

ABB ROBOTICS | DATASHEET

3DQI

3D quality inspection robot



3DQI off-line quality and metrology cell

Fast, accurate and flexible – maximize the quality of every part

The 3D vision offline quality and metrology cell (3DQI off-line) is the ABB standard cell for off-line quality inspection. It offers a faster, more dynamic technology than traditional CMM (Coordinated Measuring Machine) based methods.

Easy to install and use and offering high accuracy, it can be used to measure an unlimited range of manufactured parts.

Key benefits:

- Easy to install and relocate
- Designed to use minimum amount of floor space
- Valuable functionalities improving productivity
- Structured light technology with integrated
- photogrammetry head
- Easy to use thanks to Robot Studio Power Pack (Sidio Planner)
- Replaces need for manual control jigs
- Compliant with VDI 2634/III and CE

Fast, accurate, flexible

Up to 10 times faster than Coordinated Measuring Machine (CMM) systems, the 3DQI off-line quality and metrology cell can dramatically accelerate production by providing fast, accurate testing to make metrology easier and less time consuming. Capable of detecting defects of less than half the width of a human hair and imperceptible to the naked eye, the 3D Quality Inspection (3DQI) solution eliminates the need for time consuming manual inspection, while substantially reducing the likelihood of faults and errors. As well as increasing productivity, the system also reduces costs by minimizing the risk of product defects that could lead to potential recalls.

The 3DQI is mainly conceived for off-line testing stations, while its modularity allows customization or expansion to meet evolving business needs. Using a single 3D white light optical sensor to scan millions of 3D points per shot, a detailed digital model of the part being inspected can be created which can be compared to an original CAD drawing. All of this can be done 10 times faster than with traditional CMM machines.

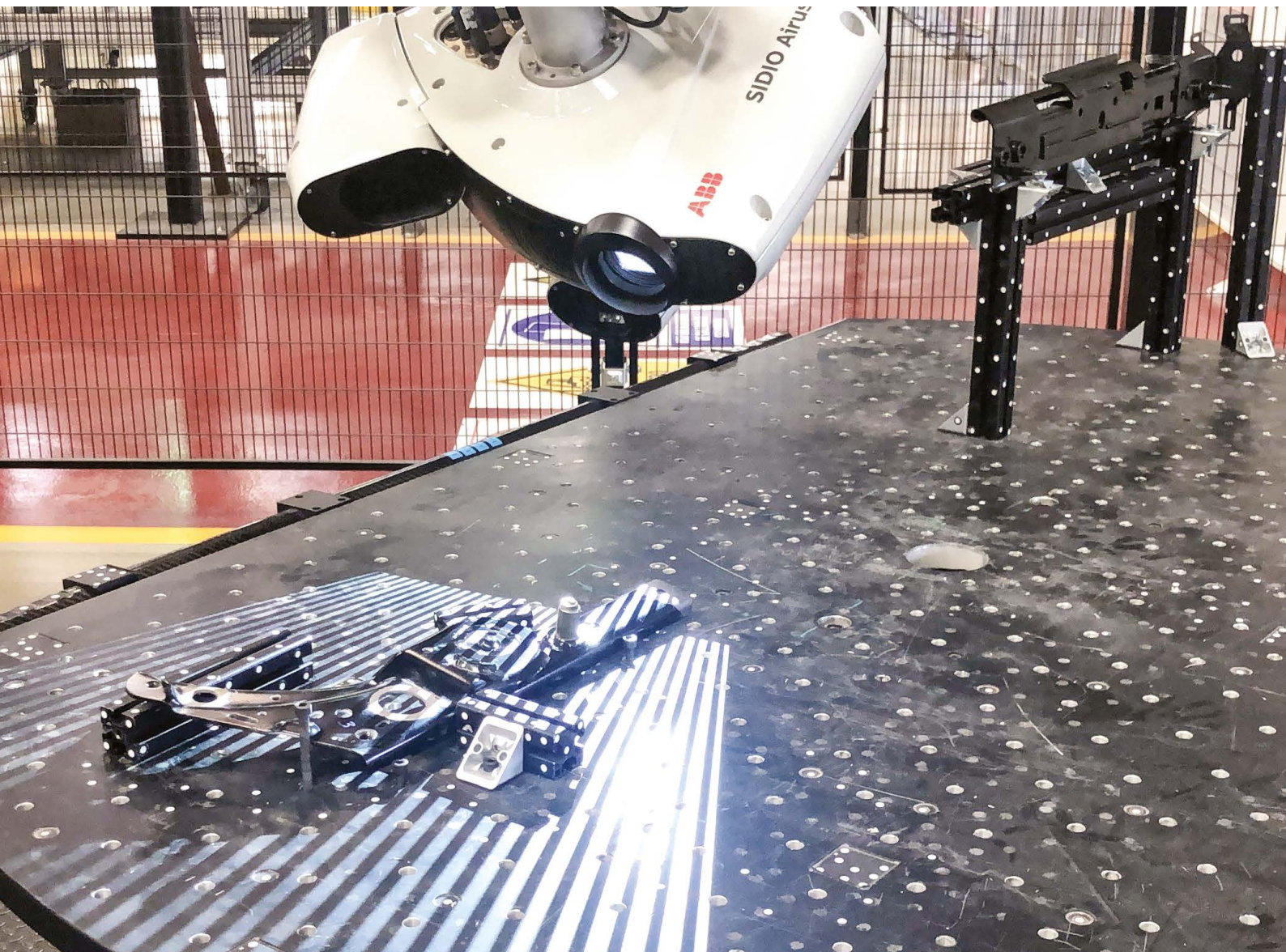
Unlimited potential

The sensor can be carried by any robot with a handling capacity greater than 20 kg. Thanks to ABB's portfolio of robots, tracks, rotary tables and modularity concepts, there are no limits on the dimensions of the parts that can be inspected.

Key benefits of the 3DQI include its combined speed, accuracy to below 100 μm and flexibility provided by its modular design, with customers able to create a solution tailored to their exact requirements.

The power of digital

The system also provides comprehensive data recording, which is processed in real time using multiprocessor technology. The digital records support tracking and tracing should auditing be required at a later date, while helping operators to optimise performance and predict potential faults before they occur. All equipment is included in ABB's powerful RobotStudio® Sidio Planner Power Pack for easy and intuitive programming, enabling new users to quickly become familiar with using the 3DQI solution.

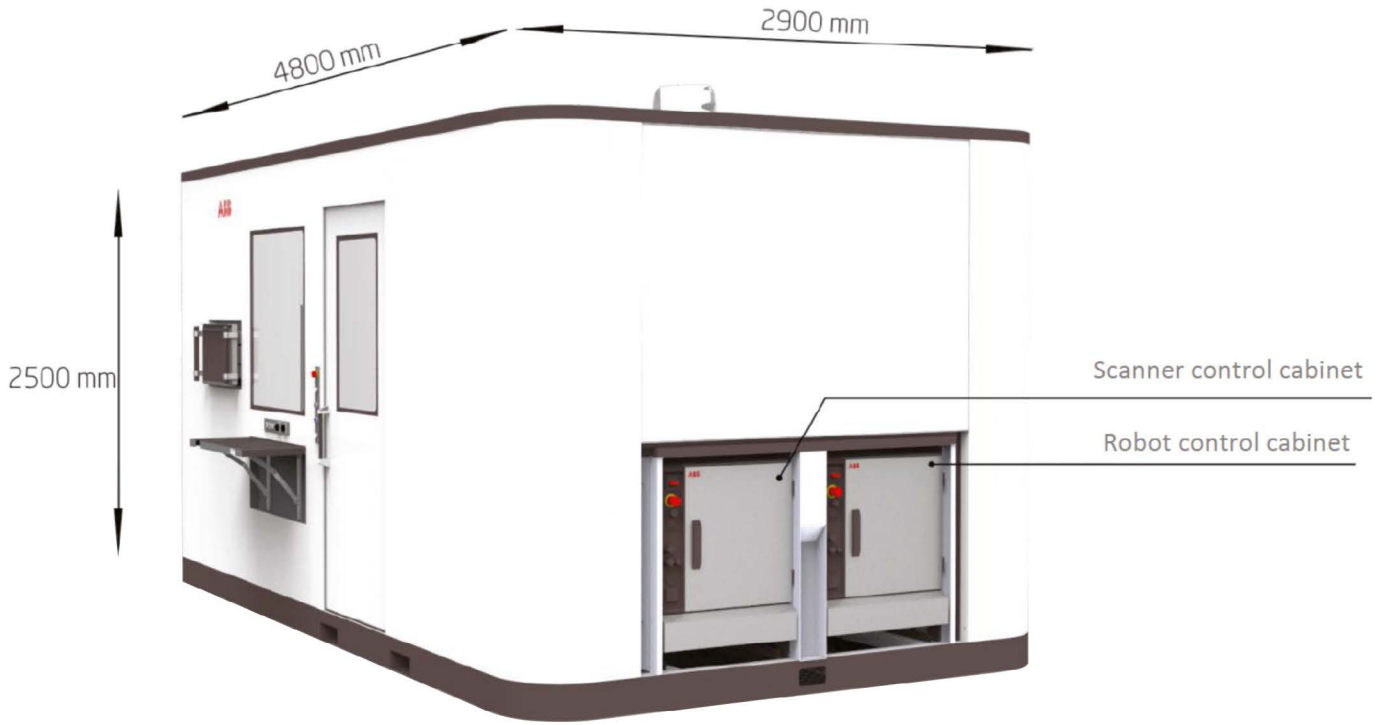


Key features and specifications



Technical data

Unit size and weight	Robotized unit: 1600 x 1300 mm – 800 kg. With rotary table: 3000 x 1300 mm – 1000 kg With closure: 4830 x 2900 mm – 3000 kg
Max. part size specifications	Cylinder of 2000 mm diameter and 2000 mm height
Field of view	550 x 390 x 200 mm ³ .
Cameras	5 Megapixels (3D scanner) Photogrammetry camera: 14 µm + 14 µm/m
Technique used	Structured light
Accuracy	Based on VDI 2634-III, accuracy below 100µm in a cylinder of 2m diameter x 2m height
Precision (Repeatability)	Based on MSA type 1 test, repeatability (sigma) 22 µm
Speed	Up to 0.25 sec/shot
Operating conditions	Temperature: 5 – 45°. Light conditions: Designed for industrial environment Electrical compatibility: 200 V – 600 V 50 Hz / 60 Hz III Phase
Rotary table (up to 600 KG parts)	Includes flexible holding fixtures for supporting multiple parts types
Floor mounting or fixing	Anchors for floor fixing.
Closure	Includes emergency stop button, safety sensors and fencing Entry: 2500 mm width with photoelectric sensors. Maintenance door
Certification	Compliant to VDI 2634-III and CE



Key benefits

INTEGRATED SOLUTION

ABB 3DQI integrates seamlessly with Industry 4.0 technologies, while its ease of use means that it can be operated without the need for extensive training. All logic is provided within a single controller.

HIGH FLEXIBILITY

Combined with flexible holding fixtures, the simulator allows easy configuration of new parts using only CAD data and an inspection plan.

SHINY/BLACK PARTS DIGITIZATION

EDR technology implements system parameter adjustments to easily digitize shiny and black parts without the need for spray.

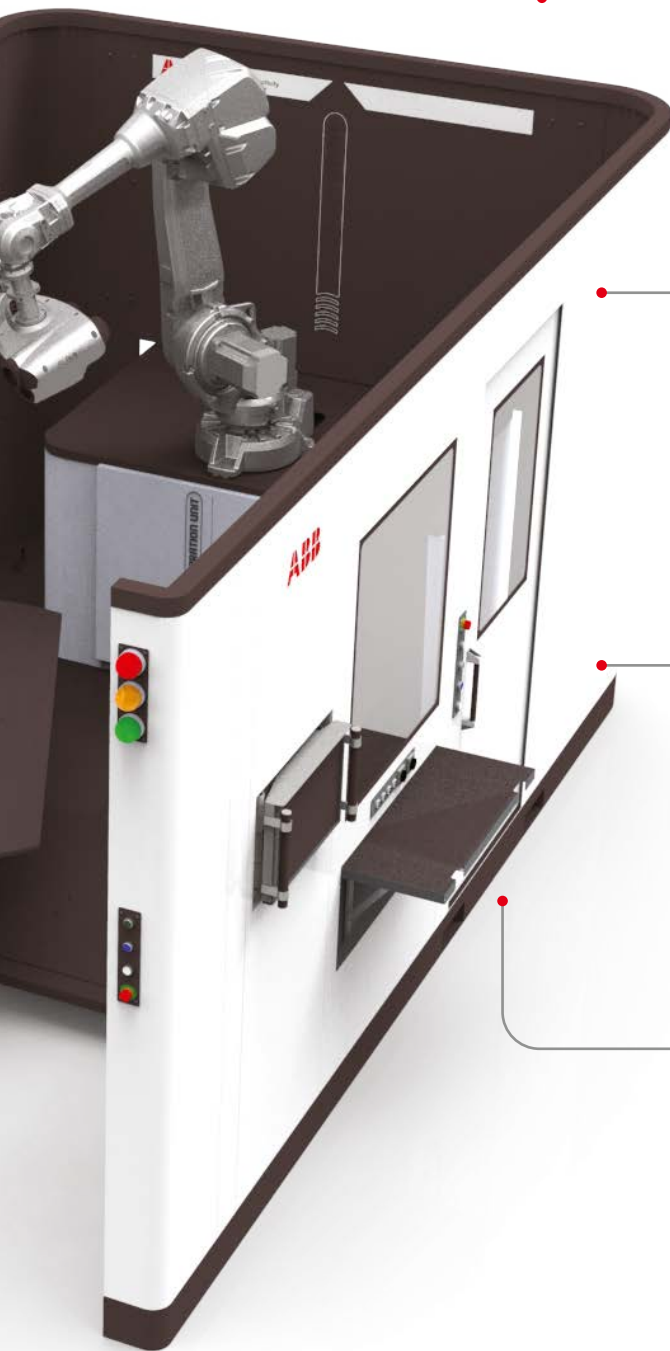
EXTREMELY FAST

Seamless integration with the ABB robot allow the scanning process to be performed rapidly, while the measured data is processed in real time using multiprocessor technology.

SIMPLE TO USE

Thanks to the fully integrated ABB Robot Studio Power-Pack, the 3DQI is extremely easy to program. Further simplicity is enabled by the inclusion of AutoPath planning, enabling the robot to automatically calculate the optimal scanning path.





SINGLE CAMERA TECHNOLOGY

One camera system reduces the number of views overlapping and potential hardware failures.

STRUCTURED LIGHT TECHNOLOGY

Adjustable light power to get the best digitizing results regardless of light conditions.

TOUCH SCREEN CONTROL

Designed to allow the operator to have a hand in the process thanks to the user-friendly interface and intuitive operation.

REMOTE CONTROL ASSISTANCE

Unit fully integrated with the ABB Patented Remote Service for retrieval of the system performance data. The root cause is immediately diagnosed and identified to determine how performance issues can be resolved.

Modular possibilities to suit every need

Based on a modular cell design, the 3DQI can be readily adapted to meet a wide variety of different customer needs. Solutions can be scaled up to meet changing requirements, with the ability to expand a single measuring station to a double station in a future project. This modular approach also extends to the equipment available for use in the cells, such as a wide choice of turning table options for maximum loads from 1,000 to 17,000kg.

3DQI - Single Measuring Station



3DQI - Double Measuring Station



3DQI modular turn table options

Option	3DQI Type	Pic	Turn table Type	Maximum Table Weight	Measuring Area (Diameter)	Maximum Available Weight (Fixture & Part)	Table Height	Floor Level	Robot Model	Solution Capabilities
1	STD/MOD		ABB MTD 750	1.000 Kg	2.000 mm	600 Kg	800 mm	No	IRB 4600	Fixtures
2	Modular		ABB MTD 750	1.000 Kg	2.500 mm	600 Kg	800 mm	No	IRB 4600	Fixtures
3	Modular		ABB MTD 5.000	5.000 Kg	3.000 mm	4.250 Kg	800 mm	No	IRB 4600	Fixtures Dies
4	Modular		ABB MTD 5.000	5.000 Kg	3.500 mm	3.000 Kg 15.000 Kg (Static)	0 mm	Yes	IRB 4600 IRB 6700	Fixtures Dies
5	Modular		ABB MTD 5.000	5.000 Kg	4.500 mm	2.500 Kg 15.000 Kg (Static)	0 mm	Yes	IRB 6700	Fixtures Dies
6	Modular		ABB + 3rd party gear	17.000 Kg	3.500 mm	15.000 Kg	0 mm	Yes	IRB 6700	Fixtures Dies



High accuracy quality measurement

When accuracy is all important

When quality matters, it is vital that the equipment used to check the integrity and safety of manufactured parts offers the highest levels of accuracy and reliability.

The 3DQI off-line quality and metrology cell uses ABB's own 3D optical scanners with structured light technology, which projects a known pattern onto measured objects to enable calculation of their depth and surface characteristics.



3D optical scanner

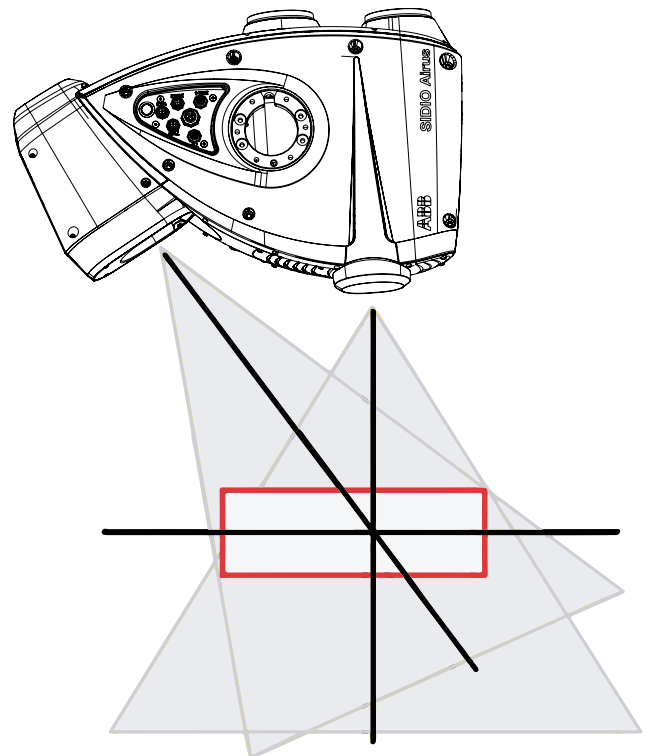
The 3D optical scanner digitalizes any surface located within its so-called measuring volume. This volume is a parallelepiped in front of the scanner. The center of this volume results from the intersection of the projector beam and the center of the camera image, as can be seen in the diagram.

The volume it covers corresponds to a width of 550mm, a height of 335mm and a depth of 200mm. Thanks to the 5-megapixel camera, it obtains a resolution of 27 pixels per square millimeter.

The 3D Optical Scanner is the main component of the solution and it is in charge of obtaining the three-dimensional coordinates of the points of the part surface.

The measurement is performed without contact, using only structured light for the object geometry

The scanner works by projecting light patterns onto the measured part, with the resulting data being used to create a digitalised high-density 3D point cloud representation of that part.



How it works

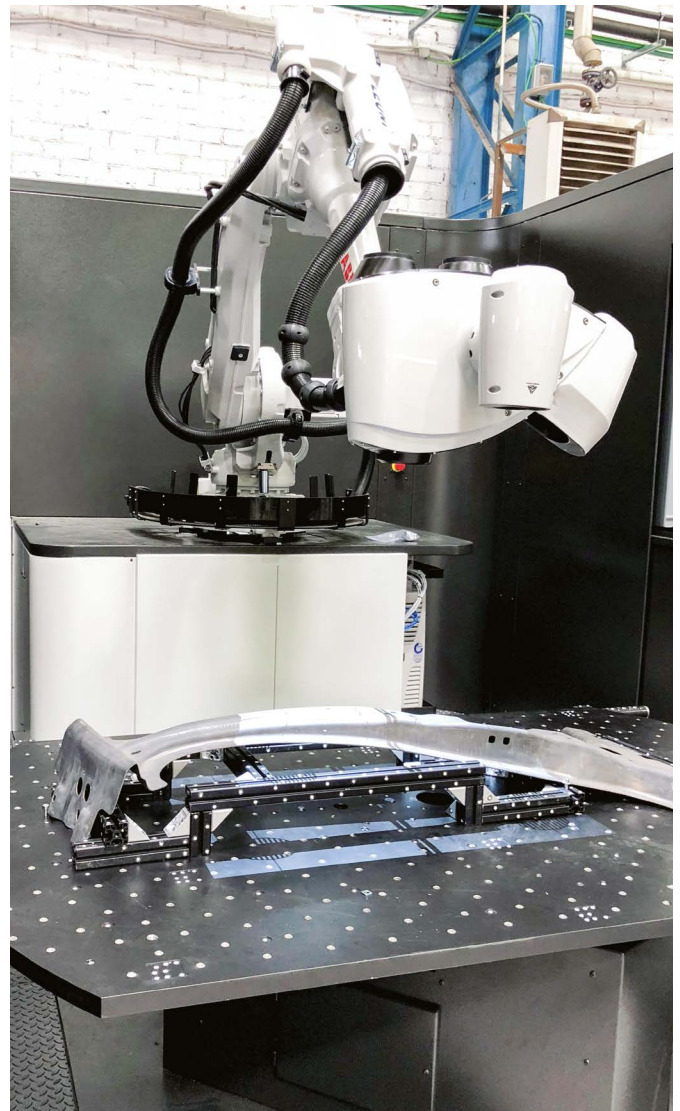
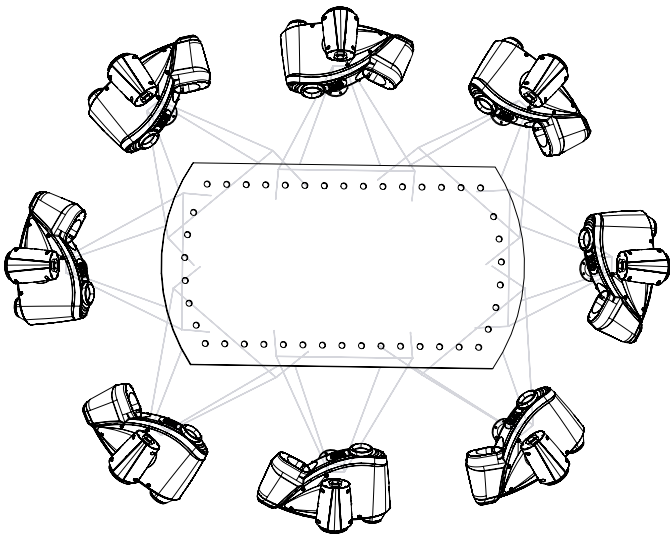
The 3D optical scanner works on the photogrammetric principle. Photogrammetry is a high-precision 3D measuring system offering outstanding speed and versatility. This technology is used in the cell to calibrate the whole working volume, which rests on the rotating table.

The procedure for calibrating the working volume consists in taking images of the space of interest from different positions and with different camera angles.

Each shot locates an independent number of simple targets, coded targets and the scaling bar. Once the whole capture process has been completed, the data are processed and the user is provided with a file with the XYZ position of all the measured simple targets.

These XYZ references will be used to combine all the digitalization made while the parts are measured.

This guarantees the greatest accuracy irrespective of the robot working conditions.



—
www.abb.com/robotics

We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents – in whole or in parts – is forbidden without prior written consent of ABB.

© Copyright 2020 ABB
All rights reserved.

3DQ1 3D quality inspection robot datasheet 16.7.2020

