



HEIDENHAIN



Product Information

VT 121

VT 122

Vision Systems for
In-Process Tool Inspection

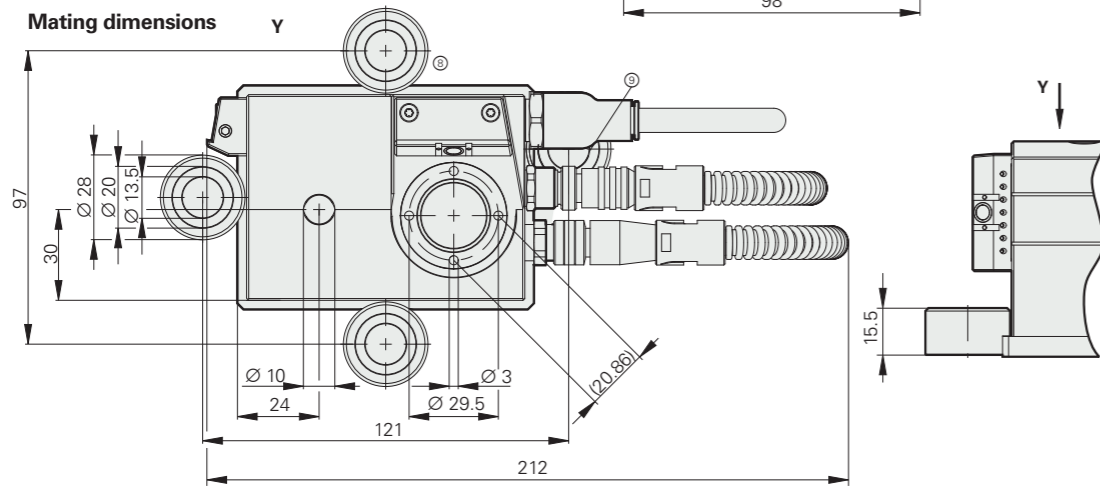
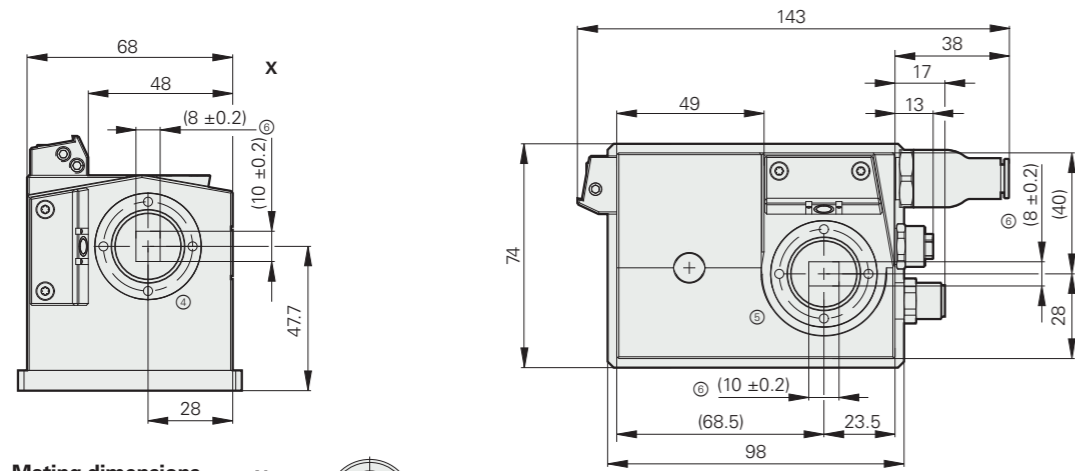
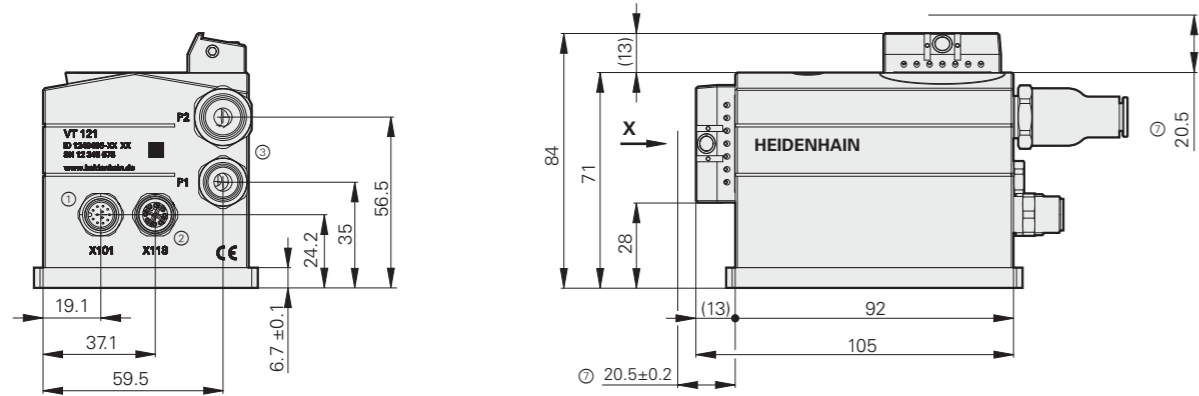
VTC

Software for Tool Inspection
on a PC

VT 121, VT 122

Vision system for tool inspection and measurement

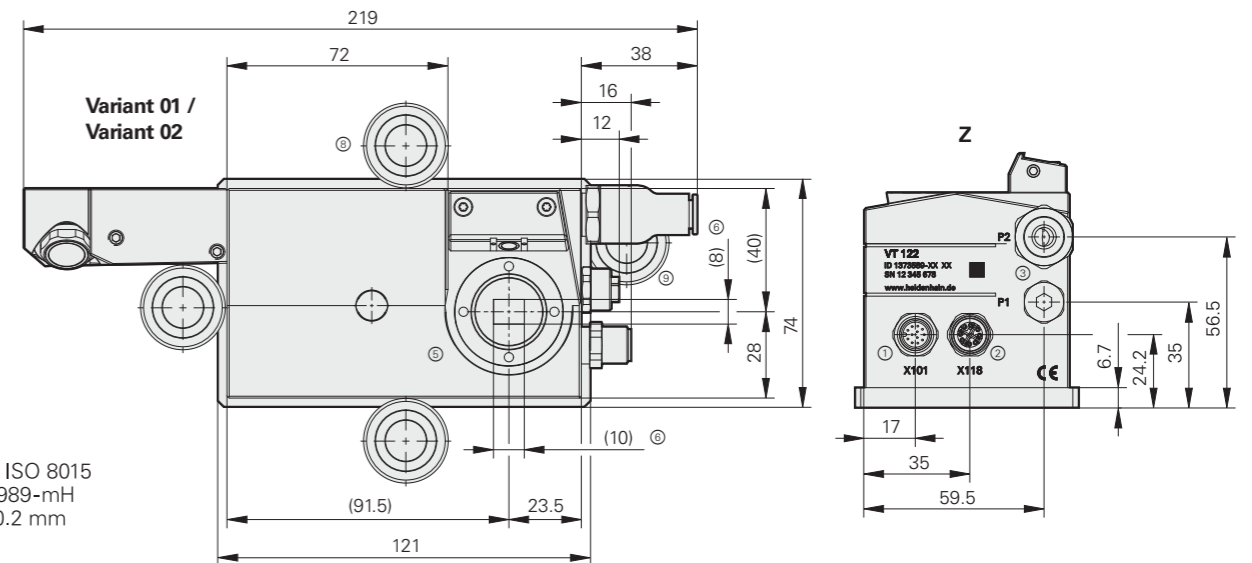
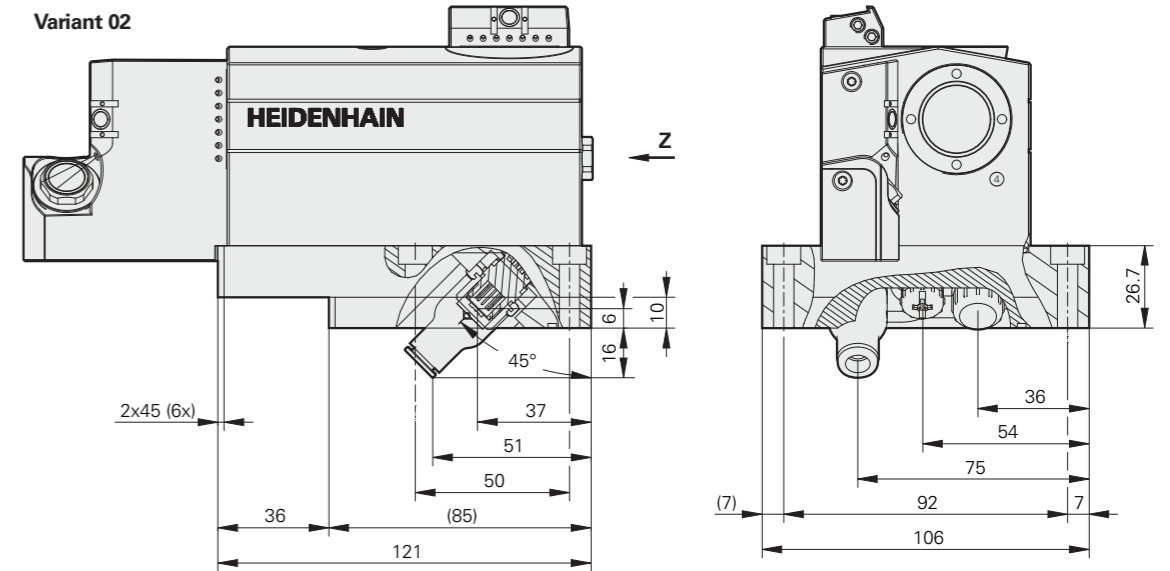
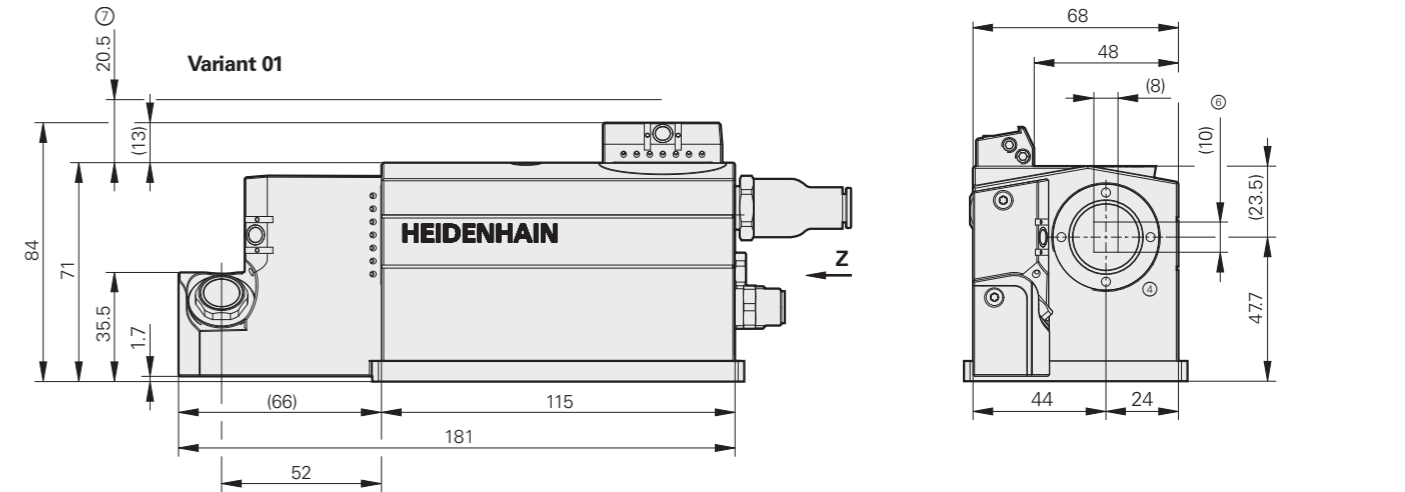
VT 121



mm
Tolerancing ISO 8015
ISO 2768:1989-mH
≤ 6 mm: ±0.2 mm

- 1 = Connection for supply voltage
- 2 = Data interface
- 3 = Connections for compressed air
- 4 = Camera 1
- 5 = Camera 2
- 6 = Camera field of view
- 7 = Focal plane
- 8 = Attached with at least two diagonally positioned fixing clamps (ID 329454-02)
- 9 = Fixing clamp difficult to use due to electrical connections

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Specifications	VT 121	VT 122
Camera	Two 1.3-megapixel cameras <ul style="list-style-type: none"> • Monochrome • Each with a ring light and lateral LED (settings via PC software) • 8 mm compressed air inlet for pulse cleaning of tool and cover lenses (optional: two 6 mm inlets available) 	
	–	Measuring LED on Camera 1 for tool measurement
Image size	8 mm x 10 mm	
Supply voltage	19.2 V to 30 V (EN 61131-2)	
Electrical connection (supply voltage)	12-pin A-coded M12 flange socket (male)	
Camera interface	Gigabit Ethernet (CAT 5e or later)	
Electrical connection (camera interface)	8-pin X-coded M12 flange socket (female)	
Cable length	Max. 25 m (with HEIDENHAIN cable)	
Placement of connections*	On the side	<ul style="list-style-type: none"> • On the side • Through the base plate
Operating distance	20.5 mm	52 mm (Camera 1) 20.5 mm (Camera 2)
Protection rating	IP66/68	
Mass	≈ 1.00 kg	
Operating temperature	0 °C to 45 °C	
Type of mounting	Attached with fixing clamps	<ul style="list-style-type: none"> • Attached with fixing clamps • Fastened with four M6 screws: 92 mm x 50 mm
ID number	1249466-01	1373589-xx

* Please select when ordering

Visual Tool Check (VTC)

Software for tool inspection on a PC

Tool	Diameter	Breakage control	Images	Wear measurement (vg)	In-process measurement
		Starting from a length difference of $DL \geq 0.1$ mm		Resolution 5 μ m	$2\sigma < 2$ μ m (with VT 122)
End mill	1 mm to 100 mm	✓	✓	✓	✓
Drill	1 mm to 32 mm	✓	✓	✓	✓
Ball-nose cutter	1 mm to 32 mm	✓	✓	–	✓
Toroid cutter	1 mm to 100 mm ($R_2 \leq 16$ mm)	✓	✓	–	✓
Others	Upon request				

Control	TNC 640 HSCI, TNC7	Other controls (also non-TNC)
NC software version	Installation possible starting with NC software 340590-10 (with the <i>Python OEM Process</i> and <i>Remote Desktop Manager</i> software options)	Upon request
Cycles	<ul style="list-style-type: none"> • Setup • Calibration • Manual inspection • Panoramic image of side teeth • Plan view or profile view • Individual or mosaic image of face teeth • Breakage detection (length) • Tool measurement (length, radius, corner radius) • Measuring with zero length • Point angle measurement • Temperature compensation 	<ul style="list-style-type: none"> • Individual images • Panoramic image • Breakage detection • Other cycles available on request
Installation	By the machine manufacturer	

More information:

The VTC User's Manual (1322445) has details on the scope of function

VTC software download:
www.heidenhain.com ▶ *service* ▶ *downloads* ▶ *software*

Visual tool inspection

All-in-one device: microscope, inspector and tool presetter

Tool measurement on the machine shortens non-productive times, increases machining accuracy and reduces the scrapping and reworking of machined parts. With the non-contacting VT 121 and VT 122 vision systems you can measure your tools in their entirety.

The vision systems for tool inspection consist of two components:

- Camera with two objectives (VT 121, VT 122)
- Touch-operated PC software (VTC)

There are two variants of the VT 122: Either with connections through the base plate for mounting on a prepared machine, or with lateral connections for variable cable routing.

The vision systems enable tool imaging during machining. Besides documenting tool status and wear, the following applications are possible as well:

- Tool inspection before critical machining steps
- Optimization of cutting parameters

- Optimization of NC programs
- Breakage detection
- Tool inspection after expiration of tool life

As part of the tool inspection, the camera takes close-up images of each tooth as well as detailed panoramic images of the entire tool circumference. During inspection with the VTC, the lighting angle can be varied for these panoramic images, enabling optimal illumination of individual teeth. Tools can also be imaged from below. The VTC can run automatically during unattended shifts (with cycles for TNC controls). Tools that exceed typical wear limits are then automatically disabled by the NC cycle.

Tool inspection is performed conveniently on the control's display screen. Inspections can also be performed offline at a later time with the PC software (requires appropriate software options).

The vision systems not only help you avoid expensive damage to the tool, workpiece, and machine but even the tool costs themselves can be reduced in the long term through targeted minimization of tool wear. These are the resulting benefits:

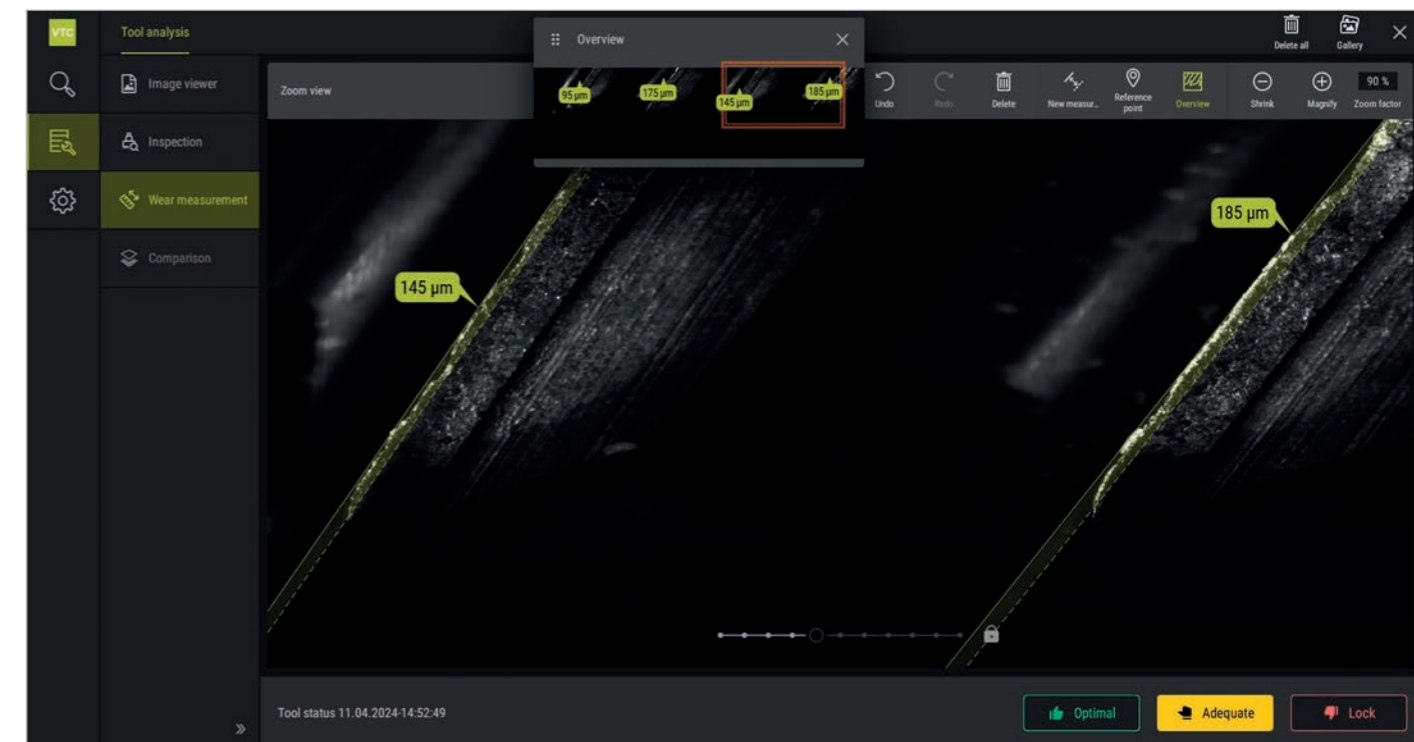
- Automated imaging during machining
- Time savings through keeping the tool in the machine
- Fewer influences on the process, since the tool does not cool down (such as during microscope inspection in a lab)
- PC software (can be used on its own for later inspection)
- Compact system usable for even large tools
- Rugged design
- Controlled compressed-air cleaning

The VT 121 and VT 122 systems have designated probing surfaces for automated setup with a touch probe. An imaging cycle lets you define which views are to be imaged once the tool has been cleaned. Names can be assigned to the resulting image series, allowing you to use the VTC software for systematic evaluations. Tools with a large number of teeth are easy to inspect thanks to an inspection overview feature, allowing you to navigate through the image series with a zoom window for greater detail. This overview allows you to directly disable tools as needed.

The sealed and highly rugged vision systems are designed to be installed inside the machine's work envelope. They require compressed air only during tool clearing cycles. The vision systems can be employed regardless of whether cooling lubricant is used or dry machining is performed. Compressed air from the integrated jets cleans the tools and the cameras' cover glass. An optimal cleaning strategy ensures removal of nearly all chips. The camera systems can be connected via their Gigabit Ethernet interface.







Illustrative video with the system in action



Tool evaluation with inspection view

Electrical connection

Adapter cable and connecting cables

PUR 4 x (2 x 0.16 mm ²)			
PUR 6 x (2 x 0.19 mm ²); A _P = 0.19 mm ²		Ø 6 mm ¹⁾	Ø 6.9 mm ²⁾
Adapter cable for camera interface, partially in metal armor, 8-pin M12 X-coded coupling (male) and 8-pin RJ45 connector (IP20)		–	1313965-xx ³⁾
Connecting cable for power supply, partially in metal armor, 12-pin M12 connector (female) and stripped cable end		1325985-xx ³⁾	–
Connecting cable with 12-pin M12 connector (female) and stripped cable end		801285-xx ⁴⁾	–
Connecting cable with 12-pin M12 connector (female) and 12-pin M12 coupling (male)		1109993-xx ⁴⁾	–

¹⁾ Metal armor Ø: 10 mm

²⁾ Metal armor Ø: 11.1 mm

³⁾ Cable length: 5 m to 30 m

⁴⁾ Cable length: 1 m to 20 m

A_P: Cross section of power supply lines

Accessories

Mounting

Fixing clamps (included in items supplied)
ID 329454-02

Installation

- Compressed air inlets: 6 mm (optional)
- Power pack
- Compressed air tubing
ID 207881-41 or
ID 207881-42
- Metal armor for compressed air tubing
- Compressed air filter (optional)
- Compressed air valves

Maintenance

- Replacement kit with cover glass for the VT 121 and VT 122
ID 1321963-02

HEIDENHAIN

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This Product Information document supersedes all previous editions, which thereby become invalid. The basis for ordering from HEIDENHAIN is always the Product Information document edition valid when the order is placed.



Further information:

Comply with the requirements described in the following documents to ensure correct and intended operation:

- Operating Instructions: VT 121 1322444-xx
- Operating Instructions: VT 122 1422124-xx
- Brochure: *Interfaces of HEIDENHAIN Encoders* 1078628-xx