code</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>1280 × 640 px</td>
</tr>
<tr>
<td>M</td>
<td>1280 × 1024 px</td>
</tr>
<tr>
<td>H</td>
<td>2592 × 1944 px</td>
</tr>
</tbody>
</table>

**Laser**

<table>
<thead>
<tr>
<th>Code</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>6 mm</td>
</tr>
<tr>
<td>G</td>
<td>16 mm</td>
</tr>
</tbody>
</table>

**Focal Distance**

- 6 mm
- 16 mm

**Angle of Triangulation**

- 30°
- 45°

**Interface**

<table>
<thead>
<tr>
<th>Code</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>04</td>
<td>4-pin</td>
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<tr>
<td>08</td>
<td>8-pin</td>
</tr>
<tr>
<td>12</td>
<td>12-pin</td>
</tr>
<tr>
<td>F</td>
<td>Fast Ethernet</td>
</tr>
</tbody>
</table>

**Camera Interface**

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CODE</td>
<td>L0637</td>
<td>H0637</td>
</tr>
<tr>
<td>CODE</td>
<td>H1237</td>
<td>H1637</td>
</tr>
<tr>
<td>CODE</td>
<td>U1645</td>
<td></td>
</tr>
</tbody>
</table>

**Size**

- 110 x 85 x 35 mm

**Weight**

- ca. 400 g

**Protection class**

- IP 64

**Housing**

- Aluminium, eloxated

**Environmental conditions**

- for warehousing: −20 up to 60 °C, humidity max. 90 %
- during operation: 0 up to 55 °C, humidity max. 80 %

**Registrations**

- CE, UL
**COMMUNICATIVE**
Interface to robot or PLC through Industrial Ethernet, TCP/IP or IO

**ROBUST**
Automatic adjustment of illumination and reflexion compensation of the laser line for extreme conditions

**SMART**
No PC needed during operation

**SIMPLE**
Graphic configuration without programming skills

**ALLROUNDER**
Detection, measuring, verification and control on one device

**FUNCTIONAL**
User and change management, configuration and fault analysis using PC software VISIONELEMENTS.

**POWERFUL**
Laser triangulation is possible on almost any surface

**SMALL BUT IMPRESSIVE**
Suitable for industrial use, compact design

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**AUTOMATION INTERFACE**
We know the challenges manufacturing companies have to handle complex production systems to enhance their own competitiveness. Our products offer the highest level of comfort and only need little specialist knowledge by using comfortable interfaces for various robots and control systems.

**ADAPTIVE IMAGING**
AI° stands out through optimal integration capability as well as highest user friendliness, specifically in regards to the requirements of today’s complex production scenarios. The components can be integrated without special programming skills.

**ARTIFICIAL INTELLIGENCE**
Thanks to many years of experience in dealing with industrial robots in the automotive industry, we understand the requirements for quality and process optimization in production environments for various products. Therefore, we deliver sensors and pertaining intelligence in an integrated machine vision solution.

**ALL INCLUSIVE**
We offer various possibilities for our customers, from components to integrated solutions. AI° not only offers high value products, but also services and support for parameter setting and start up, training as well as software programming for your special requirements.

**AI° STANDS FOR NEXT LEVEL IMAGING AND ROBOT VISION SYSTEMS OF ENGROTEC · SOLUTIONS GMBH.**