

# TRS1 non-contact broken tool detection system



## TRS1 laser-based non-contact broken tool detection system

### System components

- **TRS1 broken tool detection device**  
The TRS1 is a cost effective solution for high speed broken tool detection of tools that are solid on-centre e.g. drills, taps etc.
- **Air filter/regulator**  
Provides the TRS1 with clean dry air to protect it against coolant and swarf.
- **Software for broken tool detection**  
Renishaw has written software especially for the TRS1. Software for a range of controllers is supplied with the system kit.
- **PSU3 power supply**  
Used when 12 Vdc to 24 Vdc supply is not available from the machine.

### System features

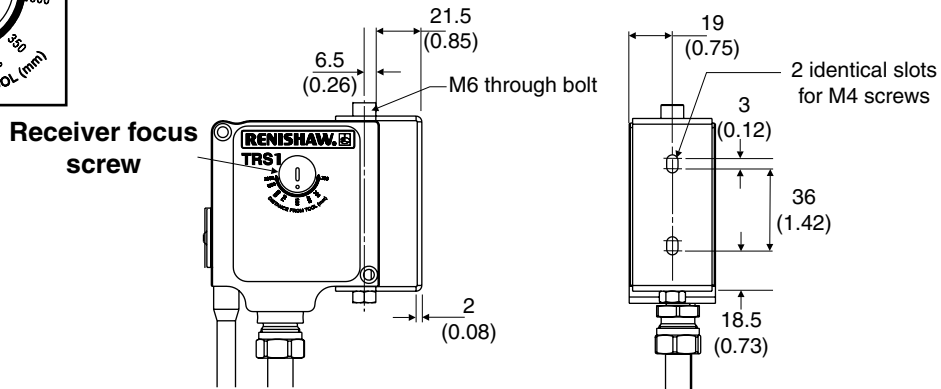
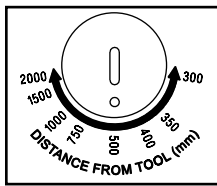
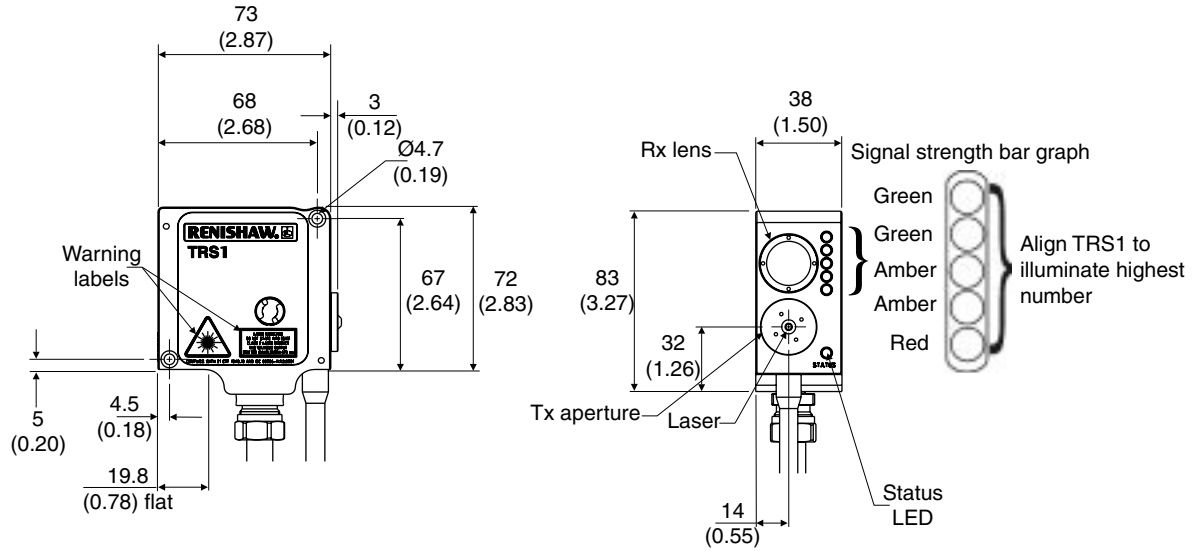
- Conventional non-contact broken tool detection systems depend on the laser beam being blocked (tool OK) or not blocked (tool broken).  
  
The TRS1 is different. It contains unique tool recognition technology that can distinguish between the tool, or coolant and swarf. TRS1 responds to the pattern of light reflected from the tool, offering benefits over conventional systems. It is fast and reliable under real machining conditions.
  - During a typical broken tool detection cycle, the tool spends approximately 1 second in the laser beam.
  - Inexpensive and easy to install, as all the components are housed in a single unit.
  - No M-codes required.
  - Tools as small as  $\text{Ø}0.5 \text{ mm}$  (0.019 in)\* can be checked.
  - The range is between 300 mm (12 in) and 2 m (79 in).
  - Compact design 38 mm (1.50 in) wide x 73 mm (2.87 in) deep x 83 mm (3.27 in) high.
- \* depending on the range, tool surface finish, machine environment and installation.

# Data sheet

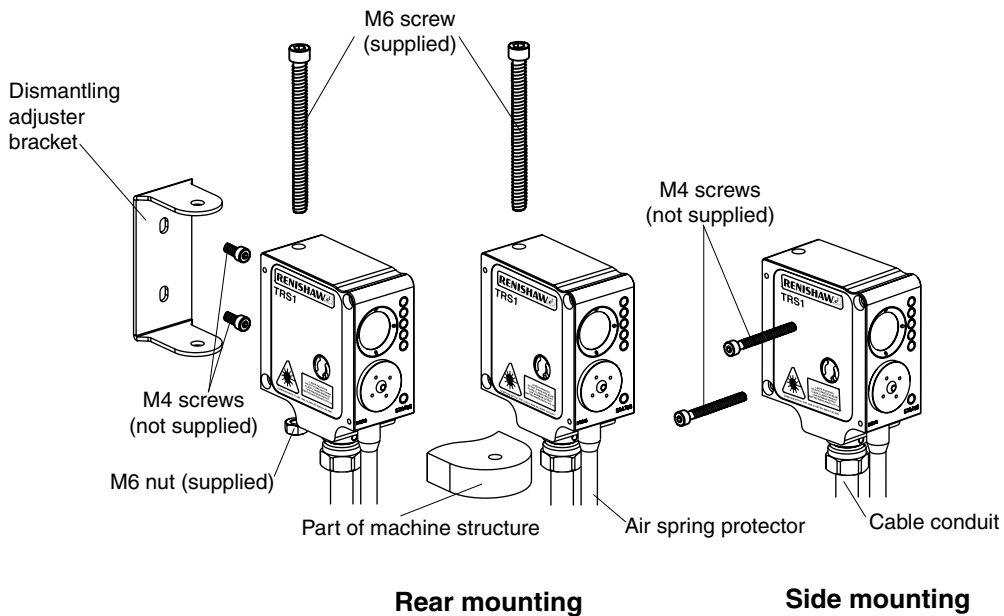
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### Technical data

Dimensions in mm (in)



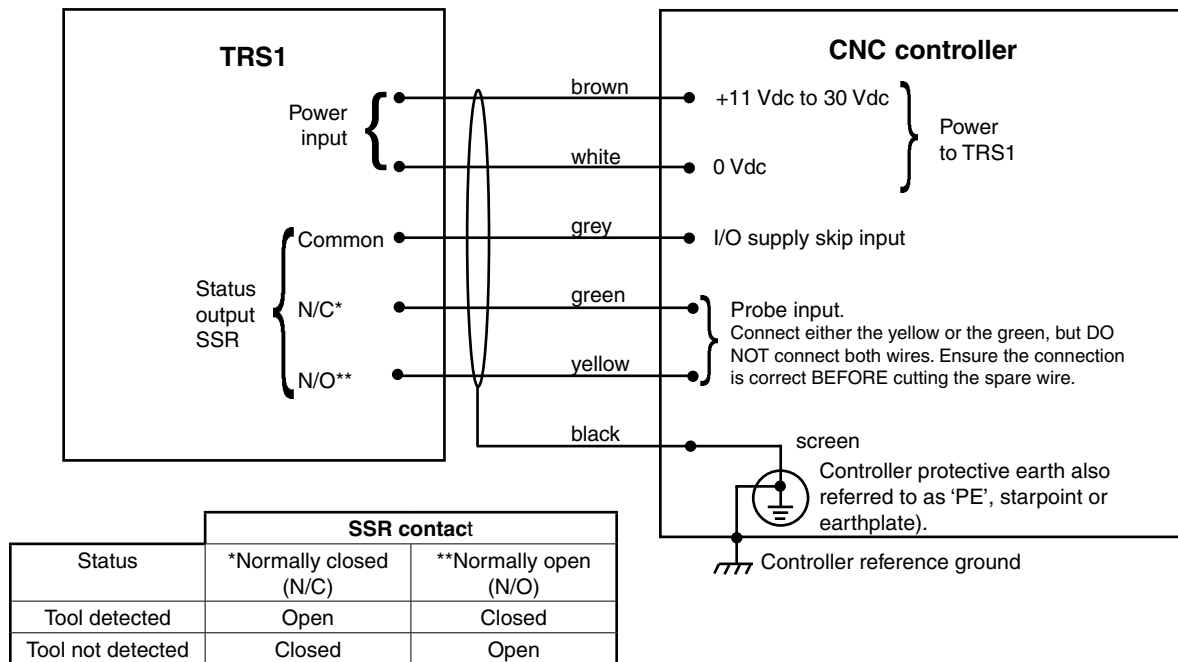
### Mounting details



## Electrical connections

The TRS1 connects directly to the machine controller.

**Important note:** The diagram below is an example connection diagram.



## Specification

|                       |   |
|-----------------------|---|
| Application           | High speed non-contact tool breakage detection of solid tools.  |
| Laser type            | Visible red light <1 mW 670 nm<br>Conforms to American (21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice no. 50 dated July 26, 2001) and European (BS EN 60852-1:1993 + A2:2001) laser safety standards.   |
| Working temperature   | 5 °C to 50 °C   |
| Storage temperature   | -10 °C to 70 °C   |
| IP rating             | The electronics are sealed to IPX8. The laser lens is sealed to IPX5 with air on.   |
| Life                  | Tested to >1 million on/off cycles.   |
| Minimum tool diameter | Ø1 mm bright drill at 2 m (6.56 ft) and Ø0.5 mm bright drill at 0.3 m (0.984 ft), dependent on installation, set-up and tool type/condition.  |
| Pneumatic supply      | Ø4 mm air pipe. Air pressure 2 bar (29 psi) min., 4.5 bar (65.25 psi) max., dependent on air pipe length.<br>Air supply to the TRS1 air regulator unit must conform to ISO 8573-1: Class 5 particles and moisture free.<br>Air supply to the TRS1 unit must conform to ISO 8573-1: Air quality of class 1.7.2 |
| Weight                | 0.75 kg (1.65 lb) including 10 m of cable.  |
| Mounting              | Mounting bracket provided, with M4 mounting holes. Alternative mounting arrangement provided by M4 holes in the product housing.  |
| Input voltage         | 11 Vdc to 30 Vdc  |
| Current consumption   | Typically less than 45 mA.  |
| Cable                 | 5 core plus screen cable. Each core 18/0.1 insulated.<br>Ø5.0 (0.20 in) x 10 m (32 ft)  |
| Output                | Solid state relay (SSR) normally open/normally closed contact max. 40 mA (fused at 50 mA).  |



LASER RADIATION  
DO NOT STARE INTO BEAM  
CLASS 2 LASER PRODUCT  
1mW MAXIMUM OUTPUT  
EMITTED WAVELENGTH 670nm

**Parts list** – please quote the part number when ordering equipment

| Type                                  | Part number | Description   |
|---------------------------------------|-------------|---|
| TRS1                                  | A-4178-0400 | TRS1 assembly, 10 m cable, mounting bracket, pin spanner, product documentation and software CD, laser warning sign   |
| TRS1 kit                              | A-4178-1000 | Contains all the items as per kit A-4178-0400 plus cable conduit, air regulator, 25 m air pipe and air pipe conduit   |
| Pin spanner                           | P-TL09-0005 | Used for removing air cap   |
| Air assembly kit                      | A-2253-5120 | Air regulator with 2 x Ø4 mm air fittings and gauge, 25 m x Ø4 mm air pipe  |
| Air filter service kit                | P-FI01-S002 | Service kit for air regulator - parts for both filter bowls   |
| Deluxe air filter                     | P-FI01-0008 | Air regulator with blocked filter indication and auto drain   |
| Product documentation and software CD | H-2000-5254 | Contains installation and user instructions, programming manuals, software and software installation instructions   |
| Cable conduit                         | P-CF01-0001 | Sold per metre  |
| Air pipe                              | P-PF26-0010 | 25 m x Ø4 mm black nylon tube   |
| PSU3                                  | A-2019-0018 | PSU3 power supply system (for details see data sheet H-2000-2200, which is available from the Renishaw web site at <a href="http://www.renishaw.com">www.renishaw.com</a> ) |
| Air pipe conduit                      | M-2253-0207 | 2 m x Ø7 mm stainless steel air pipe protector  |
| Cable gland                           | P-CF02-0001 | Cable gland for cable conduit   |
| Cable gland                           | P-CA61-0054 | Cable gland (domed) for air pipe conduit  |
| Locknut                               | P-NU09-0016 | M16 x 1.5 mm locknut  |
| Air cap                               | A-4178-0440 | Replacement air cap   |

**For worldwide contact details, please visit our main web site at [www.renishaw.com/contact](http://www.renishaw.com/contact)**