FAQs for TH6D
Seam Tracker

Guiding the way to a perfect welding seam

The in-process optical seam tracking with TH6D paves the way toward a perfect welding seam: Components and joints are recorded using a combination of laser lines and a camera, allowing the course of the welding seam to be corrected in real time. Contact free and independent of both system and process, the method is suitable for all standard seam shapes and types of material.

Universal, precise & non-touch!

ABICOR BINZEL® ROBOTIC SYSTEMS

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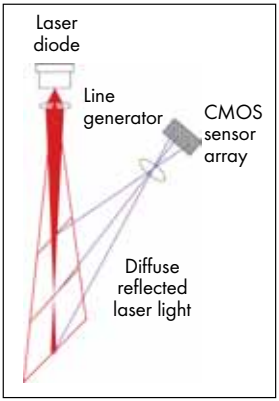
TH6D FAQ



1) How does the TH6D work?

A. It works on the concept of laser triangulation. A laser diode inside of the sensor creates lines and projects to the part. These lines reflect and are picked up by a camera. Data is then turned into lines which the system interprets as the joint and sends positional information to the motion system.

B: Information output includes data for X, Y and Z positions, rotation angle around each axis, joint, gap, mismatch, etc.

2) Why are three beams better than one?

A. Three times the sampling allowing for excellent stability during the acquisition of measurement data.

B. Uses the average of the three beams to calculate the path allowing for greater variances in material quality.

Detail	One-Line	More-Line
Seam geometry information	Y, Z, gap, area, mismatch, length of laser line	Y, Z, gap, area, mismatch, length of laser line
Angles	Not available, theoretical about comparing two or more pictures and robot information	A, B, C right, C left, C total
Measure redundancy	None	In every picture
Plausibility	None, because of missing redundancy	Yes, because of redundancy
3D applications	Only with additional software or multiple part measurement	Possible, due to all necessary information in one picture
Equivocality	None	Equivocality are possible, software parameters and filter supporting
Arithmetic average	Not available, theoretical possible calculating robot position with sensor measurements	Available
Concave-convex part detection	Not possible	Available, due to distance in x of laser line

3) What is the standoff distance? What is the look ahead distance?

A. Standoff: 150mm (+/- 12mm)

B. Look ahead (Robot Applications): 10mm to 30mm

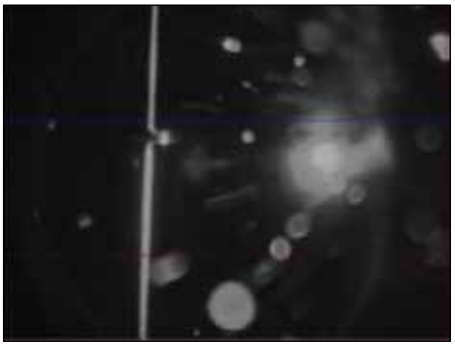
C. Look ahead (Fixed Automation): 10mm on the low side as far forward as the process will allow.

4) What is the resolution of the camera? What is the sampling rate?

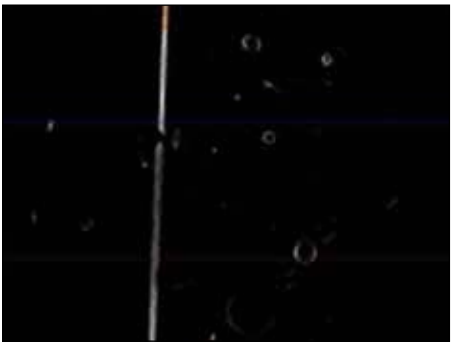
A. 0.03mm x 0.07mm
B. 60 - 240 Hz

5) Will the TH6D work on stainless steel or aluminum? Can the TH6D work on shiny material in general?

A. Yes, there can be a little more setup as the sensor angle to the joint is not as forgiving.
B. The system uses a data filter which is implemented by software and its purpose is to erase the reflections and all other light influences like the ones shown below:
   i. Welding spatter
   ii. Excessive reflection due to high reflective surfaces like aluminum



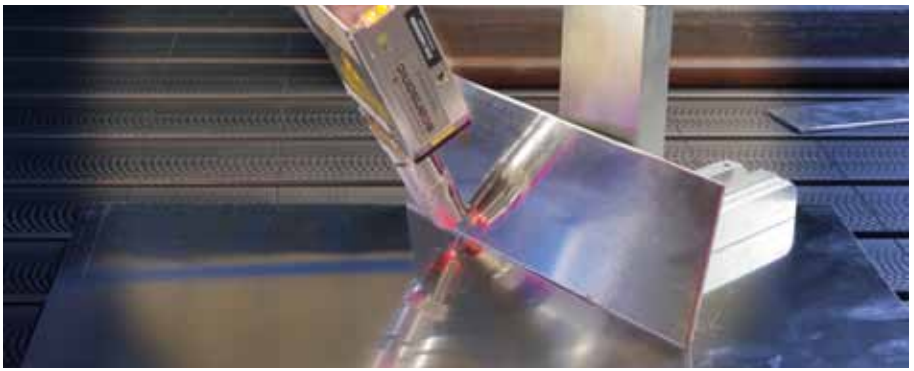
Without filtering



With filtering

6) What kind of tracking speed can be expected to achieve?

A. 6m/min (256 IPM) has been verified as possible with the right set up. Actual speed will vary to some extent. Most high end arc applications are at 80 - 120 IPM. the TH6D is capable of processing these speeds with good stability.



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7) What are my mounting options?

A. A number of pre-engineered mounts are available.

Reference Mounting Options chart of page 5.

Note: Contact Scott Huber or Toli Tselichev for specific applications.

8) What are the robot requirements?

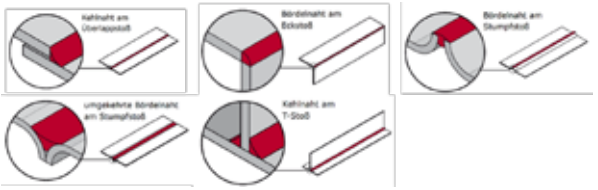
A. Robots will typically require a specific software set on the controller to support the installation and interpretation of data flow for motion control.

B. Most connections are done via Ethernet however digital/analog interfaces are available as well.

Reference Robot Requirements chart on page 6.

9) What type of welding joints can the TH6D track?

A. There are a number of pre-engineered welding joints defined. See below.



10) Am I limited to arc welding applications

A. This unit can be used for virtually any process that requires real time seam tracking including, but not limited to, MIG, TIG, plasma, laser, brazing, sealing, caulking, cutting, etc.

B. The addition of the AutoGuide to the product line is another great use for the TH6D. AutoGuide is an integrated product that includes a TH6D sensor, torch mount, and 2 axis motor package to control torch position (Y and Z up to 200 mm total in each direction) based on the TH6D seam tracking information. This can be used for gantry or fixed position welding and contains its own control package for setting up the seam tracking unit.

Mounting Requirements

TH6D Part No.	Torch Mounting System	Robot Model	Flange	Torch Type	
780.3241.0	iSTM	Fanuc Arcmate 100/120iC	780.3606.0	ABIROB A500/22° (980.1013.0) ABIROB A500/35° (980.1014.0)	
780.3242.0			780.3606.0	ABIROB A500 (980.1015.0)	
780.3245.0			780.0680.0	ABIROB 350GC/30° (980.0028) ABIROB W600 0°/22° (782.0190/782.0191)	
780.3251.0	iCAT			ABIROB A360 22°/35° (980.1024/980.1025) ABIROB A500 22°/35° (980.1013/980.1014) ABIROB W500 45° (782.0078) ABIROB W600 0°/22° (782.0190/782.0191) ABIROB 350GC 30° (980.0028) ROBO WH500 (962.1550)	
780.3261.0	iSTM	ABB IRB 2600iD	284.0499.0		
780.3272.0		ABB 1600iC	780.0678.0	ABIROB W600 0°/22° (782.0191/782.0192)	
For external robots				**Torch mounting system**	
780.3266.0	CAT2			ABIROB W500 22° (782.003/782.0076) 35° (782.0004/782.0077) 45° (782.0005/782.0078) ABIROB A360 22° (980.1024)	780.0414 780.420 780.0422 780.0444
780.3270.0				ABIROB W600 22° (782.0910/782.0214) 35° (782.0192/782.0215) 45° (782.0193/782.0216)	780.0781 780.0782 780.0784

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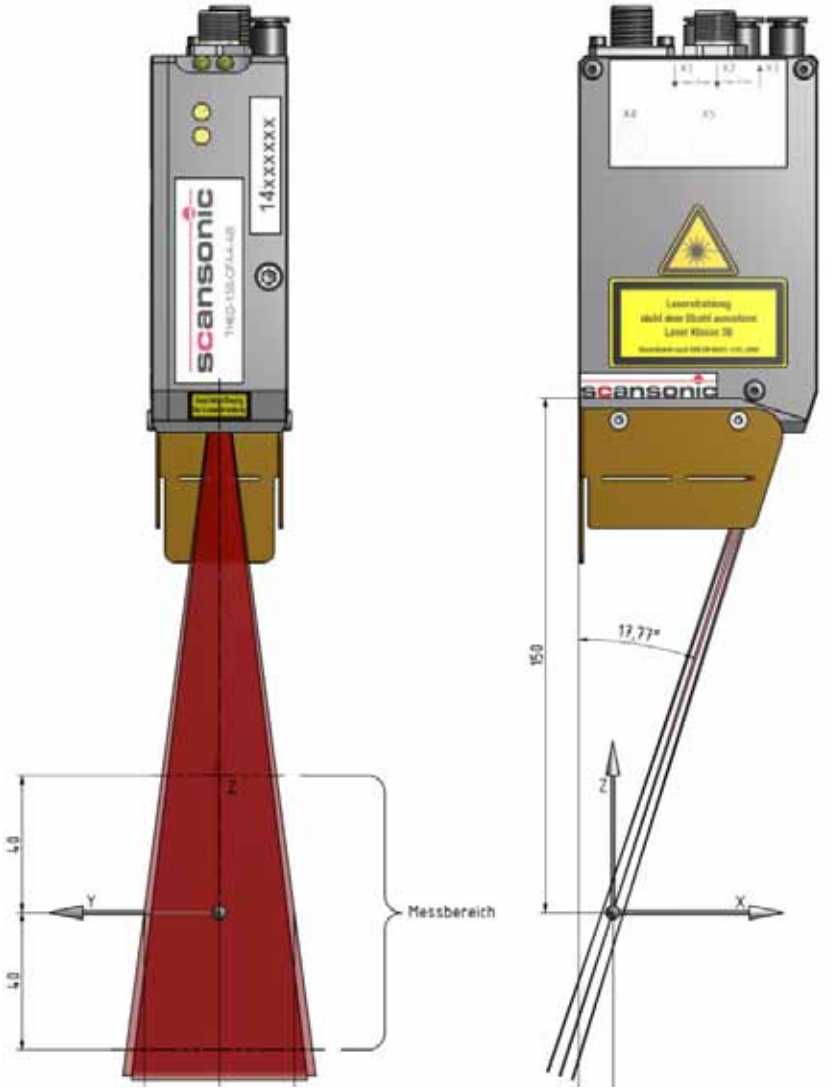
Robot Requirements

<table>
<tr><th rowspan="2">Robot Manufacturer</th><th rowspan="2">Interface</th><th colspan="3">Robot requirements</th><th rowspan="2">Calibration with</th></tr>
<tr><th>Hardware</th><th>Software</th><th>Data Link Sensor-robot</th></tr>
<tr><td rowspan="2">ABB</td><td>Ethernet</td><td rowspan="2">- Controller iRC5</td><td rowspan="2">- Robot System Software 5.15
- Option “Optical Tracking Arc 660-1”</td><td>Ethernet</td><td rowspan="2">Scansonic or ABB calibration plate</td></tr>
<tr><td>Serial</td><td>Serial IRS-732</td></tr>
<tr><td>Fanuc</td><td>Ethernet</td><td>- Controller R-J3iC
- Controller R-30iA
- Controller R-30iB
- Ethernet Part #2 must be free</td><td>- Operation system Fanuc “Arc Tool”
- Universal Sensor Interface (R691)
- User Socket Messaging (R648)</td><td>Ethernet</td><td>10 Point measurement (Opt: calibration plate 837.0882.1)</td></tr>
<tr><td rowspan="4">KUKA</td><td rowspan="2">RSI Interface</td><td>KR C2 edition 05
- Network Card 3Com 3C905CX-TX-M or Ethernet 100Mbit PCI</td><td>KUKA System Software (KSS) 5.4; 5.5 or 5.6
Software Modules:
- RSI Interface
- XML protocol
- InLine standard form</td><td rowspan="2">Ethernet</td><td rowspan="4">Scansonic calibration plate</td></tr>
<tr><td>KR C4
Standard Ethernet port</td><td>KUKA System Software 8.2.20 (or higher)
KUKA Robot Sensor Interface 3.1.3
KUKA.Ethernet KRL 2.1.3</td></tr>
<tr><td rowspan="2">Seam Tech Interface</td><td>KR C2 edition 05
- Network Card 3Com 3C905CX-TX-M or Ethernet 100Mbit PCI</td><td>KUKA System Software (KSS) 5.4; 5.5 or 5.6
Software Modules:
- SeamTech tracking(containing RSI Interface)
- XML protocol</td><td rowspan="2">Ethernet</td></tr>
<tr><td>KR C4
Standard Ethernet port</td><td>KUKA System Software 8.2.20 (or higher)
KUKA.Robot.Sensor Interface 3.1.3
KUKA.Ethernet KRL 2.1.3</td></tr>
<tr><td rowspan="2">Reis</td><td>Serial</td><td>IPC with RS422 interface refit</td><td>- RoboStar V
- Software Version 20.0 or higher (Proprietary Protocol)</td><td>Serial RS-422</td><td rowspan="2">Reis calibration plate</td></tr>
<tr><td>Ethernet</td><td>Standard</td><td>Software Version 24 or higher</td><td>Ethernet</td></tr>
<tr><td rowspan="2">Yaskawa</td><td>D/A Interface</td><td>- Controller DX100
- General Sensor DX100 with sensor board
- XO102-card</td><td>Robot System Software DS2.05.00A (–)00</td><td>Digital and Analog Signals</td><td>Golden Seam Referenz Path</td></tr>
<tr><td>Ethernet</td><td>Controller DX100</td><td>- Robot System Software DS1.61.00A-27
Tip: Port5020 has to be addressed in robot settings</td><td>Ethernet</td><td>Calibration plate</td></tr>
<tr><td></td><td>Digital/ Analog Interface</td><td>Analog input for measurements
- Side (y)
- Height (z) in the range of ±10V/ 4-20mA</td><td>SPS</td><td>D/A interface other fieldbus on request</td><td></td></tr>
<tr><td></td><td>Universal XML Interface</td><td>Protocol of SML - communication is based on the principles of ISO-OSI Reference model. Lowest layer is on Ethernet. The XML communication is located in layers 5-7.</td><td>SPS</td><td colspan="2"><table><tr><th>No.</th><th>Layer</th><th>Protocol</th></tr><tr><td>7</td><td>Application</td><td rowspan="2">XML (standard ASCII, 0-127)</td></tr><tr><td>6</td><td>Display</td></tr><tr><td>5</td><td>Communication</td><td>TCP</td></tr><tr><td>4</td><td>Transport</td><td>IP</td></tr><tr><td>3</td><td>Operation</td><td rowspan="3">Ethernet</td></tr><tr><td>2</td><td>Protection</td></tr><tr><td>1</td><td>Bit transfer</td></tr></table></td></tr>
<tr><td>Cloos</td><td colspan="5">No interface yet, Cloos is working on an Ethernet interface for new controllers, possible interface available by the end of 2014.</td></tr>
</table>

Specification Information

Sensor head TH6D-150-CFAA-AB

Field of measurement	Width: ± 8 mm
	Height: ± 12 mm
Optical resolution in the TCP	0.07 mm/pixel along X axis
	0.03 mm/pixel along Y axis
Nominal working gap (z = 0 mm)	150 mm from bottom edge of sensor
Nominal working gap (x = 0 mm)	10 mm from rear edge of sensor



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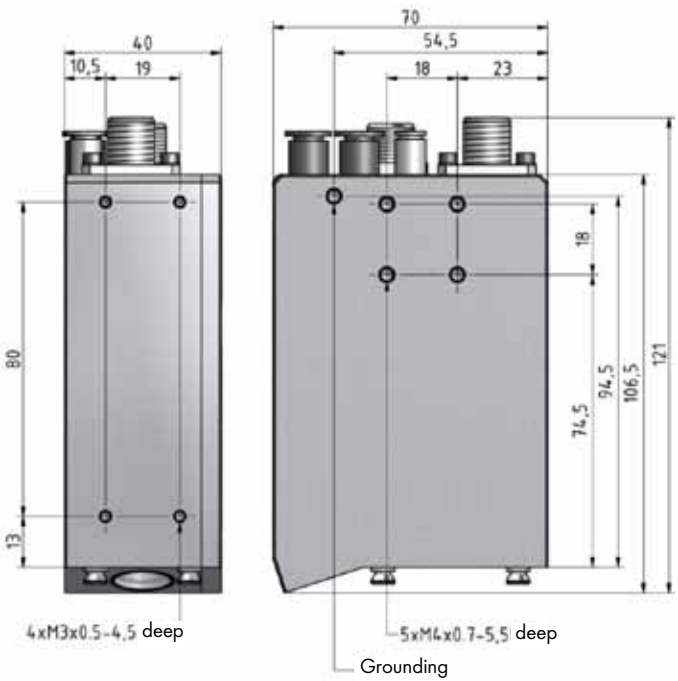
Specification Information

TH6D Sensor Head General Dimensions

	Characteristics
Configurations	TH6D-150-CFAA-AB
Power supply	12 - 36 V DC (125 mA max. at nominal 24 V) Protected against false insertion
Weight	TH6D sensor head: 0.53 kg TH6D sensor head including safety glass unit: 0.65 kg
Limiting acceleration (mech)	3 g (with or without function operations)
Laser protection class	3B
Protection class	IP64 (with plugged in connectors)
Operating wavelength	660 nm
Max. laser output	50 mW
Dimensions	70 x 121 x 40 mm (L x H x W)



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