

TBD

NON-CONTACT TOOL BREAKAGE DETECTION SYSTEM



MARPOSS

The mass production of mechanical parts requires very short machining times. Therefore a tool check, for guaranteeing high quality products with few rejects, must be carried out rapidly. In most cases, we can avoid checking for cutting edge wear, but it is essential to check for tool breakage. Failure to perform this check would compromise the machining of parts, resulting in rejects.

The TBD takes less than 1 second to check for breakage on solid body concentric tools such as: drill bits, tapping tools, flat and ball end milling cutters.

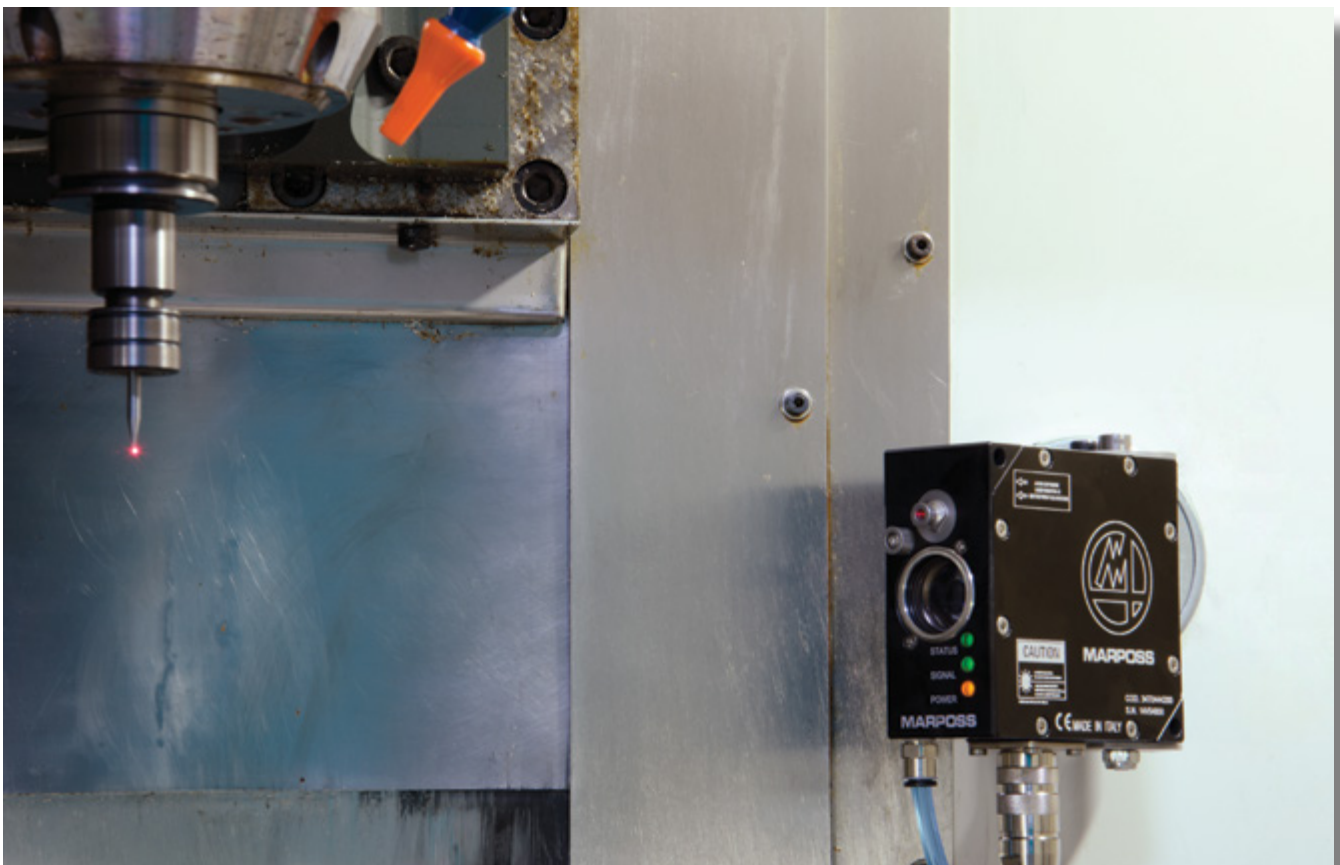
Advantages

- Fast and reliable breakage detection thanks to optimised firmware
- Detection of a wide range of solid body concentric tools
- Easy to install and wire up
- Operating mode selection for minimum detection time
- Works with speeds of rotation from 200 to 5000 rpm (standard version) or from 1000 to 80000 rpm (HS version)
- Reduces rejects and allows unmanned production

Typical applications

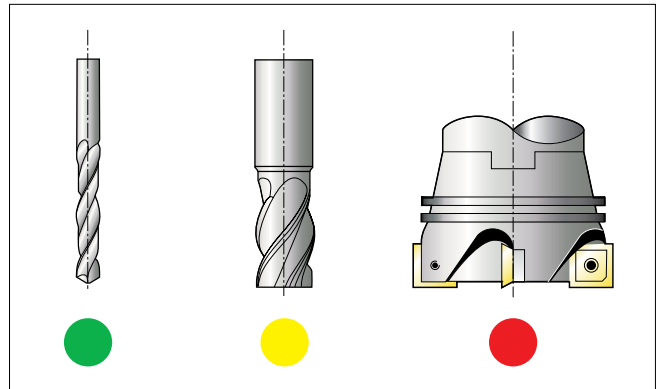
Tool presence or breakage detection on:

- Drilling and tapping machines
- Machining centres
- Transfer machines with servo-controlled spindle
- Lathes with motor-driven tools



Product description

The TBD is normally used to detect axial breakage on rotating tools, which are brought to the check position selected during set-up. The TBD has a special operating mode allowing it to detect “passing” tools, whether they are rotating or not, so that the spindle does not have to be stopped in the check position. Typical tools detected are solid body concentric tools such as drill bits, tapping tools and thread mills. Flat and ball end mills are more prone to chipping of individual cutting edges, so a correct check of these tools only covers complete breaks. Tools with inserts cannot be checked using the TBD, since they only show signs of breakage on individual cutting edges.



Reflection technology

The TBD is a contactless system using laser reflection technology. The laser beam is projected onto the tool surface which reflects it onto a high sensitivity photodiode.

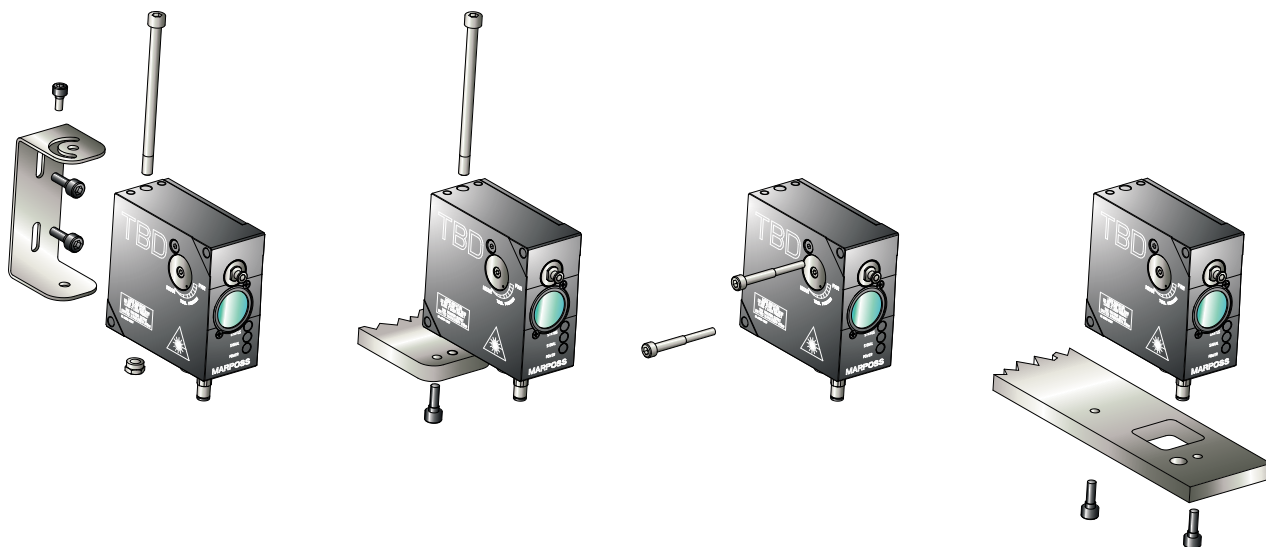
The signal received is processed to allow tool identification, filtering any interruptions caused by droplets of coolant.

A broken tool does not send any reflection signal to the TBD, which remains ready for subsequent checks.



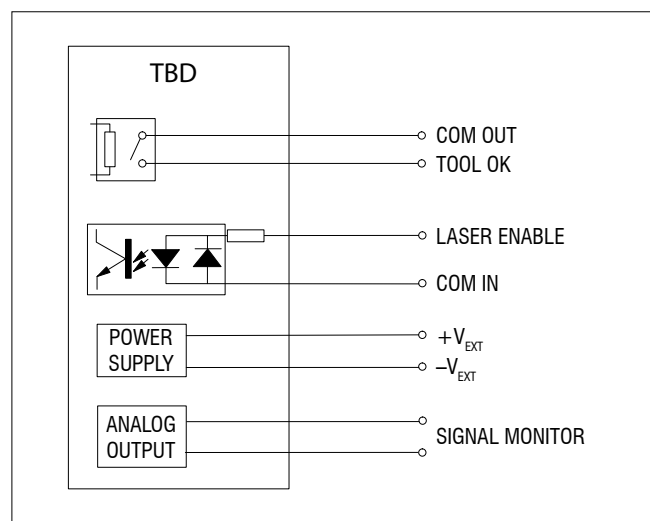
Mechanical installation

For optimum performance, mount the TBD as illustrated. The closer the TBD is to the tool, the stronger the signal reception is and the higher the number of tools detectable. The standard TBD kit includes a C-shaped bracket. Upon request, Marposs can supply customised versions.



Electrical connections

The TBD is a single device with integrated electronic interface. Although the TBD can work with the laser beam always ON, for the best results in terms of response time, we recommend the use of an M-code to switch on the laser beam. In that way, the laser diode lifetime will also be significantly extended.



Typical installation and use

The TBD checks tool integrity before a change-over or after the same operation has been repeated many times and guarantees top performance when the machine spindle moves in a single direction. The laser beam points towards the spindle axis and the check position is identified during the movement towards the magazine. No time is wasted on more complex positioning.

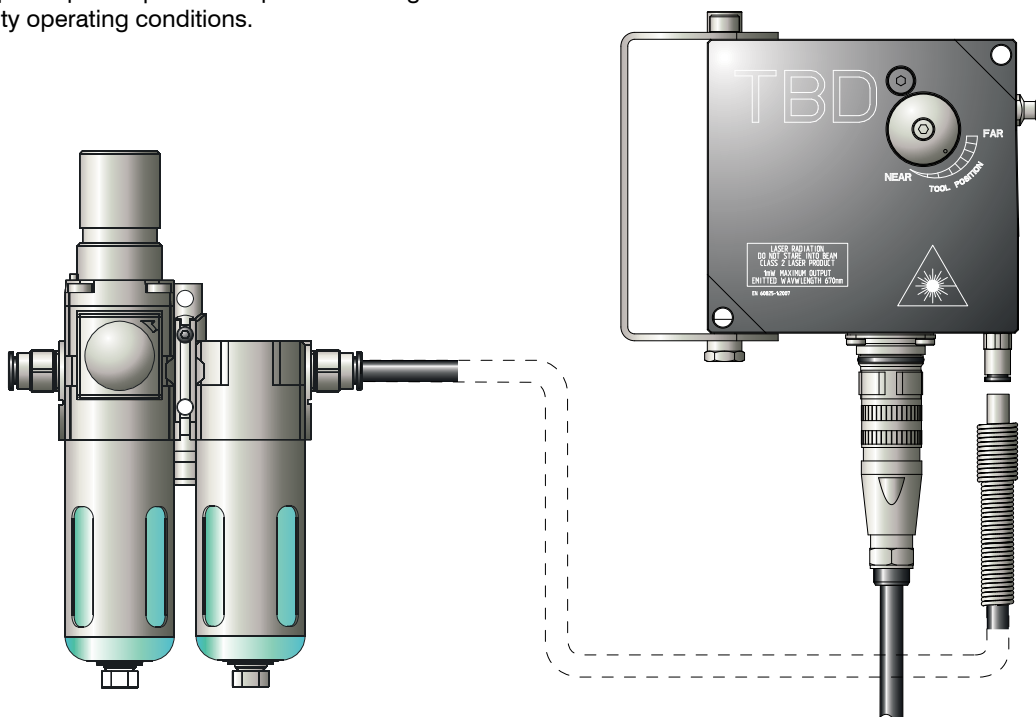
Its high speed detection time, which can be under one second, makes the TBD ideal for mass production with fast machining cycles. For optimum performance, the TBD comes complete with software designed for the most widely used CNC (see table on page 8).

Example of software cycle and parameters		
A	Safety position	
B	Speed of rotation	
C	Breakage tolerance	
D	Stroke or additional checks	
F	Return position	
Q	Offset/tool number	
W	Time out	
X	Tool check position	
Y	Tool check position	

Pneumatic connection

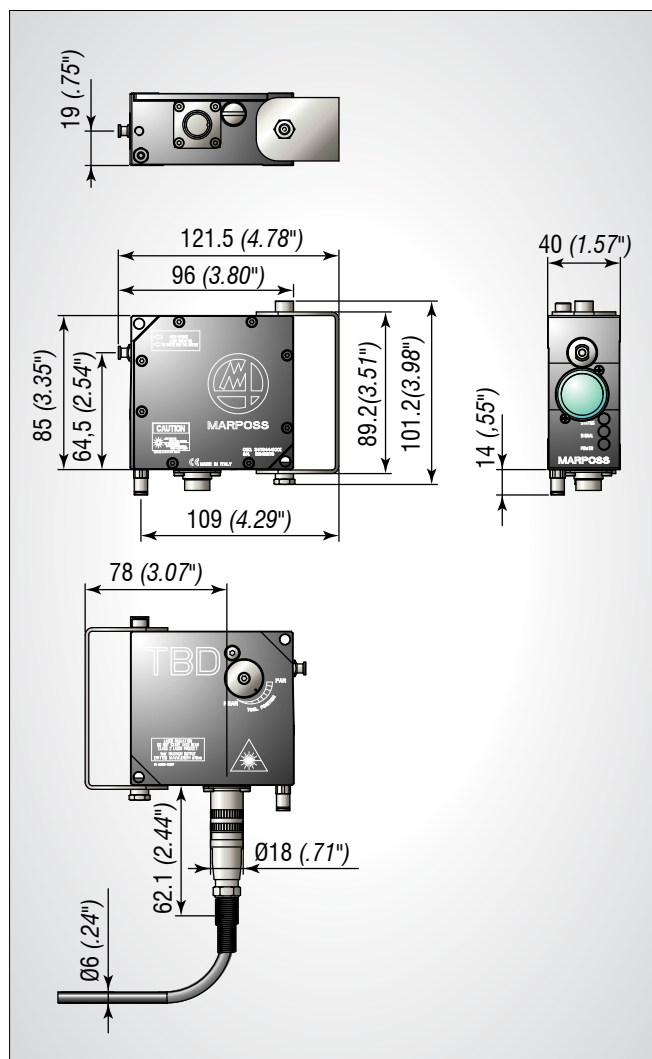
To keep the TBD emitter clean, we recommend use of the Marposs optional filter unit (code 29T0439080).

The air flow supplies both the barrier air and the optimised blower, supplied upon request to keep the receiver glass clean in heavy duty operating conditions.



TBD tool check unit

The TBD tool breakage detection unit combines flexibility and reliable detection with rapid operating times and compact dimensions. The operating range of between 200 and 5000 rpm means that it can be used in most standard applications on machining centres, drilling and tapping machines and where unmanned production is required.



Product specifications

OPERATING DISTANCE	300 mm ≤ x ≤ 2.0 m
OPERATING RANGE *	200 ≤ rpm ≤ 5000 1000 ≤ rpm ≤ 5000
MINIMUM DETECTABLE TOOL *	0.15 mm to 300 mm 0.75 mm to 2 m
COMPRESSED AIR <i>ISO 8573-1: air quality class 1.3.1</i>	Ø6 mm air hose
POWER SUPPLY	12 - 24V dc ± 20%. <i>SELV type in accordance with EN 60950-1</i>
CURRENT DRAWN	Max. 300 mA
OUTPUT SIGNALS	SSR - Max. 50V Rated current 100 mA
INPUT SIGNALS	+24V dc (source) 0V dc (sink)
MAXIMUM POWER EMITTED	<1 mW <i>Class 2 in accordance with EN 60825-1</i>
LASER WAVELENGTH	670 nm
DEGREE OF PROTECTION	IP67
WEIGHT	700 g

Operating environment conditions

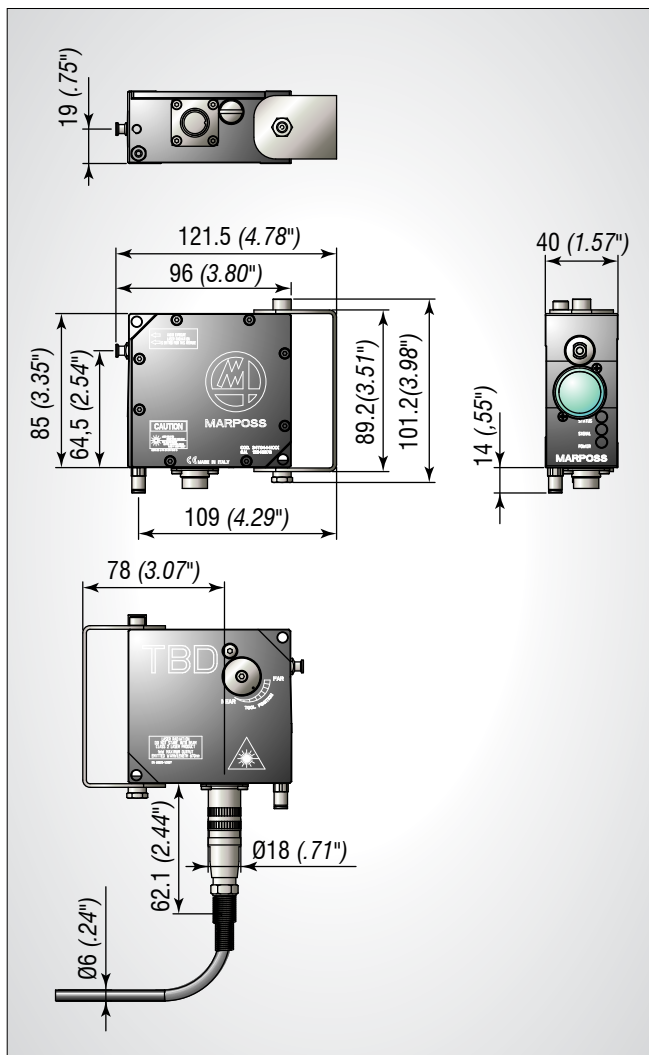
TEMPERATURE	5° to 50°C
TEMPERATURE VARIATION	Max. 2°C/h
RELATIVE HUMIDITY	Max. 90%
VIBRATIONS	None

(*) = depending on operating mode

(*) = data may vary depending on the tool coating, installation distance and operating conditions

TBD HS tool check unit

The TBD HS extends potential TBD application, being capable of checking tools rotating at up to 80000 rpm. Typical machining operations which can be checked are those requiring other levels of finish or very fast cycle times. The TBD HS allows a high quality level to be maintained during all machining.



Product specifications

OPERATING DISTANCE	300 mm ≤ x ≤ 2.0 m
OPERATING RANGE *	1000 ≤ rpm ≤ 80000 10000 ≤ rpm ≤ 80000
MINIMUM DETECTABLE TOOL *	0.15 mm to 300 mm 0.75 mm to 2 m
COMPRESSED AIR ISO 8573-1: air quality class 1.3.1	Ø6 mm air hose
POWER SUPPLY	12 - 24V dc ± 20%. SELV type in accordance with EN 60950-1
CURRENT DRAWN	Max. 300 mA
OUTPUT SIGNALS	SSR - Max. 50V Rated current 100 mA
INPUT SIGNALS	+24V dc (source) 0V dc (sink)
MAXIMUM POWER EMITTED	<1 mW Class 2 in accordance with EN 60825-1
LASER WAVELENGTH	670 nm
DEGREE OF PROTECTION	IP67
WEIGHT	700 g

Operating environment conditions

TEMPERATURE	5° to 50°C
TEMPERATURE VARIATION	Max. 2°C/h
RELATIVE HUMIDITY	Max. 90%
VIBRATIONS	None

(*) = depending on operating mode

(*) = data may vary depending on the tool coating, installation distance and operating conditions

Code plan

Kit coding plan: 3P001FUCAP

3P001	TBD kit
F	Focus type: 0 → Adjustable (300- 2000 mm) (std glass - std speed) 1 → Adjustable (300 - 2000 mm) (sapphire glass - std speed) 2 → Fixed (std glass - std speed) 3 → Fixed (sapphire glass - std speed) 4 → Adjustable (300 - 2000 mm) (std glass - high speed) 5 → Adjustable (300 - 2000 mm) (sapphire glass - high speed) 6 → Fixed (std glass - high speed) 7 → Fixed (sapphire glass - high speed)
U	Type of connection: 0 → straight connector 1 → 90° connector 2 → straight cable clamp 3 → 90° cable clamp
C	Type of cable: 0 → without cable 1 → 5 m cable with protection 2 → 15 m cable with protection 3 → 30 m cable with protection 4 → 5 m cable without protection 5 → 15 m cable without protection 6 → 30 m cable without protection
A	Mounting type: 0 → with bracket, without blower 1 → without bracket, without blower 2 → with bracket, with blower 3 → without bracket, with blower
P	Progressive number

Example of code

						F	U	C	A	P
3	P	0	0	1	0	0	1	0	0	0

→ Standard TBD unit with adjustable focusing, snap gauge and without blower, straight cable outlet with connector, 5 m cable with metal protection.

Software availability

CNC	<ul style="list-style-type: none"> Brother Fanuc Haas Heidenhain Makino Mazak Mitsubishi Siemens Yasnac
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Accessories

10T0444128	Sapphire glass for receiver	
29T0444009	Support assembly	
29T0444135	Optimised blower	
29T0444007 + 29T0444008	Precision adjustment system	



Some models of the product line, or parts of them, may be subject to export restrictions if exported outside the European Union or may be subject to restrictive measures adopted by the competent national, supranational or international authorities.



www.marpoSS.com

For a full list of address locations, please consult the MarpoSS official website

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