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Primo™ system

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Appendix 1: Primo Radio Part Setter and Primo Length Tool Setter combination relay configurations

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Before you begin

Before you begin

Disclaimer

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Trademarks

RENISHAW® and the probe emblem used in the RENISHAW logo are registered trademarks of Renishaw plc in the UK and other countries. **Apply innovation**™ and **Primo**™ are trademarks of Renishaw plc. All other brand names and product names used in this document are trade names, service marks, trademarks, or registered trademarks of their respective owners.

Warranty

Equipment requiring attention under warranty must be returned to your equipment supplier. No claims will be considered where Renishaw equipment has been misused, or where repairs or adjustments have been attempted by unauthorised persons. Prior consent must be obtained in instances where Renishaw equipment is to be substituted or omitted. Failure to comply with this requirement will invalidate the warranty.

Changes to equipment

Renishaw reserves the right to change equipment specifications without notice.

CNC machines

CNC machine tools must always be operated by fully trained personnel in accordance with the manufacturer's instructions.

Care of the Primo equipment

Keep systems clean and treat the equipment as precision tools.

Patents

Features of the Primo system, and other similar Renishaw products, are the subject of one or more of the following patents and/or patent applications:

Publication No	Country *IPSS Ref*
CN100416216	China *0589/CNw/0*
CN100466003	China *0583/CNw/0*
CN101476859	China *0589/CNw/2*
CN101354230	China *0737/CN/0*
CN101354266	China *0738/CN/0*
CN101482402	China *0583/CNw/2*
EP0695926	Europe *0334/EP/*
EP0967455	Europe *0426/EP/*
EP1185838	Europe *0466/EP/*
EP1373995	Europe *0492/EP/*
EP1425550	Europe *0522/EP/*
EP1457786	Europe *0587/EP/*
EP1477767	Europe *0466/EP/*
EP1477768	Europe *0466/EP/*
EP1576560	Europe *0583/EP/*
EP1613921	Europe *0589/EP/*
EP1701234	Europe *0492/EP/*
EP1734426	Europe *0492/EP/*
EP1804020	Europe *0522/EP/*
EP1988439	Europe *0492/EP/*
EP2018935	Europe *0737/EP/*
EP2019284	Europe *0738/EP/*
EP2216761	Europe *0583/EP/*
IN215787	India *0583/INw/0*
IN234921	India *0589/INw/0*
IN8707/DELNP/2008	India *0589/INw/2*
JP2009-053187	Japan *0738/JP/0*
JP2013-101685	Japan *0583/JP/3*
JP2013-137313	Japan *0737/JP/2*
JP3967592	Japan *0466/JPw/0*
JP4237051	Japan *0522/JPw/0*
JP4398011	Japan *0426/JP/0*
JP4575781	Japan *0583/JPw/0*
JP4754427	Japan *0466/JPw/2*
JP4773677	Japan *0492/JPw/0*
JP4851488	Japan *0492/JP/2*
JP4852411	Japan *0589/JPw/0*
JP5238749	Japan *0583/JP/2*
JP5254692	Japan *0737/JP/0*
KR1001244	Korea (South) *0583/KRw/0*
TW 1380025	Taiwan *0738/TW/0*
TW 200912579	Taiwan *0737/TW/0*
US 2009/0028286	USA *0763/US/2*
US 2011/0002361	USA *0583/US/2*
US 2013/0152418	USA *0738/US/2*
US 2013/0159714	USA *0737/US/2*
US5669151	USA *0334/US/0*
US6275053	USA *0426/US/0*
US6776344	USA *0466/USw/0*
US6941671	USA *0522/USw/0*
US7145468	USA *0492/USw/0*
US7285935	USA *0587/US/0*
US7316077	USA *0589/USw/0*
US7441707	USA *0466/USw/2*
US7486195	USA *0492/USw/2*
US7812736	USA *0492/US/3*
US7821420	USA *0583/USw/0*
US8437978	USA *0738/US/0*
US8464054	USA *0737/US/0*

EC Declaration of conformity

Renishaw plc hereby declares that the Primo Radio Part Setter, Radio 3D Tool Setter and Interface are in compliance with the essential requirements and other relevant provisions of Directive 1995/5/EC. Contact Renishaw plc at www.renishaw.com for the full EC Declaration of Conformity.

WEEE directive

The use of this symbol on Renishaw products and/or accompanying documentation indicates that the product should not be mixed with general household waste upon disposal. It is the responsibility of the end user to dispose of this product at a designated collection point for waste electrical and electronic equipment (WEEE) to enable reuse or recycling. Correct disposal of this product will help to save valuable resources and prevent potential negative effects on the environment. For more information, please contact your local waste disposal service or Renishaw distributor.

Battery disposal

The crossed out wheeled bin symbol on the batteries used in this product indicate that batteries must be collected and disposed of separately from household waste in accordance with EU battery directive 2006/66/EC . Please contact your local authority about the rules on the separate collection of batteries because correct disposal helps to prevent negative consequences for the environmental and human health.

FCC declaration (US)

FCC section 15.19

This device complies with Part 15 of the FCC rules. Operation is subject to the two conditions:

1. This device may not cause harmful interference.
2. This device may accept any interference received, including interference that may cause undesired operation.

FCC section 15.21

The user is cautioned that any changes or modifications not expressly approved by Renishaw plc, or an authorized representative, could void the user's authority to operate the equipment.

Radio approvals (radio approvals needed)

Approvals that are planned to be granted for launch:

- *Europe (EU & EFTA)*
- *USA*
- *Canada*
- *Japan*
- *China*
- *South Korea*
- *India*
- *Indonesia*
- *Malaysia*
- *Singapore*
- *Taiwan*
- *The Philippines*
- *Vietnam*
- *Australia*
- *New Zealand*

Radio Regulations

Extract from Taiwanese radio regulations

低功率電波輻性電機管理辦法
第十二條經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。
第十四條低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前項合法通信，指依電信規定作業之無線電信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

Radio equipment – Canadian warning statements

English
"Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada.
To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication."
"This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device."
Français
"Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada.
Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante."
"Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement."

Safety

Information to the user

The Primo Radio Part Setter and the Radio 3D Tool Setter are both supplied with one 3 Volt CR2 Lithium Manganese battery each. 3.6 Volt ½ AA Lithium Thionyl Chloride batteries may also be used (see section 4.2).

Lithium batteries must be approved to IEC 62133.

Please dispose of the batteries on accordance with your local environmental laws once the charge has depleted. Do not attempt to recharge these batteries.

Please ensure replacement batteries are fitted in accordance with the instructions in this manual and as indicated on the product. For specific battery operating, safety and disposal guidelines please refer to the battery manufacturer's literature.

CAUTIONS:

- Do not leave dead batteries in the equipment.
- Do not allow coolant or debris to enter the battery compartment.
- When changing the battery check that the battery polarity is correct.
- Do not store batteries in direct sunlight or rain.
- Avoid forced discharge of the batteries.
- Do not short-circuit the batteries.
- Do not disassemble, pierce, deform or apply excessive pressure to the batteries.
- Do not swallow the batteries.
- Keep the batteries out of the reach of children.
- Do not get batteries wet.
- If a battery is damaged, make sure to exercise caution when handling it.
- Never dispose of batteries in fire.

NOTES:

Always ensure that the gasket and mating surfaces are clean and free from dirt before reassembly.

After removing the old battery, wait more than 5 seconds before inserting the new battery.

If a dead battery is inadvertently inserted into the probe then the LEDs will remain a constant red.

Please ensure that you comply with international and national battery transport regulations when transporting batteries or the products; Lithium batteries are classified as dangerous goods and strict controls apply on their shipment by air. If you should need to return your Primo Radio Part Setter or Radio 3D Tool Setter to Renishaw for any reason, do not return any batteries to reduce shipment delays.

In all applications involving the use of machine tools eye protection is recommended.

The Primo Radio 3D Tool Setter has a glass window around it. Handle with care if broken to avoid injury.

Information to the machine supplier/installer

It is the machine supplier's responsibility to ensure that the user is made aware of any hazards involved in operation, including those mentioned in Renishaw product literature, and to ensure that adequate guards and safety interlocks are provided.

Under certain circumstances, the probe signal may falsely indicate a probe seated condition. Do not rely on the probe signals to halt the movement of the machine and always programme an over travel distance stop into the machining programme.

Information to the equipment installer

All Renishaw equipment is designed to comply with the relevant EC and FCC regulatory requirements. It is the responsibility of the equipment installer to ensure that the following guidelines are adhered to, in order for the product to function in accordance with these regulations:

- Any interface must be installed in a position away from any potential sources of electrical noise, i.e. power transformers, servo drives etc.
- All ground connections should be connected to the machine 'star point' (the 'star point' is a single point return for all equipment ground and screen cables)**.** Failure to adhere to this can cause a potential difference between grounds.
- All screens must be connected as outlined in the user instructions.
- Cables must not be routed alongside high current sources (i.e. motor power supply cables etc), or be near high speed data lines.
- Cable lengths should always be kept to a minimum.

Equipment operation

If the equipment is used in a way not specified by the manufacturer, the protection provided by the equipment may be impaired.

Primo training programme

The Primo system has been designed to be the ideal package for customers who are new to using metrology devices on their machine tools.

To ensure that customers achieve the best results from their purchased system Primo comes with a training package designed especially for Primo.

The Primo training programme consists of self study modules with a number of exercises in measuring a standard part that is provided with the kit. This should give all of the equipment users a high level of confidence in the equipment and their ability to use it.

Each Primo System should be supplied with a Primo Training Programme package from your Machine Tool supplier. If you have not received the Primo Training Package or any elements are missing please contact your local Renishaw office.

To find this please visit www.renisaw.com

Primo System 'Smiley' training work piece

The Primo training programme covers key routines and skills in the following areas:

- Calibration
- Work piece set up and coordinate setting
- Tool setting
- Broken tool detection

As you progress through the training programme more routines and training areas are unlocked.

Once all of the training areas are complete each user will be sent a digital certificate to prove that they have completed the Primo Training Programme.

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Primo Radio Part Setter and Radio 3D Tool Setter basics

2.1

Introduction

When used within a system:

- The Radio Part Setter enables part setup and inspection on machining centres.
- The Radio 3D Tool Setter enables broken tool detection and tool setting (length/diameter).

Primo Radio Part Setter and Radio 3D Tool Setter;

- Deliver interference-tolerant radio transmission through the use of the FHSS (Frequency Hopping Spread Spectrum).
    - Allows multiple systems to work in the same machine shop without interference.
    - Using radio transmission enables non line-of-sight operation.

Getting started

The Primo Radio Part Setter and Radio 3D Tool Setter have LEDs to provide visual indication of their status as well as overall system status.

- See section 5.21 for an LED guide.

Credit

The Primo system requires credit to function;

- Credit is in the form of a Primo credit token.
- This is inserted into the Radio Part Setter which then transfers the credit to the Primo Interface. Section 5.29.

Modes of operation

Standby mode	The equipment is waiting for a switch on signal and the Interface is waiting to send a switch on signal after receiving a signal from the machine tool.
Operational mode	Activated by a switch on signal from the Interface or a Spin. The equipment is ready for use.
Acquisition mode	Used to configure the partnering of the Primo Radio Part Setter and Radio 3D Tool Setter with the Interface. The acquisition method is described in section 5.28.
Credit transfer mode (Radio Part Setter only)	Used to transfer credit from the Radio Part Setter to the Interface. Section 5.29.

		Description	Factory setting
Equipment switch on/ switch off method	Radio on/off	Commanded by machine output.	**Radio on/off**
	Spin on/off	Spin at 1000 rpm for 1.5 s minimum. (Radio Part Setter only)	
Enhanced trigger filter		The enhanced trigger filter improves the equipments' resistance to triggering and triggering without contacting a surface.	Enhanced trigger filter **OFF**
Hibernation mode		When the Primo Radio Part Setter or 3D Tool Setter are in standby and the Primo Interface is powered off or out of range, the equipment enters hibernation; a low power mode. The Part Setter or 3D Tool Setter 'wake' from hibernation to periodically check for their partnered Interface. The 'wake up' frequency is sent every 30 seconds when hibernation is activated.	Hibernation mode **ON**

Configurable settings

Radio 3D Tool Setter switch on/off

The switch on/off method for the Radio 3D Tool Setter is not user configurable. The method used is radio on/off.

Enhanced trigger filter

When the filter is enabled a constant 10 ms filter delay is introduced to the equipment output.

- It may be necessary to reduce the Radio Part Setters approach speed to allow for the increased stylus overtravel during the extended time delay.

Re-calibration

If settings are changed via the Interface switches, it is vital that the equipment is re-calibrated; See sections 5.17 – 5.20.

Acquisition mode

The partnering of the Primo Radio Part Setter or Radio 3D Tool Setter and the Interface described in section 5.28.

NOTE:
To enter the Interface into acquisition mode, **Renikey** or a power cycle will need to be used. Locate the Renikey manual before starting the partnership process. See 3.1.

Partnering is required during initial system set up or if the Radio Part Setter turn on method had changed.

- Partnering will not be lost by reconfiguration of the equipment settings or when changing batteries.
- Partnering can take place anywhere within the performance envelope (section 5.2).

Primo credit token

Primo credit token contains the credit that allows the Primo probing system to function.

The Primo system **will not** work without credit being available in the system.

The standard Primo credit token contains 6 months worth of credit.

Upgrade credit token

Another credit token available is the Upgrade token; this allows the Primo system to work for an unlimited period.

Credit transfer

Credit is loaded into the Primo System by transferring Credit from the Credit token and into the Primo Interface. See section 5.29.

NOTE:

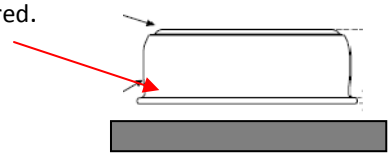
How to purchase credit:

A new 6 month credit token, or an Upgrade credit token can be purchased from the Primo website www.primoprobing.com.

You can also contact your local Renishaw supplier. See www.renishaw.com/contact.

Installation:

Please ensure that the Primo Credit Token is installed in the Radio Part Setter in the orientation shown with the lip of the Token inboard. Failing to do this will result in the Credit not being transferred.



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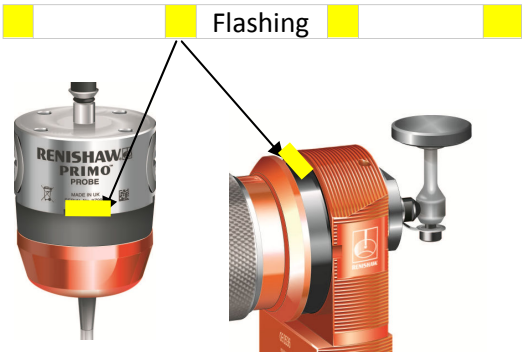
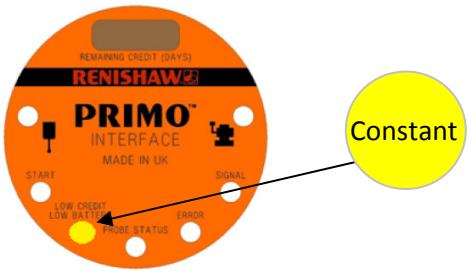
Four low credit indicators

When any of these low credit indicators are shown it is recommended that a new Primo Credit Token is loaded into the system.

1. Equipment LEDs



2. Interface low battery/credit LED



3. Interface digital display (123 days remaining shown). When the remaining credit display reads 0 days then the Primo System will stop working and new credit will need to be loaded into the system.

4. Low battery/credit output from the Interface, which can be connected to the machine control. When credit is running low, an alarm will be sent to the control.

Primo Radio Part Setter operation

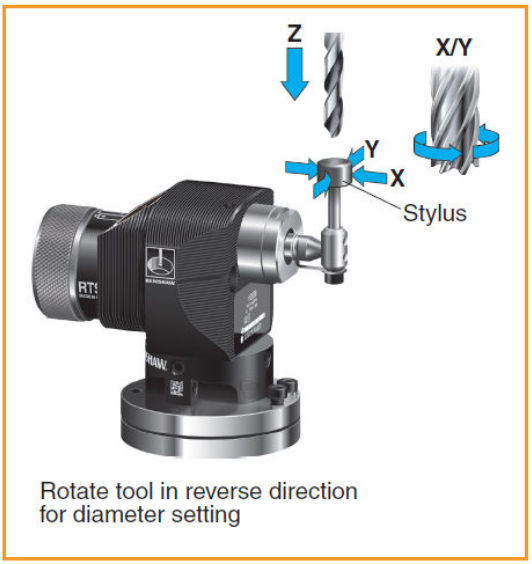
The Primo Radio Part Setter operates as a highly accurate and repeatable mechanical switch that triggers as the stylus deflects against a surface.

- The Radio Part Setter can measure in the X, Y and Z axis.
- The Primo Radio Part Setter can be used for work co-ordinate setting and for work piece measurement.
- A trigger signal is sent directly to the CNC controller so that offsets can be updated – no manual intervention is required.

Primo Radio 3D Tool Setter operation

The Radio 3D Tool Setter enables accurate machining by measuring the length and diameter of tools using the same highly accurate and repeatable switch mechanism has the Primo Radio Part Setter.

- The tool is set in the Z axis for tool length measurement and broken tool detection.
- Rotating tools are set in the X and Y axes for tool radius measurement.



Rotate tool in reverse direction for diameter setting

Software routines

Primo Software caters for 3-axis applications and covers basic probing routines.

- Calibration
- Tool setting
- Broken tool detection
- Work piece set-up
- Work piece measurement

For further information refer to the Primo Software Programming Guide H – 54XXXX

NOTES:

Software routines for tool setting are available from Renishaw and are described in data sheet H-2000-2289, which can be found at www.renishaw.com.

Software upgrades - Purchase an upgrade to the Inspection+ and Five Face Tool Setting package, as well as the Productivity+ package. See www.renishaw.com

Primo Interface basics

3.1

Introduction

The Primo Interface enables communication between the Machine Tool, Radio Part Setter and the Radio 3D Tool Setter using radio frequencies.

Power supply

The Interface requires a 12 Vdc to 30 Vdc supply capable of supplying 150 mA minimum (TBC).

Input voltage ripple

The input voltage ripple must not cause the voltage to fall below 12 V or go above 30 V.

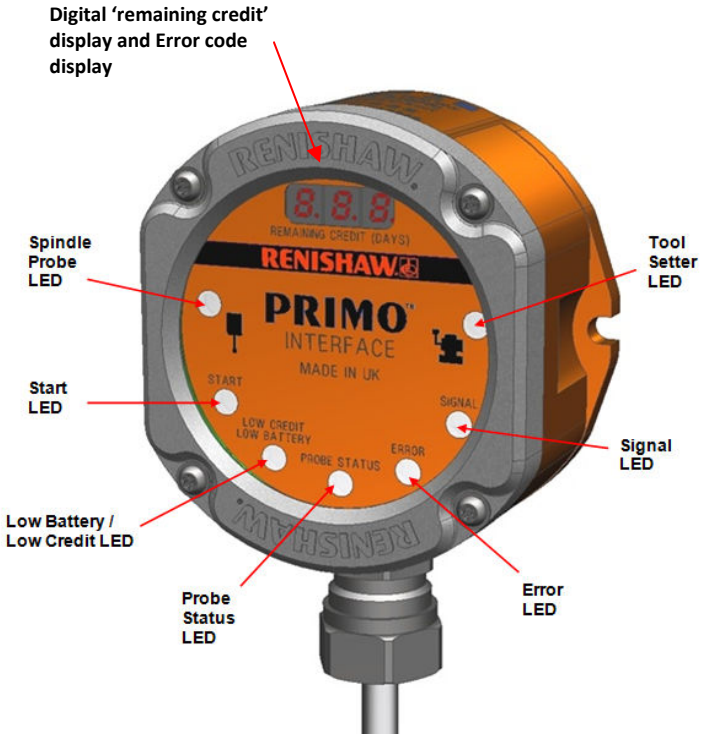
ReniKey

Renikey is a Renishaw machine programme which is used while partnering the equipment with the Interface. Refer to the ReniKey programming manual for instructions on how to use ReniKey or refer to www.renishaw.com.

Note:

If the Primo System is using a Primo Upgrade Credit Token and the Primo Interface is returned to Renishaw then the Primo Upgrade Credit Token must be returned with the interface for identification purposes.

Interface visual diagnostics



Interface inputs

Machine start inputs:

'Machine start' is configurable as a level or pulsed signal.

Level	12 to 30 Vdc When input is active probe is switched on.
Pulsed	12 to 30 Vdc Part Setter toggles from being switched on/off. Minimum pulse width is 10 ms.

See section 5.14 for the full wiring diagram.

Interface outputs

There are four SSR outputs:

- Probe status 1
- Probe status 2
- Error
- Low battery/credit

All outputs can be inverted by using switches SW1 and SW2 (see section 3.5 for more info).

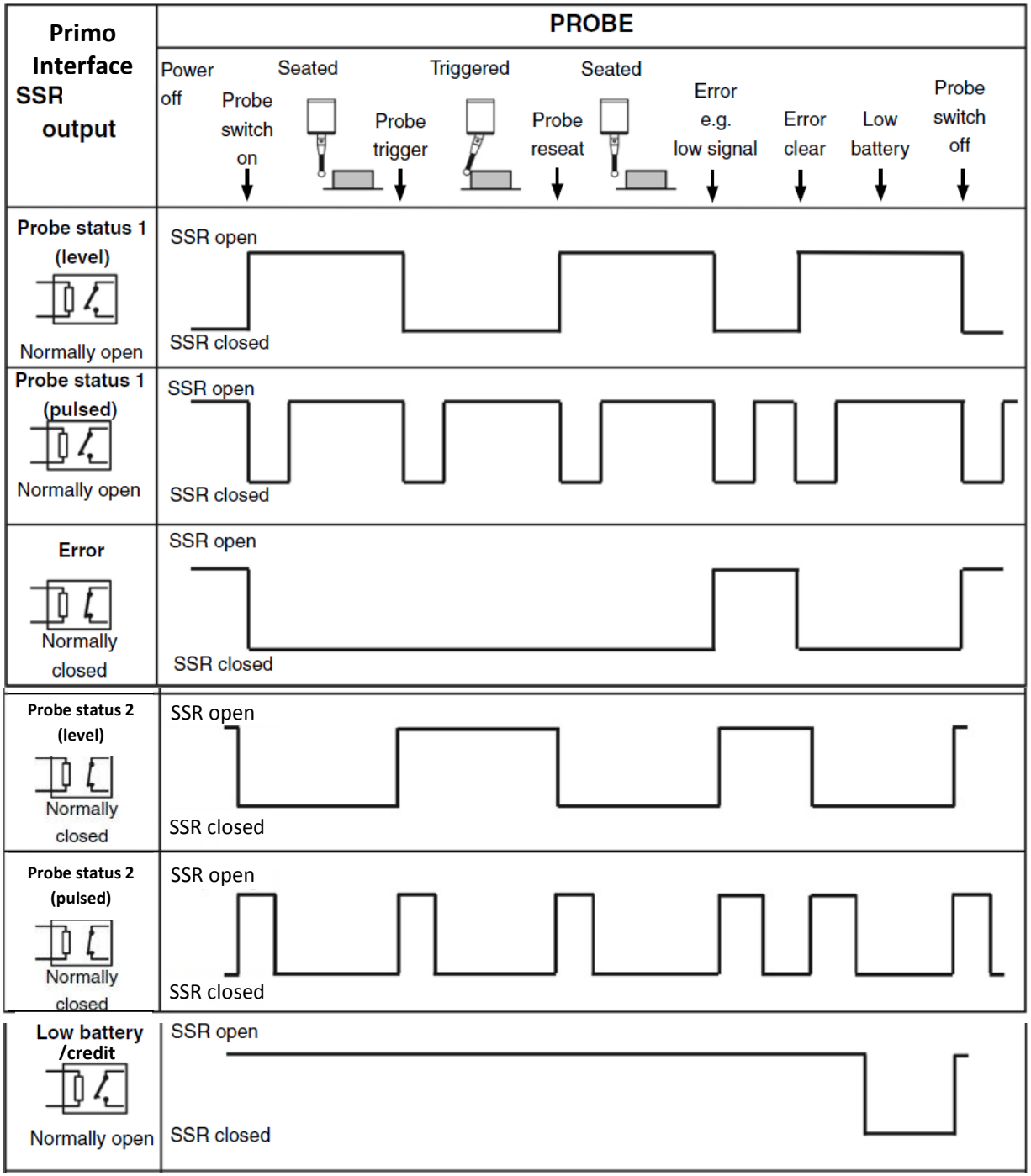
Note:

The term **'Probe Status'** refers to the measurement hardware in the system interacting with the interface and can therefore refer to the Primo Radio Part Setter and the Primo Radio 3D Tool Setter.

SSR outputs specifications:

- Maximum 'on' resistance = 25 ohm
- Maximum load voltage = 30 V
- Maximum load current = 100 mA

Interface output waveform



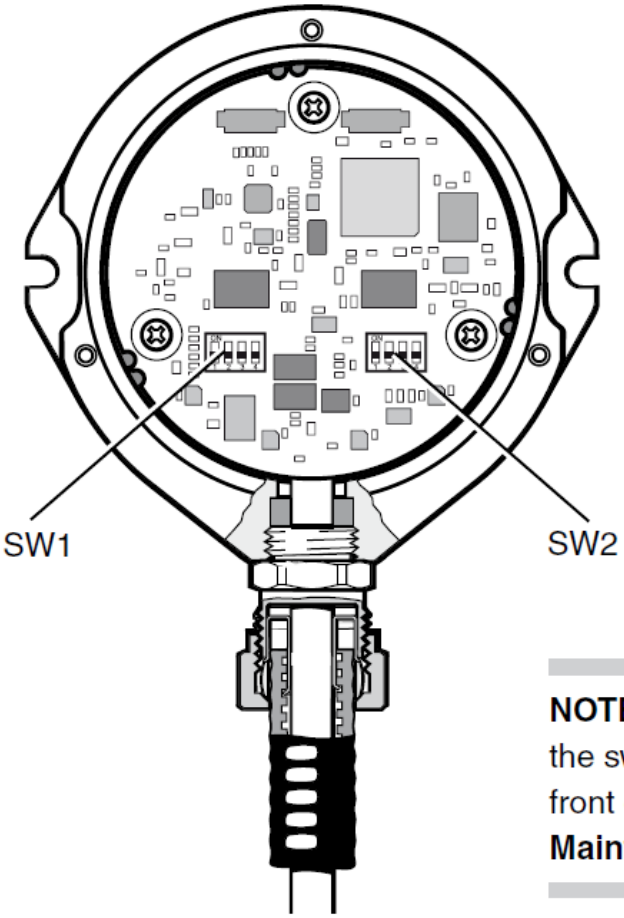
Signal delays:

1. Transmission delay Probe trigger to output change of state = 10 ms ± 10 µs *without enhanced trigger filter*

2. Start delay Time from initiation to start of signal to valid signal transmission = 1 s max

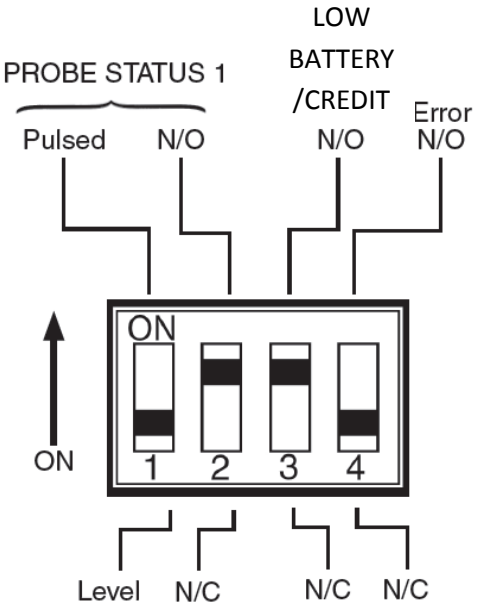
Switches SW1 and SW2

PCB diagram like below for Primo



NOTE: To gain access to the switches, remove the front cover (see **section 4 - Maintenance**.)

Switch SW1 output configuration



Note:

If an error code **E08** appears on the Primo Interface Credit remaining/error code display when a switch setting has been changed the Primo Radio Part Setter or Primo Radio 3D Tool Setter must be re-acquired.

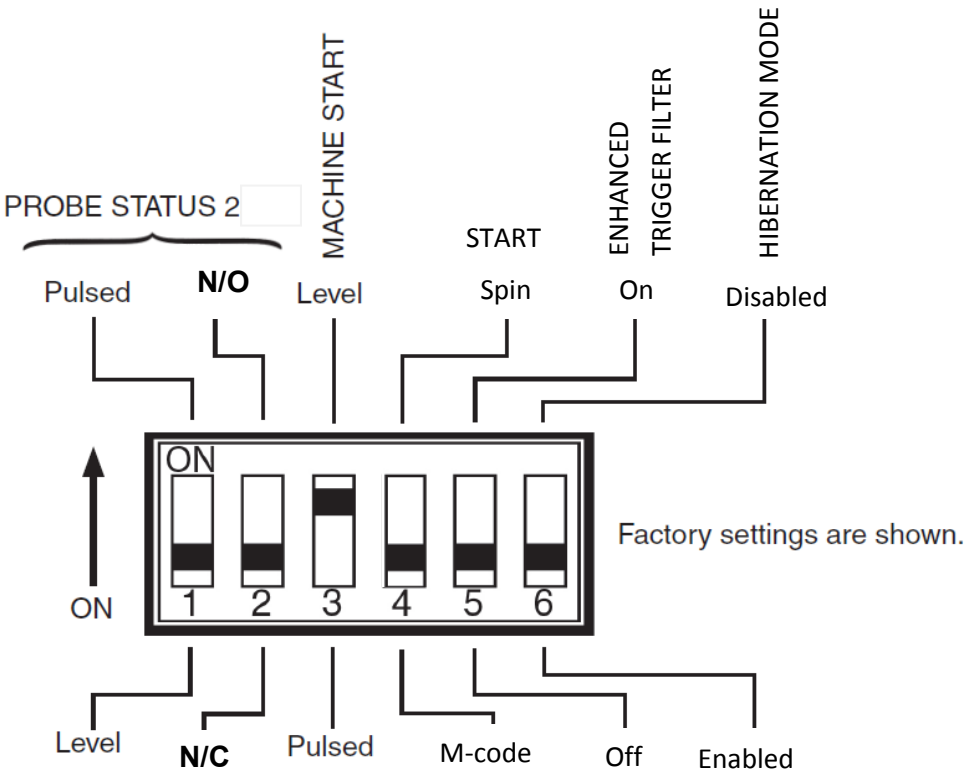
Abbreviations are as follows:

- **N/O** = Normally Open
- **N/C** = Normally Closed

Factory settings are shown.

⚠ **CAUTION:** Exercise caution when using error or probe SSR in N/O mode as a wiring fault could cause loss of error condition and therefore could result in a non-failsafe condition.

Switch SW2 output configuration



Factory settings are shown.

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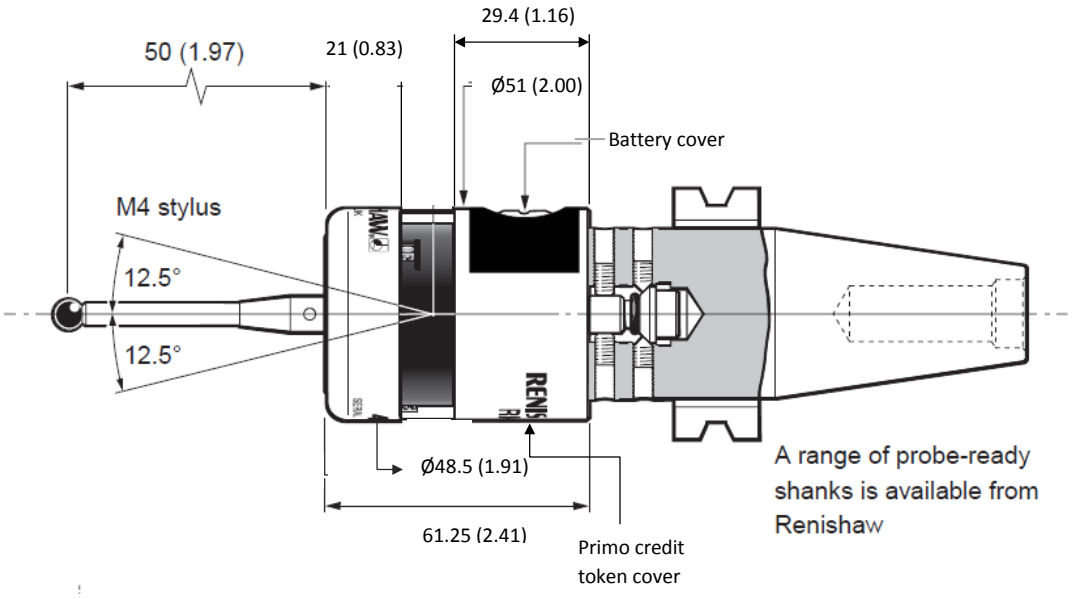
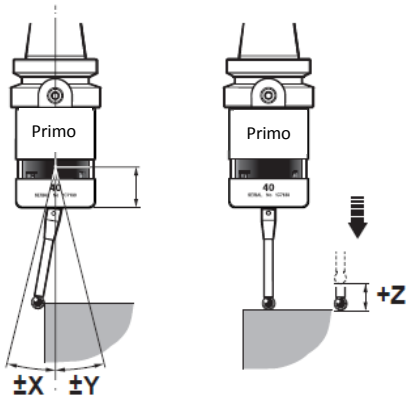
Dimensions and specifications

Part Setter dimensions

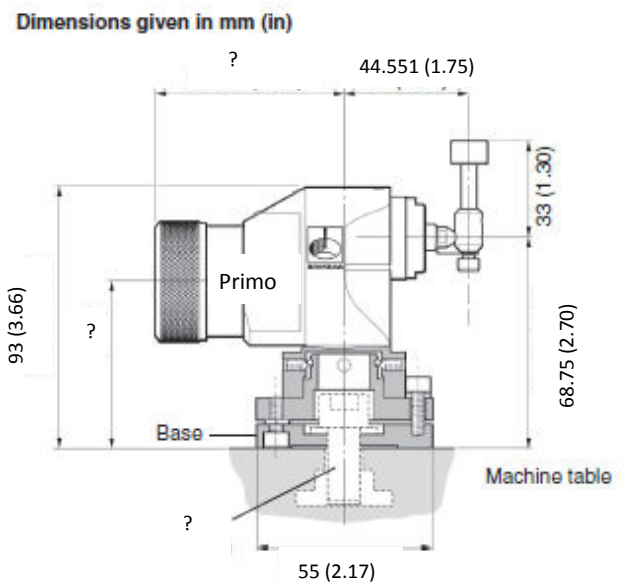
Dimensions given in mm (in)



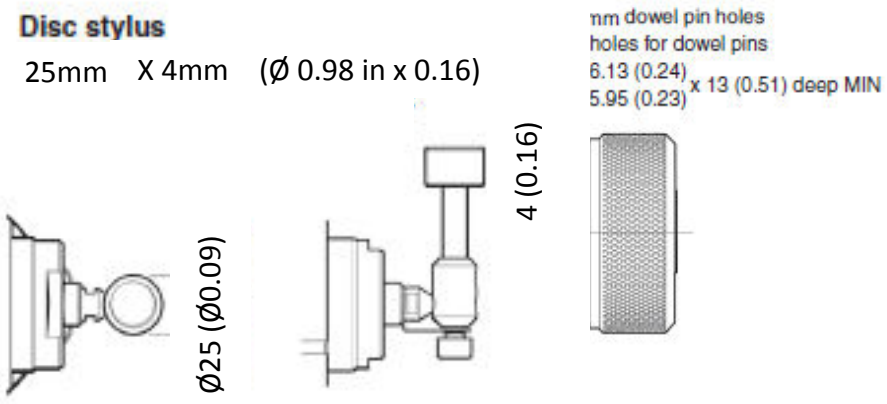


Stylus overtravel limits		
Stylus length	±X/±Y	+Z
50 (1.97)	12 (0.47)	6 (0.24)
100 (3.94)	22 (0.87)	6 (0.24)

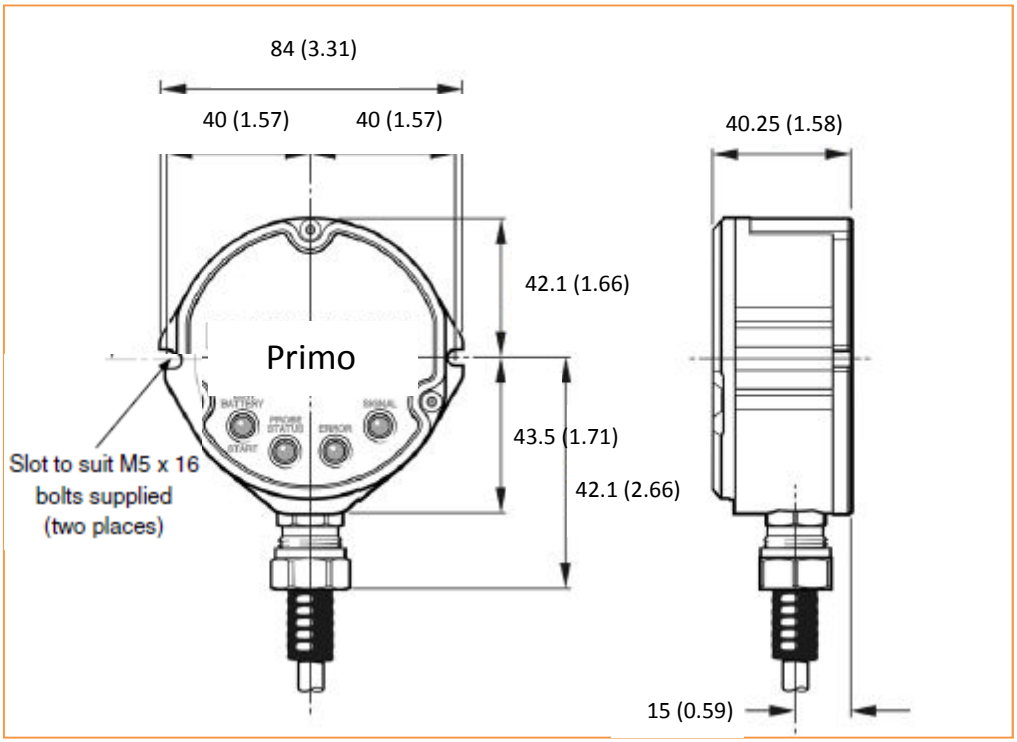
3D Tool Setter dimensions



Ensure this shows the new, larger disk stylus



Interface dimensions



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Radio Part Setter Specification

Principle Application	Work piece inspection and job set-up on all sizes of machining centres	
Dimensions Length Diameter	 61.25 mm (2.41 in) 51 mm (2.00 in)	
Weight (no shank) With battery and iButton Without battery	 360 g 349 g	
Transmission Type	Frequency Hopping Spread Spectrum (FHSS) Radio	
Radio Frequency	2400 MHz to 2483.5 MHz	
Switch-on Methods	Radio M Code, Spin	
Switch-off Methods	Radio M Code, Spin	
Spindle Speed (max)	1000 rpm *not yet been tested*	
Operating Range	Transmission range 10 m	
Receiver/Interface	Primo Interface - combined antenna, interface and receiver unit	
Sense Directions	Omni-directional ±X, ±Y, +Z	
Uni-directional Repeatability Maximum 2σ value in any direction	1.0 µm (0.00004 in) tested with 50mm stylus.	
Stylus Trigger Force XY Low Force XY High Force Z	 0.5 N, 50 gf (1.76 ozf) 0.9 N, 90 gf (3.17 ozf) 5.85 N, 585 gf (20.63 ozf)	The stylus trigger force is the force exerted on the component when the probe triggers. However, the maximum force applied to the component will occur after the trigger point and will be greater than the trigger force. The magnitude depends on a number of factors affecting probe overtravel including measuring speed and machine deceleration. If the forces applied to the component are critical, contact Renishaw for further information.
Stylus Overtravel XY Plane +Z Plane	 ±12.5˚ 6 mm (0.24 in)	
Environment (As defined in BS EN 61010-1:2001)	IP rating	IPX8 (BS5490, IEC 60529) 1 atmosphere
	Storage temperature	-25 ˚C to +70 ˚C (-13 ˚F to +158 ˚F)
	Operating temperature	+5 ˚C to +55 ˚C (+41 ˚F to +122 ˚F)
Battery Types	1 x 3V CR2 Lithium Manganese Dioxide or 1 x 3.6V ½ AA Lithium Thionyl Chloride (see section 6.4 for further details)	
Battery Reserve Life	Approximately one week after a low battery warning is first given	
Low Battery Indication	Flashing blue LED whilst probe is seated (not triggered)	
Dead Battery Indication	Continuous red LED	
Typical Battery Life	See table below	
Low credit indication	Flashing yellow LED (probe seated) 21 days before credit expires	
No credit indication	Continuous yellow LED	

Battery Type	Spin switch-on		Radio switch-on		Continuous use
	Standby life	5% usage (72 mins/day)	Standby life	5% usage	
CR2 Lithium Manganese Dioxide	*Part of alpha tests*	*Part of alpha tests*	*Part of alpha tests*	*Part of alpha tests*	*Part of alpha tests*
½ AA Lithium Thionyl Chloride	*Part of alpha tests*	*Part of alpha tests*	*Part of alpha tests*	*Part of alpha tests*	*Part of alpha tests*

3D Tool Setter Specifications

Principal Application	Tool setting and broken tool detection on all sizes of machining centres	
Dimensions	Diameter	115.1 mm (4.53 in)
	Height with disc stylus	101.75 mm (4.01 in)
Weight (without stylus) With battery Without battery	 610 g (21.5 oz) 599 g (21.1 oz)	
Transmission Type	Frequency Hopping Spread Spectrum (FHSS) Radio	
Radio Frequency	2400 MHz to 2483.5 MHz	
Switch-on Methods	Radio M Code	
Switch-off Methods	Radio M Code	
Operating range	Transmission range 10 m	
Receiver/Interface	Primo Interface - combined antenna, interface and receiver unit	
Sense Directions	Omni-directional ±X,±Y, ±Z	
Uni-directional Repeatability Maximum 2σ value in any direction	1.0 µm (0.00004 in)	
Stylus Trigger Force	1.3 N to 2.4 N/130 gf to 240 gf (4.5 ozf to 8.5 ozf) depending on sense direction	
Stylus Overtravel	XY Plane	± 3.5 mm (0.14 in)
	+Z Plane	5.5 mm (0.22 in)
Environment	IP Rating	IPX8 (EN/IEC60529)
	Storage temperature	-25 ˚C to +70 ˚C (-13 ˚F to +158 ˚F)
	Operating temperature	+5 ˚C to +55 ˚C (+41 ˚F to +122 ˚F)
Battery Types	1 x 3V CR2 Lithium Manganese Dioxide or 1 x 3.6V ½ AA Lithium Thionyl Chloride (see section 6.4 for further details)	
Battery Reserve Life	Approximately one week after a low battery warning is first given	
Typical Battery Life	See table below	
Low Battery Indication	Flashing blue LED (probe seated)	
Dead Battery Indication	Continuous red LED	
Low credit indication	Flashing yellow LED (probe seated) 21 days before credit expires	
No credit indication	Continuous yellow LED	

Battery Type	Turn-on Time	Standby Life	5% Usage (72 minutes/day)	Continuous use
CR2 Lithium Manganese Dioxide	*Part of alpha tests*	*Part of alpha tests*	*Part of alpha tests*	*Part of alpha tests*
½ AA Lithium Thionyl Chloride	*Part of alpha tests*	*Part of alpha tests*	*Part of alpha tests*	*Part of alpha tests*

Interface specification

Principal application	The Interface communicates between the Machine Tool, the Radio Part Setter and the Radio 3D Tool Setter	
Dimensions	Height Width Depth	110 mm (4.33 in) 84 mm (3.31 in) 40.25 mm (1.58 in)
Weight	In box Interface including 8 m (26.2 ft) of cable	TBC g TBC g
Transmission type	Frequency hopping spread spectrum (FHSS) radio 2400 MHz to 2483.5 MHz	
Transmission range	Transmission range 10 m	
Power supply	10 Vdc to 30 Vdc	
Cable	8 m (26.25 ft) standard length	
Mounting	A mounting bracket can be purchased as an optional extra. See section 5.13 to find out how to install the mounting bracket with your interface.	
Conduit	A flexible conduit to aid protection of the Interface cable can be purchased as an optional extra. See section 5.15 for recommended conduits and installation information.	
Environment	IP rating	IPX8
	Storage temperature	-10 ˚C to +70 ˚C (14 ˚F to 158 ˚F)
	Operating temperature	5 ˚C to 50 ˚C (41 ˚F to 122 ˚F)

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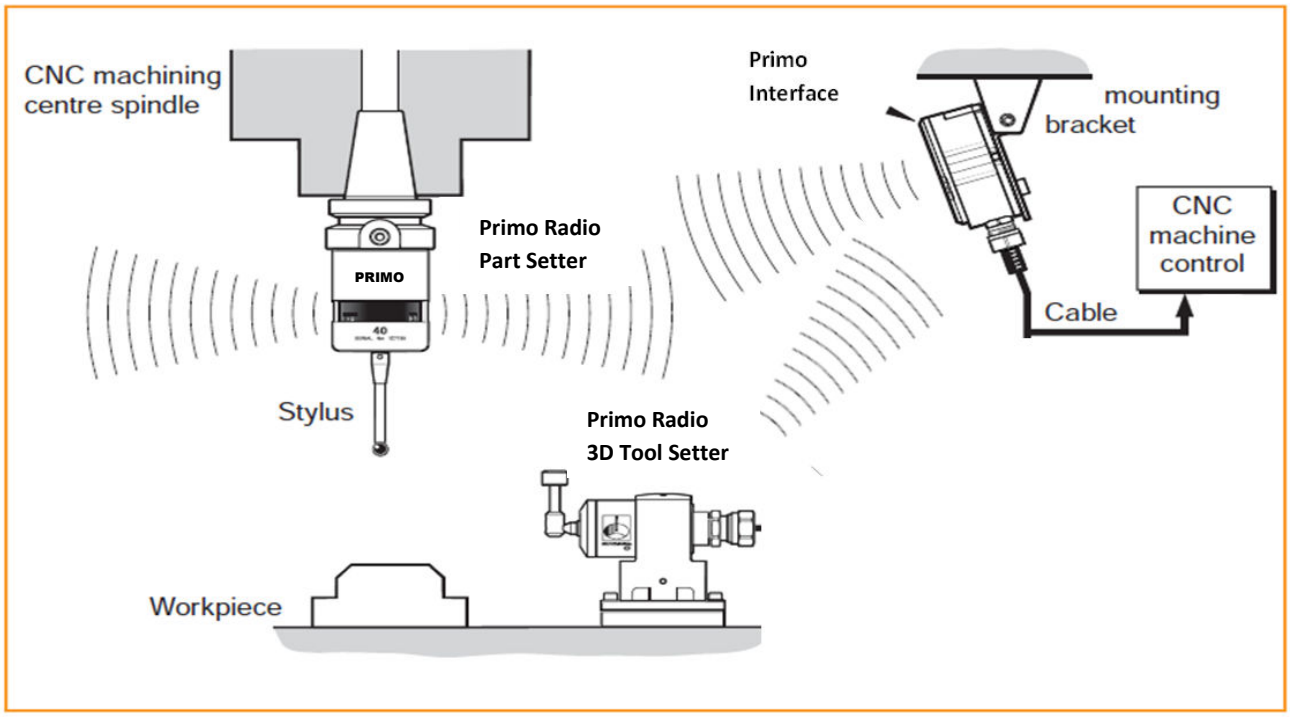
System installation



Operating envelope

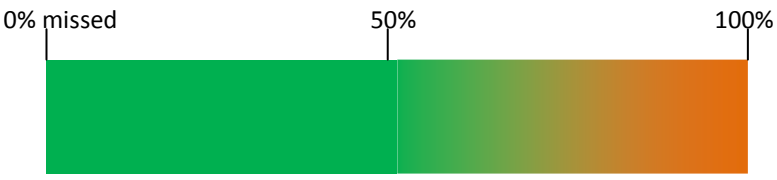
Radio transmission does not require line-of-sight and will pass through small gaps and machine tool windows, providing a reflected path (of less than 10 m (49.2 ft)) is available.

To ensure unrestricted transmission performance:
Keep all Primo System components within the performance envelope (section 5.2).
Ensure the Interface signal LED stays close to green. Green represents excellent signal, yellow represents reduced signal (section 5.28).
Do not allow coolant and swarf residue to accumulate on the equipment.
Regularly wipe clean the Part Setter Body and the 3D Tool Setter window.
Reduction in transmission range may result when operating in temperatures 0 ˚C to +5 ˚C (+32 ˚F to +41 ˚F) and +55 ˚C to +60 ˚C (+122 ˚F to +140 ˚F). Avoid these temperature ranges if possible.

Signal strength LED

The signal LED on the Primo Interface indicates the number of missed communications with the equipment. The LED shows with Green to Amber the number of missed communications. When communication fails the LED goes out.

The system will continue to perform 100% effectively as long as there is signal.



Equipment – Interface positioning

The system elements should be positioned so that:

- The optimum range can be achieved over the full travel of the machine's axes.
- The front cover of the Interface is facing in the general direction of the machining area.

Performance envelope

Performance envelope for Primo Radio Part Setter

Performance envelope/range will be tested in alpha testing

Diagram here

Performance envelope for 3D Tool Setter

Performance envelope/range will be tested in alpha testing

Diagram here

Preparing the Part Setter

Fitting the stylus

For the most accurate results from your Primo Radio Part Setter it is crucial that a Renishaw manufactured Stylus is fitted.

(Same diagram as below but with Primo Probe)

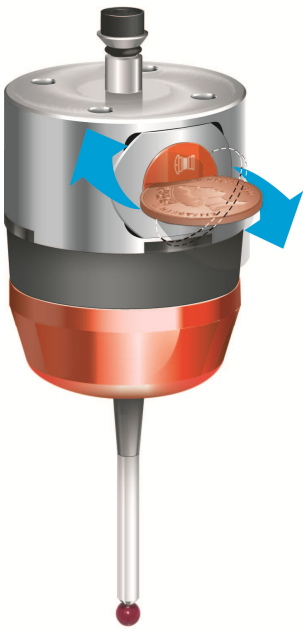
1

2

M-5000-3707

Installing the battery *(same diagram as below but with Primo Probe – one battery)*

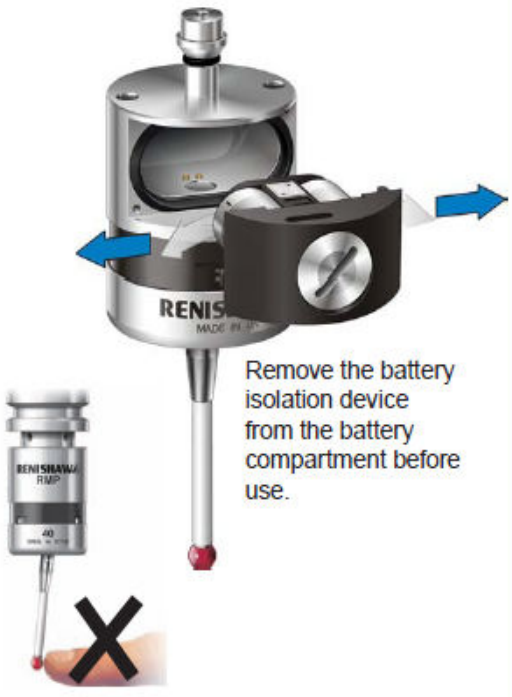
1



NOTES:

See Section 6.4 for a list of suitable batteries and section 1.4 for battery safety information.

2



3

Mounting the Part Setter on a shank *(same diagram as below but with Primo Probe)*

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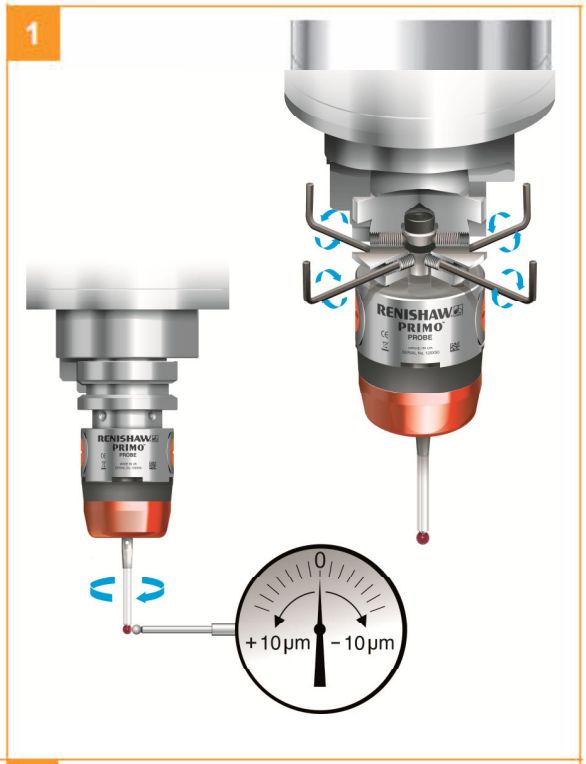
Part Setter stylus on-centre adjustment *(same diagram as below but with Primo Probe)*

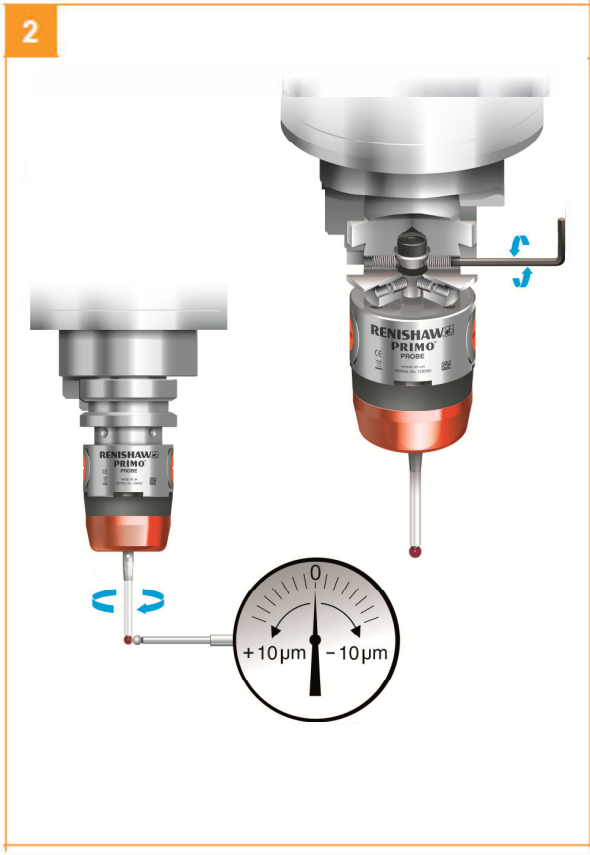
For the centre setting software view the Primo Programming guide

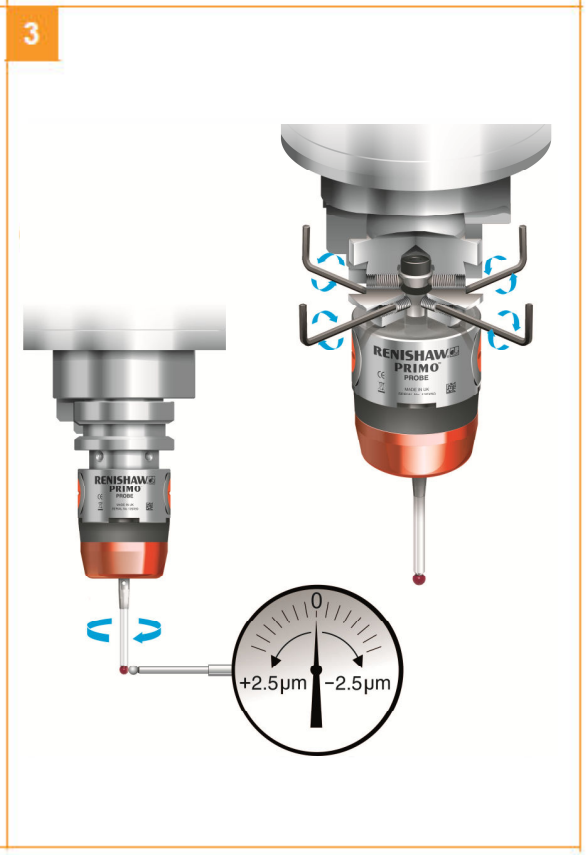
NOTES:

If a Part Setter and shank assembly is dropped, it must be rechecked for correct on-centre adjustment.

Do not hit the Part Setter to achieve on-centre adjustment.







Preparing the 3D Tool Setter for use

Fitting the stylus, break stem and captive link *(same diagram as below but with Primo Tool Setter and showing compartment in the back for spare break stem)*

Stylus weak link break stem

Incorporated into the stylus, the break stem protects the mechanism from damage in the event of excessive stylus over travel or a collision. There is a compartment in the back of the 3D Tool Setter for a spare break stem to be stored.

Captive link

In the event of the break stem being damaged the captive link ties the stylus to the probe.

NOTE:

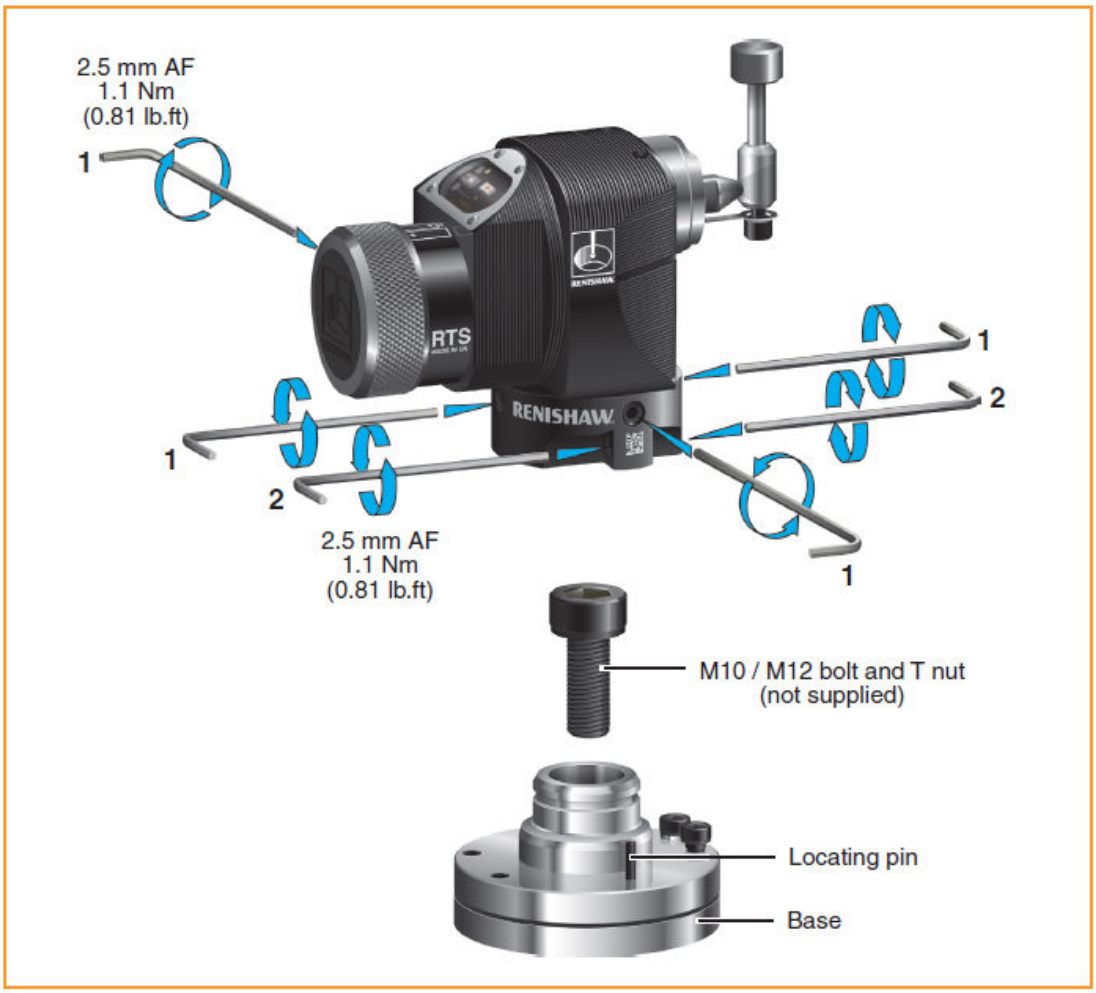
Always hold the support bar in the position to avoid over stressing the break stem.

Installing the battery *(same diagram as below but with Primo Tool Setter – one battery)*

NOTES:

See section 6.4 for a list of suitable battery types.
And section 1.4 for battery safety information.

Mounting the 3D Tool Setter on a machine table *(same diagram as below but with Primo Tool Setter)*



1) Undo 3 of the 4 screws that hold the 3D Tool Setter to the base.
2) Bolt the 3D Tool Setter base to the table using an M12 or M10 cap head screw and washer. (not supplied)
3) Reattach the tool setter to the base.

3D Tool Setter stylus level setting

(*The same diagram but for the Primo Tool setter)*

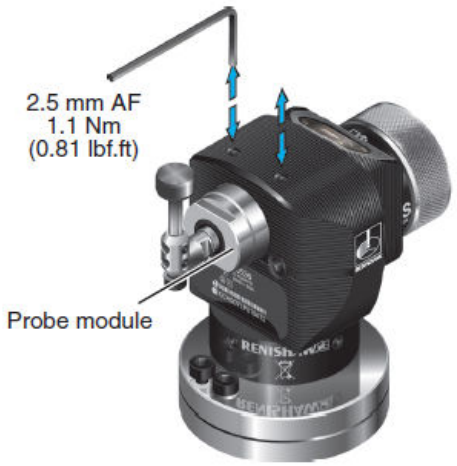
For the level setting software view the Primo Programming guide

Side to side level adjustment

The top surface of the stylus must be set level.

- Alternately adjust the grub screws provided this causes the 3D Tool Setter to rotate and change the stylus level setting.
- When the stylus surface is level, tighten the grub screws.

1



For the level setting software view the Primo Programming guide

Front to back level adjustment

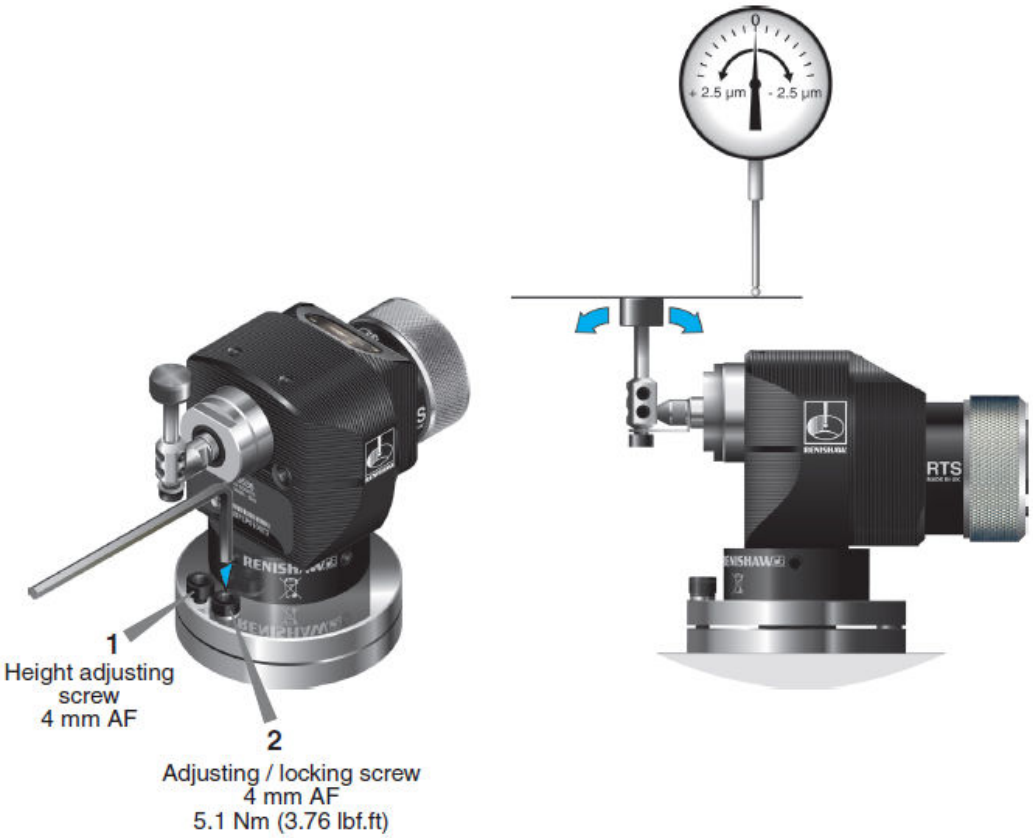
To raise the front:

Slacken locking screw 2 and adjust height adjusting screw 1 until the stylus is level. Then fully tighten screw 2.

To lower the front:

Keep tightening/slackening the height adjusting screw 1 and loosening/locking screw 2 until the stylus is level. Then fully tighten screw 2.

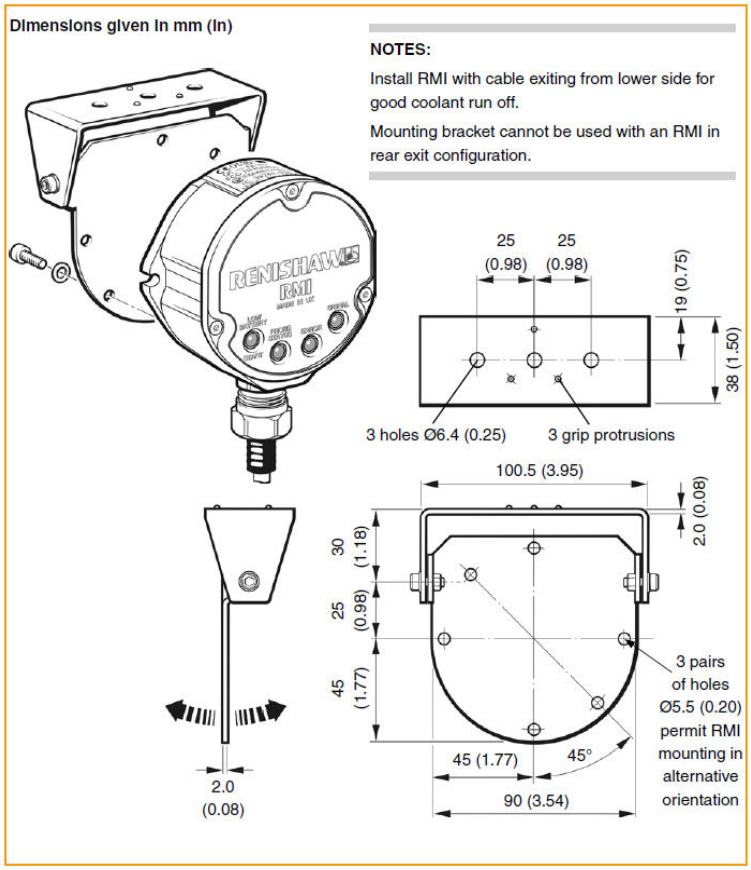
2



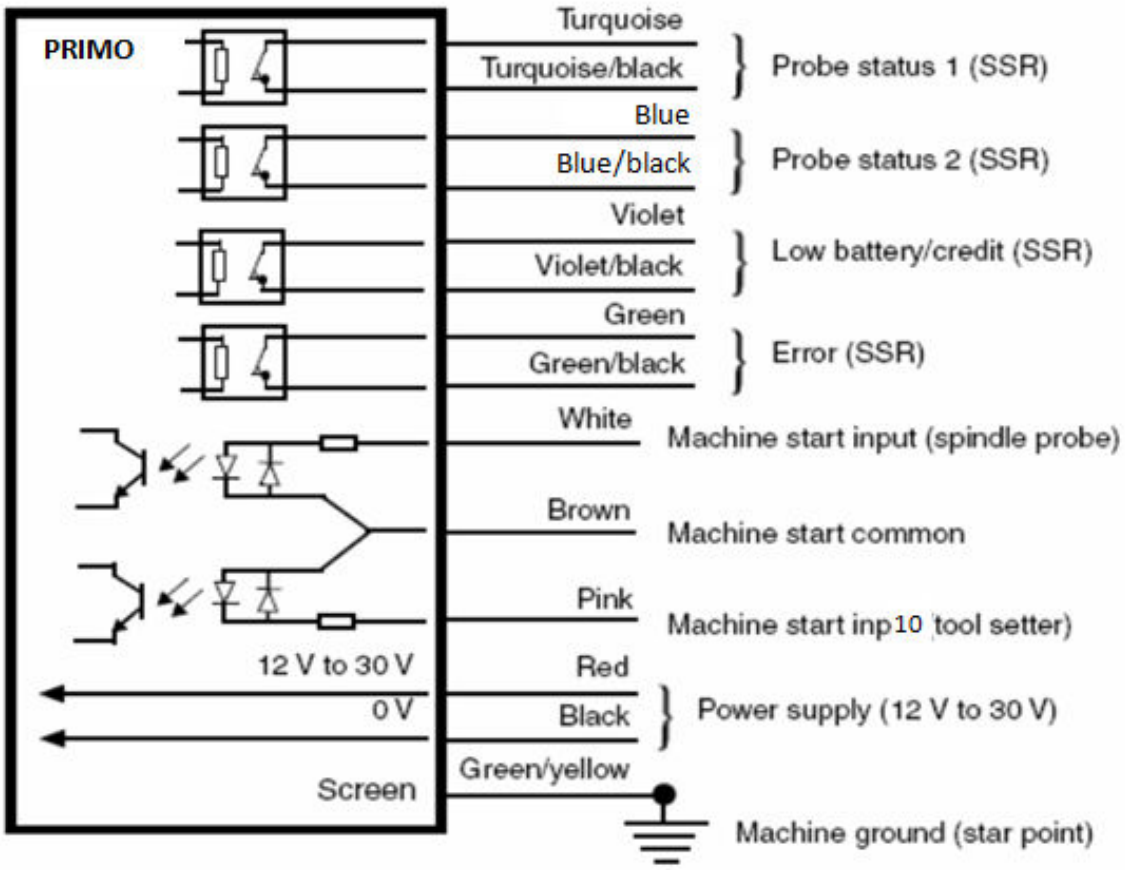
Preparing the Interface for use

Mounting bracket (optional)

Diagram like below but for Primo.



Interface wiring diagram



CAUTION:

⚠ The power supply 0 V should be terminated at the machine ground (star point).

Interface cable

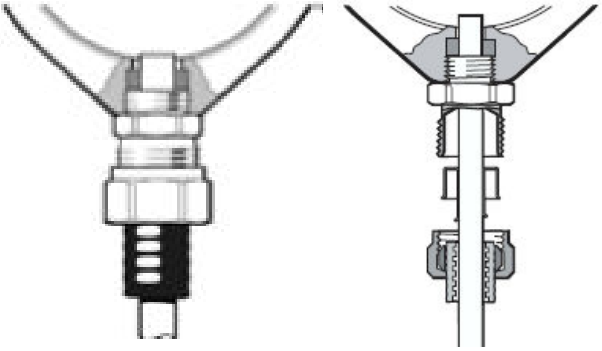
Cable specification

Length	*Diameter*	*Number of cores*	*Dimensions of each core*
8 m (26.25 ft)*	7.5 mm (0.29 in)	13 cores	18 x 0.1 mm

A ferrule should be crimped onto each cable wire for a more positive connection at the terminal box.

A cable sealing gland prevents coolant and dirt from entering the Interface.

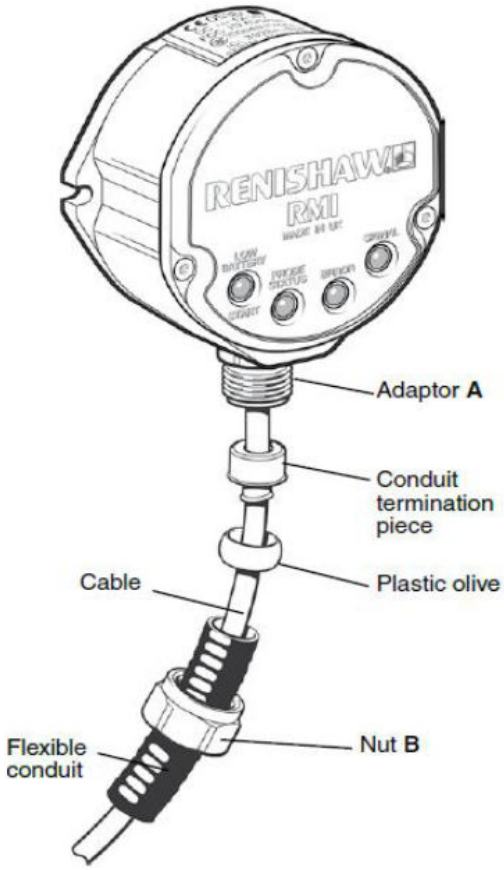
The Interface cable can be further protected by a flexible conduit.



Fitting flexible conduit

The recommended flexible conduit is Anamet™ Sealtite HFX (5/16 in) Polyurethane.

1. Slide nut **B** and plastic olive onto the Conduit.
2. Screw conduit termination piece into end of the conduit.
3. Fit conduit to adaptor **A** and tighten nut **B**.



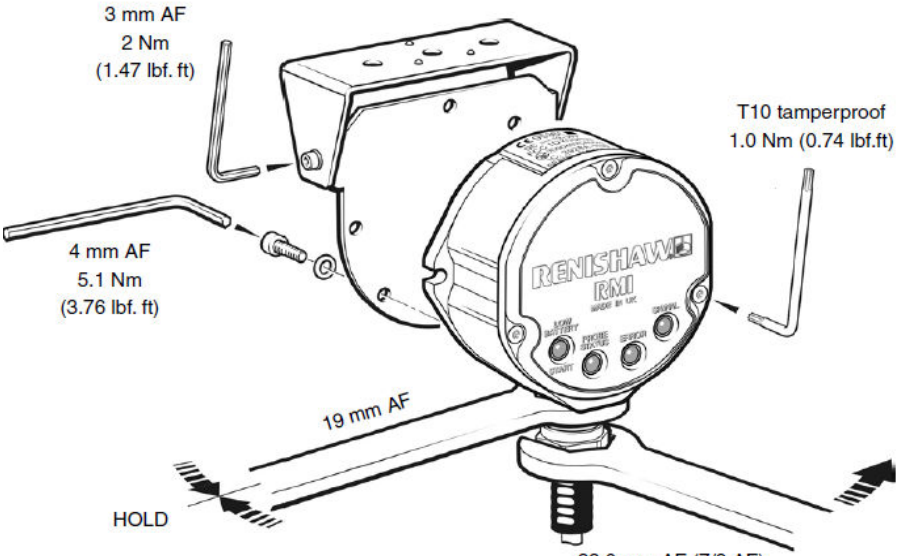
CAUTIONS:

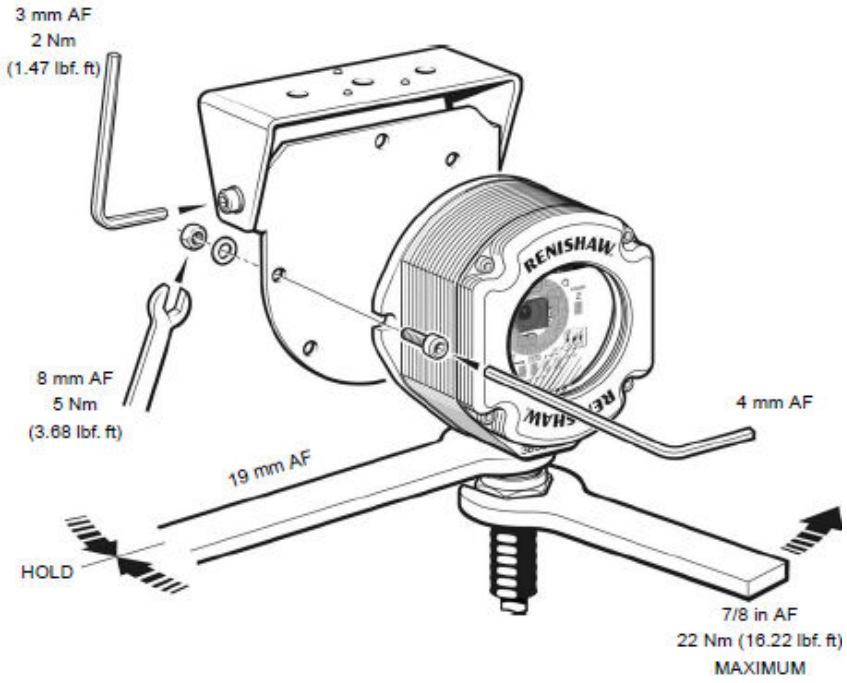
Failure to protect the cable can result in system failure due to either cable damage or coolant ingress through cores into the Interface.

Failure due to inadequate cable protection will invalidate the warranty.

Interface screw torque values

For Primo, this diagram will look like the RMI for the front cover screws and conduit adaptor, but will look like the OMI-2T for the screws at the sides of the Interface attaching it the mounting bracket. (See both diagrams below).





Calibrating the Primo equipment

Why calibrate?

The Primo system has a built in software routine. This calibration process is described in section 5.18.

Before the equipment is used it is very important that the Radio Part Setter and 3D Tool Setter are calibrated correctly.

Calibration of the equipment allows software to compensate for possible errors in the measurements.

- This can be caused by the difference between the position that the stylus touches and the position reported to the machine.

Calibrate:

- when a Primo system is to be used for the first time
- at regular intervals as maintenance
- when a new stylus is fitted to the probe
- when the stylus has become distorted or the equipment has crashed
- when equipment settings are changed
- If repeatability of relocation of the probe shank is poor
    - In this case, the probe may need to be recalibrated each time it is selected

Traditional calibration methods should still be used when:

- when using a non standard stylus;
- when only one piece of equipment is installed in the machine;
- when high accuracy is required (<10 µm);
- When working in a 4 or 5 axis machine.

The Primo System Calibration Software routines and Traditional Calibration methods are described in the Primo Programming Guide.

Radio Part Setter and Radio 3D Tool Setter LED Guide

= quick flash

(32 ms, 992 ms between each flash)

= quick double flash

(32 ms flash, 128 ms separating the double flash, 832 ms between each double flash)

= flash

(128 ms, 640 ms between each flash)

= long flash

(512 ms, 512ms between each flash in acquisition mode, 128 ms between each flash in credit transfer mode, 16 ms between each flash in the RGB start up signal)

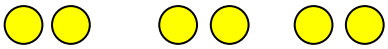
Start up

LED colour	Status	Graphic hint
Red, Green, Blue	Equipment starting up/newly changed battery/ newly inserted credit token	

Acquisition mode

LED colour	Status	Graphic hint
5 green flashes	Acquisition prompt (seated)	
5 red flashes	Acquisition prompt (triggered)	
Flashing violet	Acquisition waiting	
Continuous violet	Interface identified	
On green for 5 s	Acquisition complete	

Operational mode *(all signals repeat)*

LED colour	Status	Graphic hint
Flashing green	Equipment seated – good battery, good credit	
Flashing red	Equipment triggered *	
Flashing blue	Equipment seated – low battery, good credit	
Flashing yellow	Equipment seated – good battery, low credit	
Flashing blue & yellow	Equipment seated – low battery, low credit	
Double flashing yellow	Equipment seated – very low credit	

*Probe triggered flashing red signal overrides any other indication such as low battery or credit. The status of these indicators can only be viewed when the probe is seated.

Errors

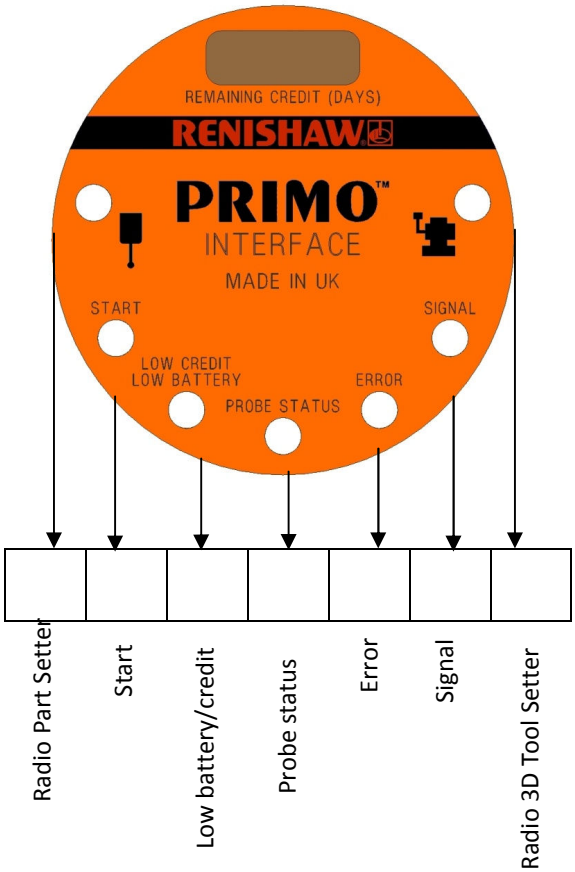
LED colour	Status	Graphic hint
Continuous violet	Tampered hardware	
Continuous red	Battery dead	
Continuous yellow	Credit exhausted	

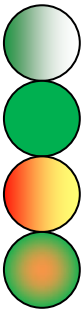
Credit transfer mode *(Primo Radio Part Setter only)*

LED colour	Status	Graphic hint
Flashing yellow and green	Credit transfer mode (repeats until mode change)	
Flashing yellow and red	Credit transfer unsuccessful (repeats 5 times)	
Flashing yellow and blue	Credit transfer successful (repeats 5 times)	
Flashing red and violet	Credit transfer mode – represents a lifetime system	

Interface LED signals

Key:





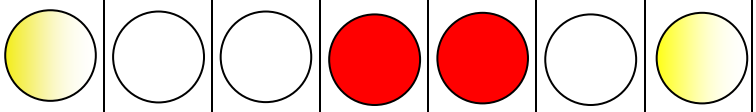
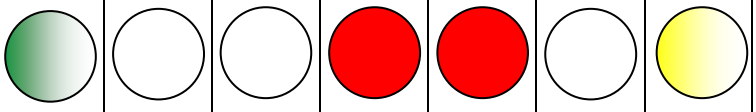
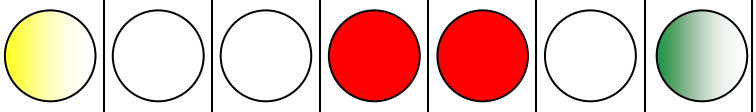
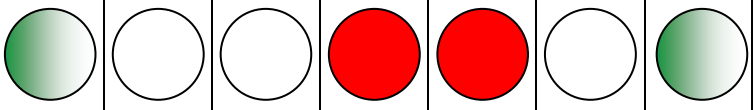
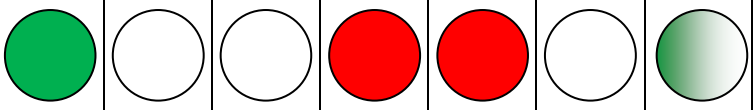
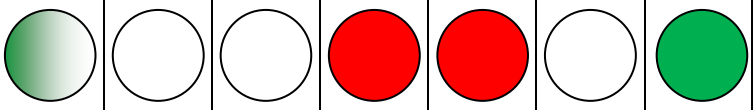
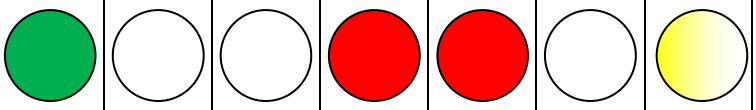
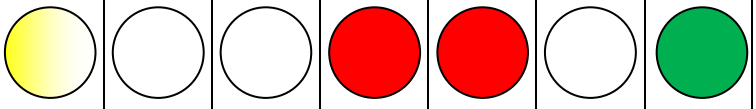
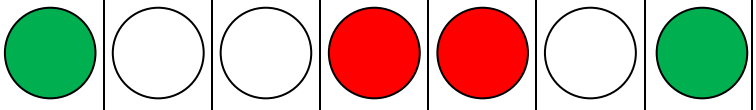
= LED flashing green/off

= LED constant green

= LED flashing red and yellow with even periods

= LED graded between green and amber

Acquisition mode

System Status	Graphic display							Details
	Part Setter	Start	Low battery/ credit	Probe status	Error	Signal	3D Tool Setter	
Interface in “Acquisition waiting” state								The Part Setter LEDs flash yellow/off at least once for up to 8s or until a Part Setter is discovered
Interface identifies Part Setter*								The Part Setter LED flashes green for up to 3 minutes or until an “acquisition ready” message is received from the Part Setter
Interface identifies 3D Tool Setter								The 3D Tool Setter LED flashes green for up to 3 minutes or until an “acquisition ready” message is received from the 3D Tool Setter
Part Setter and 3D Tool Setter identified								Both LEDs flash green for up to three minutes or until an “acquisition ready” message is received from the equipment
The Part Setter is acquired (3D Tool setter acquisition pending)								The part Setter LED is on, 3D Tool Setter LED flashes for 3 minutes or until the 3D Tool Setter is acquired
3D Tool Setter acquired (Part Setter acquisition pending)								The 3D Tool Setter LED is on, the Part Setter LED flashes for 3 minutes or until the Part Setter is acquired.
Part Setter acquired								Part Setter LED stays on for 5 sec
3D Tool Setter acquired								3D Tool setter LED stays on for 5 sec
Part Setter and 3D Tool Setter acquired								Part Setter and 3D Tool Setter LEDs stay on for 5 sec

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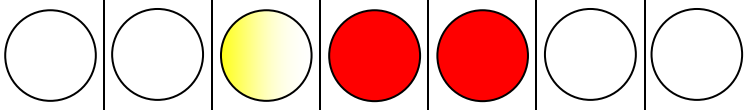
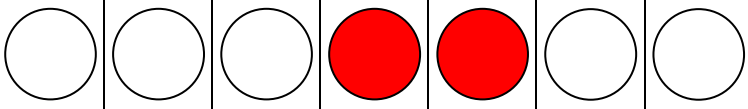
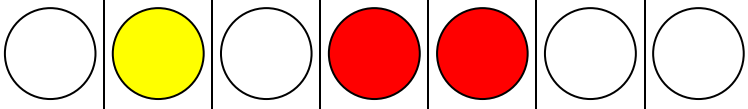
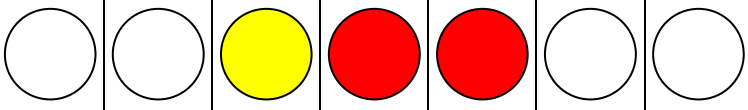
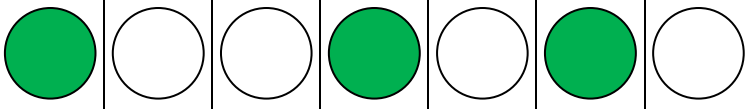
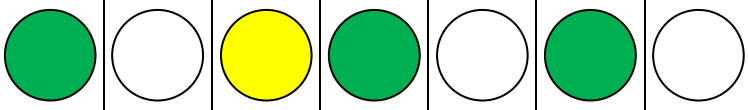
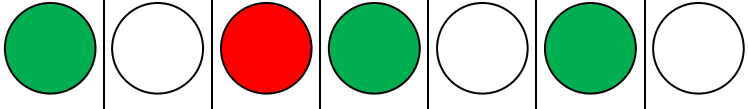
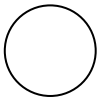
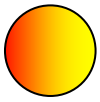
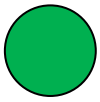
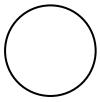
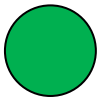
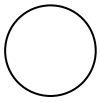
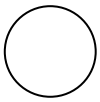
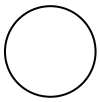
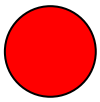
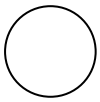
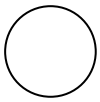
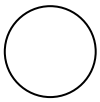
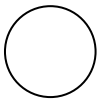
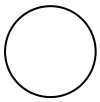
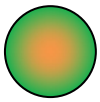
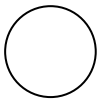
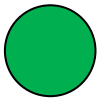
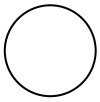
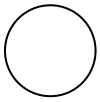
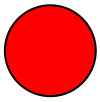
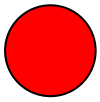
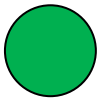
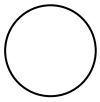
Credit transfer

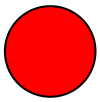
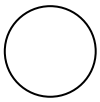
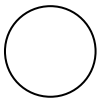
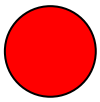
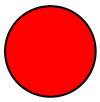
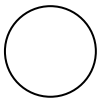
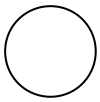
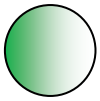
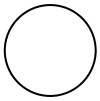
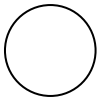
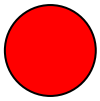
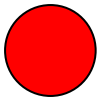
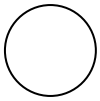
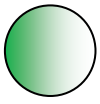
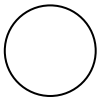
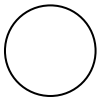
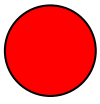
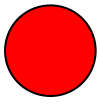
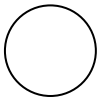
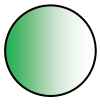
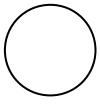
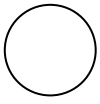
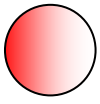
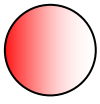
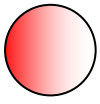
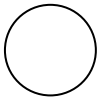
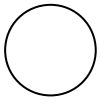
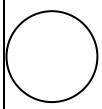
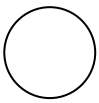
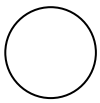
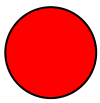
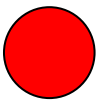
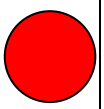
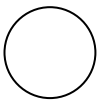
System Status	Graphic display							Details
	Part Setter	Start	Low battery/ credit	Probe status	Error	Signal	3D Tool Setter	
Credit transfer in progress								The low credit/low battery LED will flash yellow for 2s to show credit transfer in progress

Operational mode

System Status	Graphic display							Details
	Part Setter	Start	Low battery/ credit	Probe status	Error	Signal	3D Tool Setter	
Standby								Primo System in standby mode
Start signal								When set to level start, the start LED will stay yellow until the Part Setter or 3D Tool Setter starts. When set to pulsed start, the start LED will stay yellow for 30s or until the equipment starts.
Standby low credit								When no equipment is operating the low credit/battery LED will be yellow if credit is low
Part Setter on and seated								
Part Setter on, seated with low credit								
Part Setter on, seated with low battery								

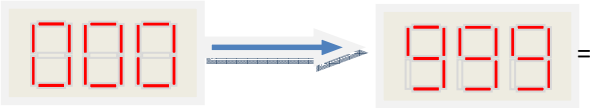
Part Setter on, seated with low battery and credit								The low credit/battery LED will flash Red and Yellow while conditions persist
Part Setter on and triggered								
Part Setter on, seated with poor signal								The signal LED is graded from Green to Amber to show the Part Setter signal strength. 100% indicates best signal
Part Setter triggered start								

Error states

System Status	Graphic display							Details
	Probe	Start	Low battery/ credit	Probe status	Error	Signal	Tool Setter	
New Part Setter acquisition required								If the Part Setter spin/m-code sip switch is changed after it is acquired, the part Setter will need to be re-acquired or the switch must be changed back
3D Tool setter on, attempted switch on of Part Setter								The part Setter LED will flash to indicate a multiple equipment error, the LED will continue to flash while conditions exist
Attempted switch on of both pieces of equipment simultaneously								The Part Setter and 3D Tool Setter LEDs with flash to show a multiple equipment error
System over current								Flash the low credit/battery, status and error LEDs. The error will continue until the fault is cleared and the power is cycled
Hardware validation failure								

Interface digital display codes

Credit codes:



= AVAILABLE CREDIT (in days)

= CREDIT UPGRADED TO UNLIMITED (upgrade credit token)

Error codes:

E01 = Multiple M-code Error
E02 = Multiple active equipment Error
E08 = Acquisition required (incorrect dip switch state for turn on method)
E20 = Output over current

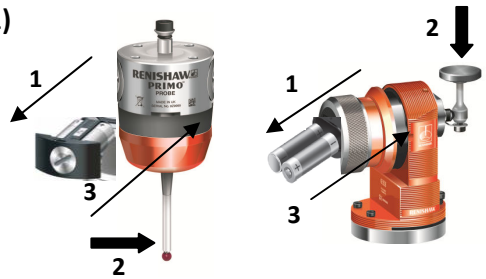
NOTE:

There may be more error codes to come!!!

Method of partnership

Both the Part Setter and the 3D Tool Setter can be partnered with the Primo interface simultaneously.

1)



1. Remove betteries **>5s**
2. Trigger stylus and hold
3. Re-insert batteries

LED check

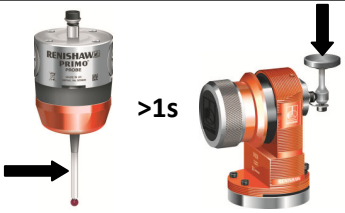
Probe status check

2) Probe enters “Acquisition waiting”

Release stylus

3) Probe identifies Interface

4)



Trigger the stylus again for more than 1 second

5) Acquisition complete (LED green 5 s)

Note:

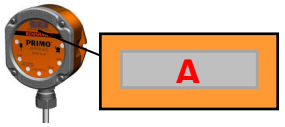
Primo System Kits will be supplied with Equipment that has already been acquired. Using this acquisition process will only be needed when using replacement equipment or when equipment has been bought separately.

1)

Turn the Primo Interface off and on to activate Acquisition mode

2) Interface enters “Acquisition waiting”

Primo Radio Part Setter Primo Radio 3D Tool Setter



3) Interface identifies probe

Primo Radio Part Setter Primo Radio 3D Tool Setter

Part setter identified, 3D Tool Setter waiting

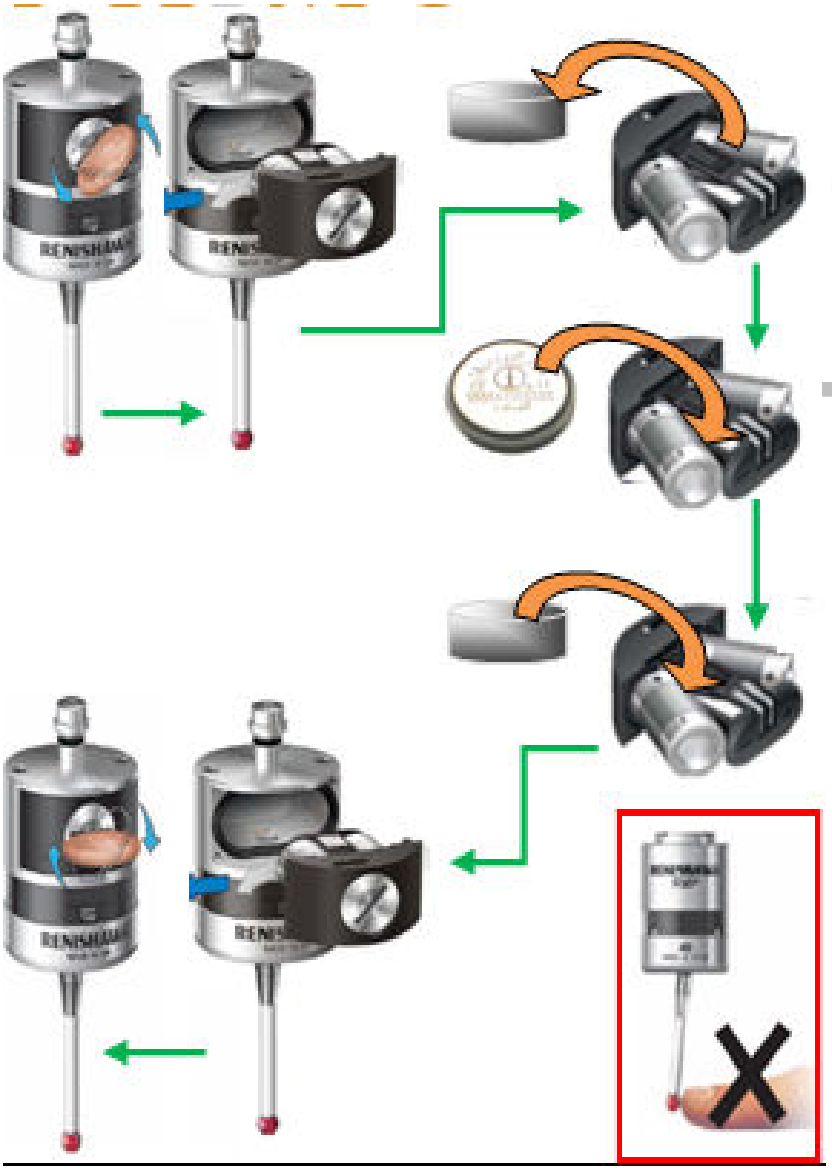
5) Acquisition complete (probe LED green 5 s)

Primo Radio Part Setter Primo Radio 3D Tool Setter

Part setter acquired, 3D Tool Setter waiting

Installing the credit token

(same diagram as below but with Primo Probe – one iButton) remove metal ring, insert ibutton, return metal ring, reinsert cartage



Note: At the time of purchase the 1 month credit token is already inserted into the Part Setter's credit Token 'cassette'. All subsequent tokens must be inserted into this cassette.

Method of credit transfer

NOTES:

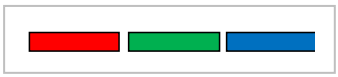
If credit transfer is interrupted after it's been initiated (stage 4), then credit transfer **must** be completed on that system.

Once all the credit has been transferred do not remove the token from the Primo Probe.

1)

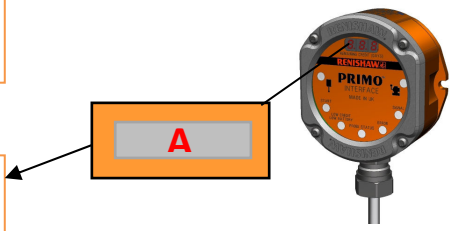
Insert Primo credit token and replace cover.

2)



RGB start up LED signal.

This is followed by the 5 green acquisition prompt flashes.



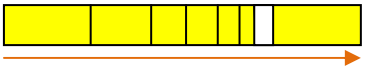
3)

The Part Setter has entered credit transfer mode.

4)

> 5s

Trigger the stylus, the LED's will flash at an increasing rate; hold the stylus until LED's show solid Yellow.



5)

Credit transfer **unsuccessful** indicated by yellow/red flashes. These flashes repeat 5 times. Part Setter returns to credit transfer mode.

5)

Credit transfer **successful** indicated by yellow/blue flashes. These flashes repeat 5 times. The Interface display shows remaining credit.

Maintenance

Maintenance

You may undertake the maintenance routines described in these instructions; further dismantling and repair of Renishaw equipment must be carried out by an authorised Renishaw Services Centre.

Cleaning the equipment

Wipe the window of the Radio 3D Tool Setter and the body shell of the Radio Part Setter with a clean cloth on a regular basis to remove machining residue.

Changing the battery

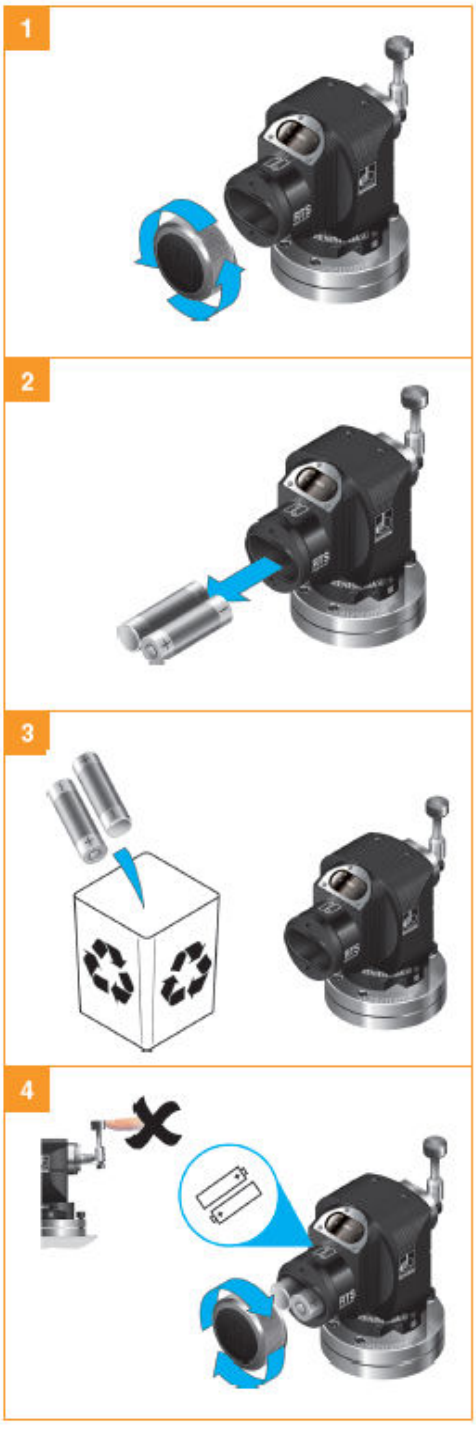
Part Setter *(same diagram as below but with Primo Probe – one CR2 battery)*

NOTES:

See section 6.4 for a list of suitable battery types.
And section 1.4 for battery safety information.

3D Tool Setter

(Same diagram as below but with Primo Probe – one CR2 battery)



NOTES:

See section 6.4 for a list of suitable battery types.
And section 1.4 for battery safety information.

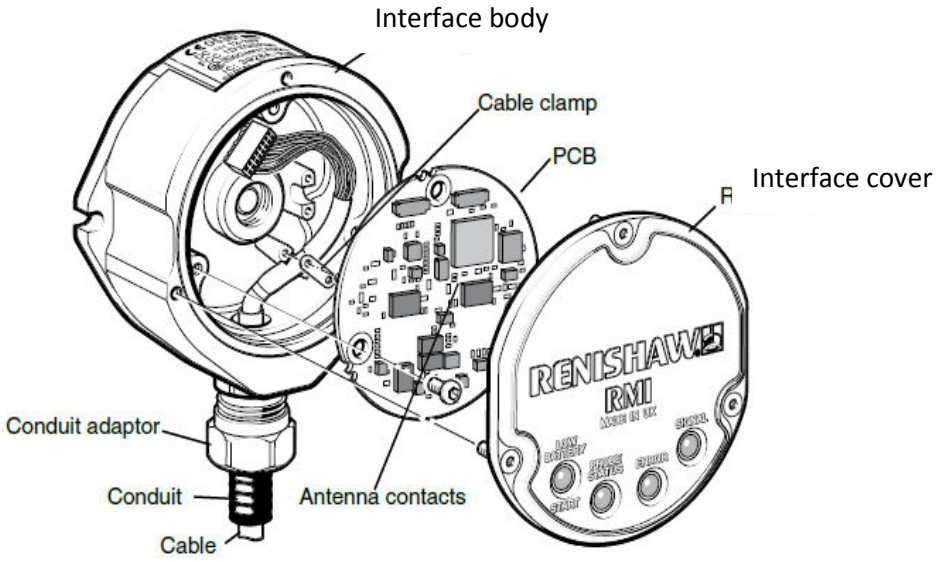
Allowed battery types

CR2 Lithium Manganese (3V)	½ AA Lithium Thionyl Chloride (3.6V)∞	
✓ ***All batteries of this type (CR2) are fine****	✓ **Ecocel**: *EB1426* **Saft:** *LS 14250C, LS 14250* **Tadiran:** *SL-750* **Xeno:** *XL-050F*	✗ **Dubilier:** *SB-AA02* **Maxwell**: *ER3S* **Sanyo:** CR 14250SE **Tadiran:** *SL-350, SL-550, TL-4902, TL-5902, TL-2150, TL-5101* **Varta:** *CR ½ AA*

**All CR2 batteries have worked fine so far, but still more testing to be done*

∞Most of these batteries have not been tested yet, but it is assumed at the moment that the list of allowed batteries and not allowed batteries, will basically be the same as for the RMP40

Interface cover



CAUTION:

Keep interface clean - No liquids or particles should enter the interface

Do not allow the antenna contacts to be contaminated.

Do not twist or rotate the cover by hand.

Removing the Interface cover

1) Clean thoroughly to ensure no debris or coolant enters the unit. 	2) Unscrew (but DO NOT remove) each captive screw and washer evenly from the cover using the T10 tamper proof key.

Routine 3D Tool Setter maintenance

- Ensure the 3D Tool Setter is firmly secured to its mounting.
- Keep all electrical connections clean.
- Inspect the inner diaphragm once a month.

NOTE:

In the event of inner diaphragm seal damage, return the 3D Tool Setter to your supplier for repair.

Inspecting the inner diaphragm seal

(1)

Spanner
5 mm AF
2.6 Nm
(1.92 lbf.ft)

Remove the stylus/break stem assembly

(2)

Spanner
24 mm or 15/16 in
3 Nm
(1.47 lbf.ft)

Remove the front cover

(3)

Remove the metal eyelid and spring

(4)

Wash inside of probe with clean coolant

(5)

Inspect the inner diaphragm seal for signs of piercing and damage

(6)

If there is no damage, reassemble the Tool Setter

RENISHAW apply innovation

Fault finding

Primo Radio Part Setter

Symptom	Cause	Action
Part Setter fails to power up (no LEDs illuminated or fails to indicate current Part Setter settings)	No credit token	Insert credit token
	Dead battery	Change battery
	Wrong battery	Change battery
	Battery inserted incorrectly	Check battery insertion/polarity.
	Battery not removed for long enough so the Part Setter has not reset	Remove battery for a minimum of 5 seconds
Part Setter fails to switch on	Dead battery	Change battery
	Battery inserted incorrectly	Check battery insertion/polarity
	Part Setter out of range	Check position of Interface
	No Interface 'start/stop' signal (radio-on mode only)	Check Interface for green start LED
	Incorrect spin speed (spin-on mode only)	Check spin speed and duration
	Incorrect switch-on method configured	Check configuration and alter as required
	Primo in hibernation mode (radio-on mode only)	Ensure probe is in range and wait up to 30 seconds, then resend switch-on signal. Check position of Interface
	System credit depleted	Insert new credit token
Machine stops unexpectedly during a cycle	Radio link failure/Part Setter out of range.	Check Interface/receiver and remove obstruction
	Interface receiver/machine fault	Refer to receiver/machine user's guide
	Dead battery	Change battery
	Part Setter unable to find target surface	Check that part is correctly positioned and that stylus has not broken
	Stylus not given sufficient time to settle from a rapid deceleration	Add a short dwell before the move (length of dwell will depend on stylus length and rate of deceleration). Max dwell is one second
Part Setter crashes	Work piece obstructing Part Setter path	Review software
	Part Setter length offset missing	Review software
Poor repeatability and/or accuracy	Debris on part or stylus	Clean part and stylus
	Poor tool change repeatability	Redatum after each tool change
	Loose Part Setter mounting on shank or loose stylus	Check and tighten as appropriate
	Calibration out of date and/or incorrect offsets	Review probing software

	Calibration and measurement speeds not the same	Review probing software
	Calibration feature has moved	Correct the position
	Measurement occurs as stylus leaves surface	Review software
	Measurement occurs within the machine's acceleration and deceleration zone	Review software and probe filter settings
	Probing speed too high or too low	Perform simple repeatability trials at various speeds
	Temperature variation causes machine and workpiece movement	Minimise temperature changes
	Machine tool faulty	Perform health checks on machine tool
Part Setter status LEDs do not correspond to Interface LEDs	Radio link failure – Part Setter out of Interface range	Check position of Part Setter
	Part Setter has been enclosed/shielded by metal	Remove from obstruction
	Part Setter and Interface are not partnered	Partner Part Setter and Interface
Interface error LED lit during probing cycle	Part Setter not switched on or timed out	Change setting. Review turn-off method
	Part Setter out of range	Check position of Interface
Interface low battery LED lit	Low battery	Change battery soon
Reduced range	Local radio interference	Identify and remove
Part Setter fails to switch off	Incorrect switch-off method configured	Check configuration and alter as required
	No Interface 'start/stop' signal (radio-on mode only)	Check Interface for green start LED
	Incorrect spin speed	Check spin speed

Tool Setter

Symptom	Cause	Action
3D Tool Setter fails to power up (no LEDs illuminated or fails to indicate current probe settings) or erratic LED behaviour	Dead battery	Change battery
	Wrong battery	Change battery
	Battery inserted incorrectly	Check battery insertion/polarity
	Battery removed for too short a time and probe has not reset	Remove battery for a minimum of 5 seconds
3D Tool Setter fails to switch on	Dead battery	Change batteries
	Battery inserted incorrectly	Check battery insertion/polarity
	3D Tool Setter out of range	Check position of Interface
	No Interface 'start/stop' signal (radio-on mode only)	Check Interface for green start LED
	3D Tool Setter in hibernation mode (radio-on mode only)	Ensure 3D Tool Setter is in range and wait up to 30 seconds, then resend switch-on signal. Check position of Interface
	System credit depleted	Insert new credit token into Part Setter and upload credit
Machine stops unexpectedly during a probing cycle	Radio link failure/3D Tool Setter out of range.	Check Interface/receiver and remove obstruction
	Interface receiver/machine fault	Refer to receiver/machine user's guide
	Dead battery	Change battery
	3D Tool Setter unable to find target surface	Check that part is correctly positioned and that stylus has not broken
	False trigger	Enable enhanced trigger filer
Spindle crashes into 3D Tool Setter	Tool length offset incorrect	Review offsets
	Wrong piece of equipment selected if multiple are available	Review interface wiring or part program.
Poor repeatability and/or accuracy	Debris on part or stylus	Clean part and stylus
	Loose 3D Tool Setter mounting on shank or loose stylus	Check and tighten as appropriate
	Excessive machine vibration	Enable enhanced trigger filter. Eliminate vibrations.
	Calibration out of date and/or incorrect offsets	Review probing software. Repeat calibration routine.
	Calibration and machine speeds not the same	Review software
	Calibration feature has moved	Correct the position
	Measurement occurs within the machine's acceleration and deceleration zone	Review software to increase back-off distance and review probe filter settings
	Machine speed too high or too low	Perform simple repeatability trials at various speeds
	Temperature variation causes machine and workpiece movement	Minimise temperature changes
	Machine tool faulty	Perform health checks on machine tool

3D Tool Setter status LEDs do not correspond to Interface LEDs	Radio link failure – 3D Tool Setter out of Interface range	Check position of 3D Tool Setter
	3D Tool Setter has been enclosed/shielded by metal	Remove from obstruction
	3D Tool Setter and Interface are not partnered	Partner 3D Tool Setter and Interface
Interface error LED lit during probing cycle	3D Tool Setter not switched on or timed out	Change setting. Review turn-off method
	Probe out of range	Check position of Interface
	Dead Interface batteries	Change Interface batteries
	3D Tool Setter and Interface not partnered	Partner 3D Tool Setter and Interface
Interface low battery LED lit	Low battery	Change battery soon
Reduced range	Local radio interference	Identify and remove
Probe fails to switch off	No Interface ‘start/stop’ signal (radio-on mode only)	Check Interface for green start LED

Interface

Symptom	Cause	Action
No LEDs lit on interface	No power to interface	Check wiring
Interface status LEDs do not correspond to status LEDs	Radio link failure – probe out of interface range	Check position of interface.
	Probe has been enclosed/shielded by metal	Review installation
	Interface and probe are not partnered	Partner interface and probe
Interface probe status LED continually lit red	Dead probe batteries	Change probe batteries
Interface error LED lit during probing cycle	Damaged cable	Check wiring
	Loss of power	Check wiring
	Dead probe batteries	Change probe batteries
Interface error LED illuminated during intended probing cycle	Probe not switched on	Check configuration and alter as required
	Probe out of range	Check position of interface
All interface LEDs flashing	Wiring fault	Check wiring
	Output over-current	Check wiring, turn power to interface off and on again to reset
Interface low battery LED lit	Low equipment batteries	Change equipment batteries soon
Reduced range	Local radio interference	Identify and move

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Parts list

Type	Part Number	Description
		Primo training programme kit

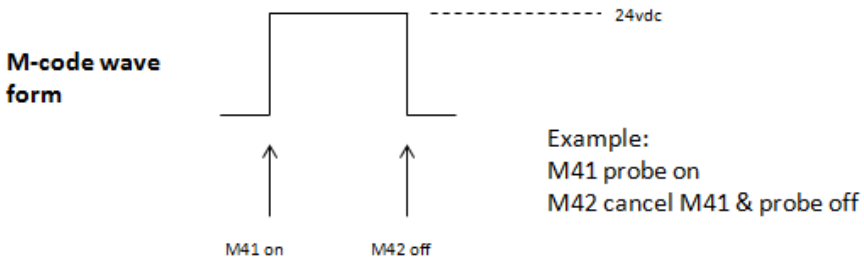
Appendix 1: Primo Radio Part Setter and Primo Length Tool Setter combination relay configurations

Interface switch relays

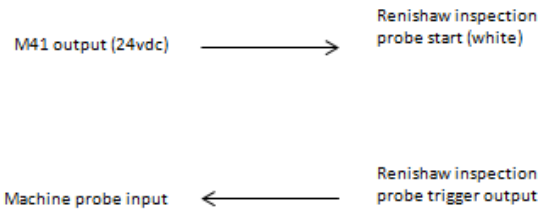
If the Primo Radio Part Setter is used in conjunction with the Primo Z Tool Setter on a machine with only one Skip input then a relay will be required to switch between the equipment. The relays that Renishaw recommends are:

Wieland 24VDC relay, part number is 341-4812
Wieland 110VAC relay, part number is 341-4828

Single system (Spindle probe) using a latched 24vdc M-code with cancel code and no finish (confirmation) signal.



No Relay required

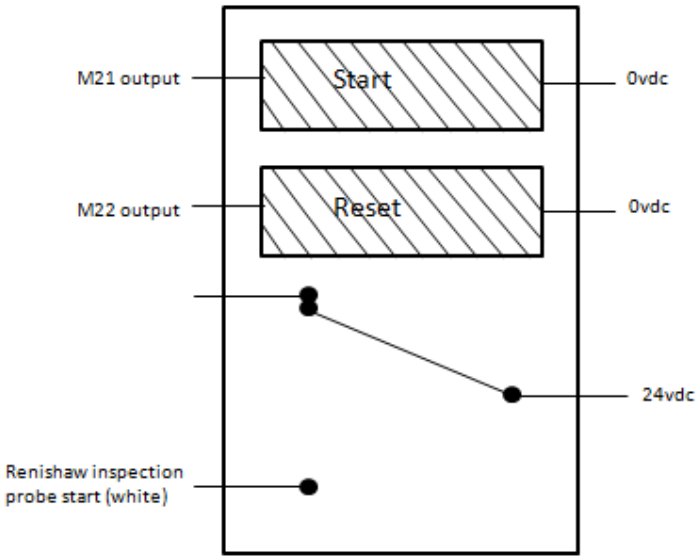


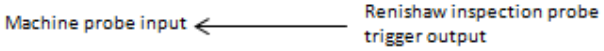
Single system (Spindle probe) using 2 pulsed 24vdc M-codes and no finish (confirmation) signal.

M-code wave form

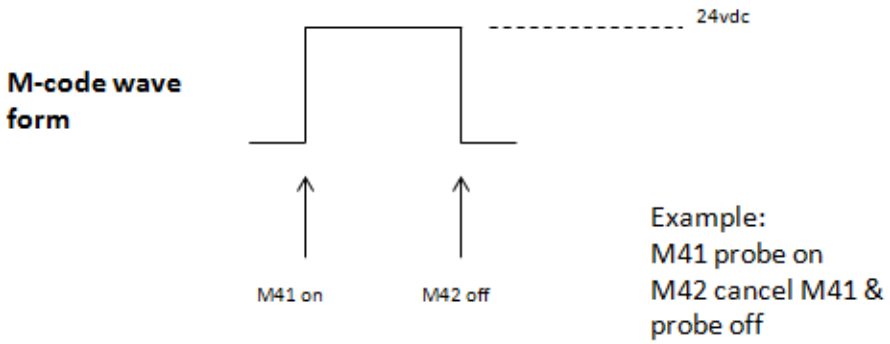
Example:
M21 probe on
M22 probe off

24vdc single pole latching relay

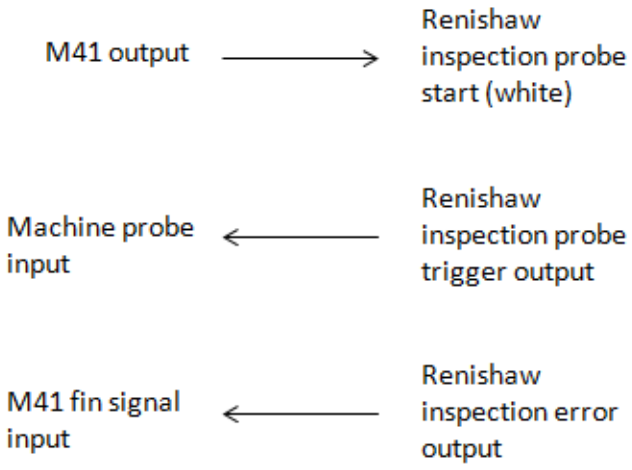




Single system (Spindle probe) using a latched 24vdc M-code with cancel code and finish (confirmation) signal.

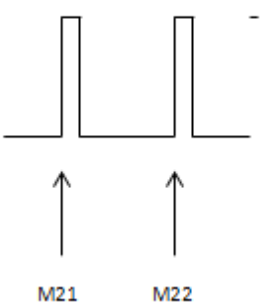


No Relay required



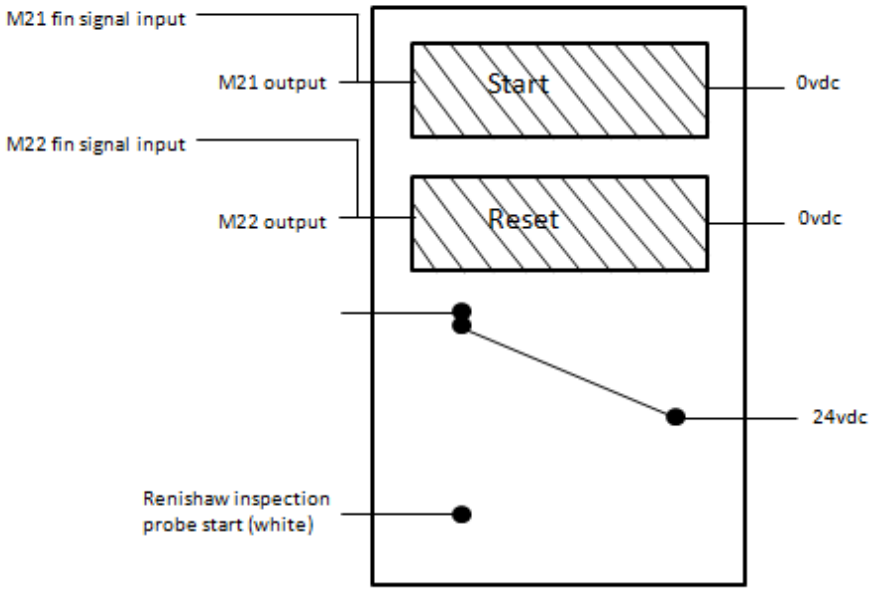
Single system (Spindle probe) using 2 pulsed 24vdc M-codes and finish (confirmation) signals for both M-codes.

M-code wave form



Example:
M21 probe on
M22 probe off

24vdc single pole latching relay

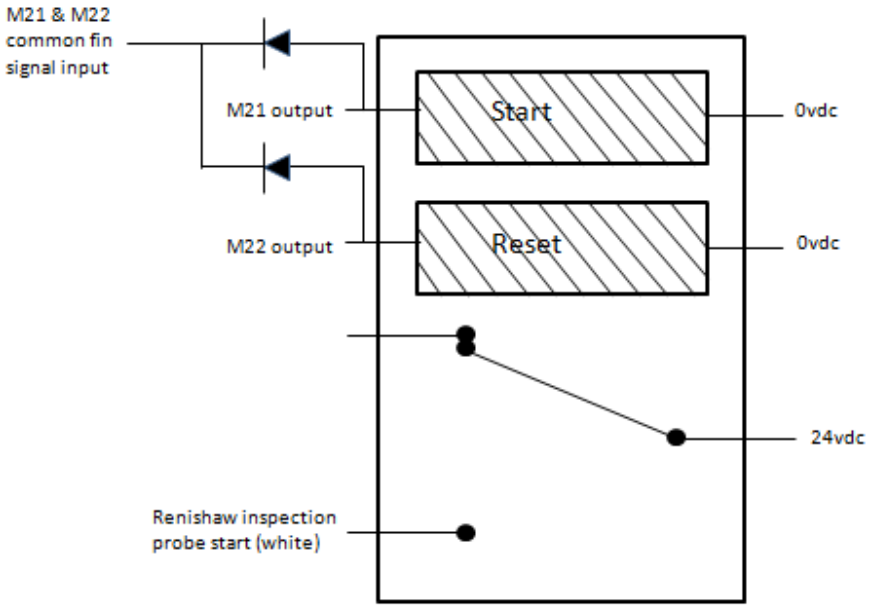


Single system (Spindle probe) using 2 pulsed 24vdc M-codes and common finish (confirmation) signal for both M-codes.

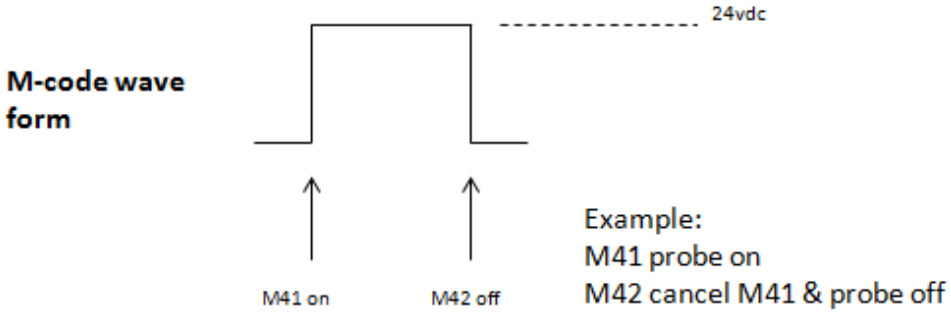
M-code wave form

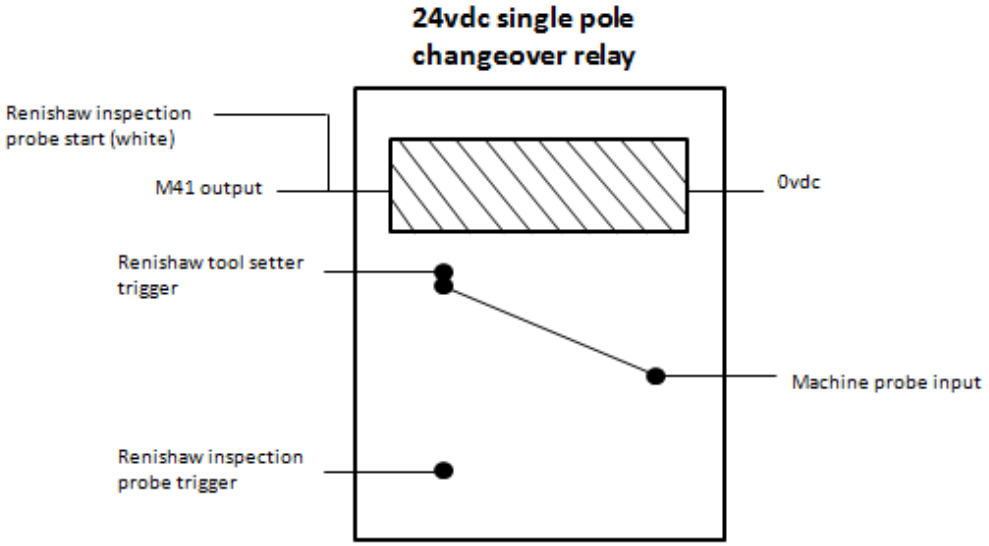
Example:
M21 probe on
M22 probe off

24vdc single pole latching relay

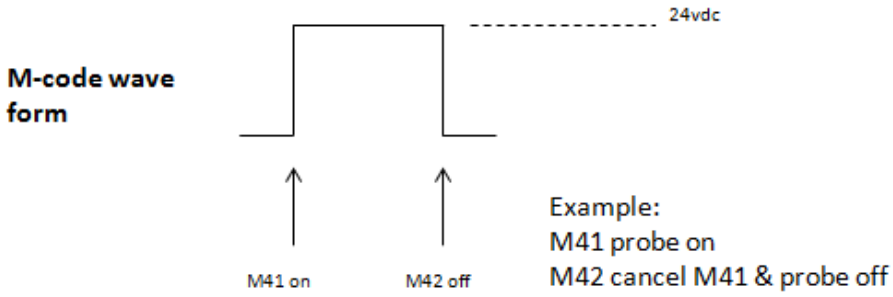


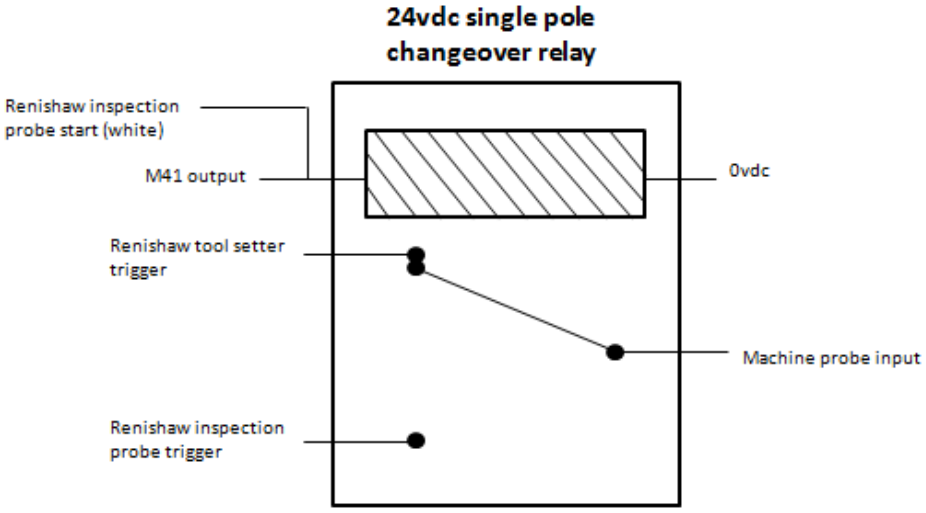
Dual system using a latched M-code with cancel code and no finish (confirmation) signal.

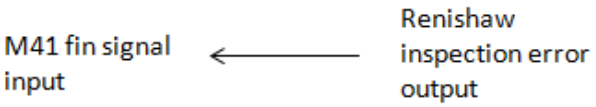




Dual system using a latched M-code with cancel code and finish (confirmation) signal.





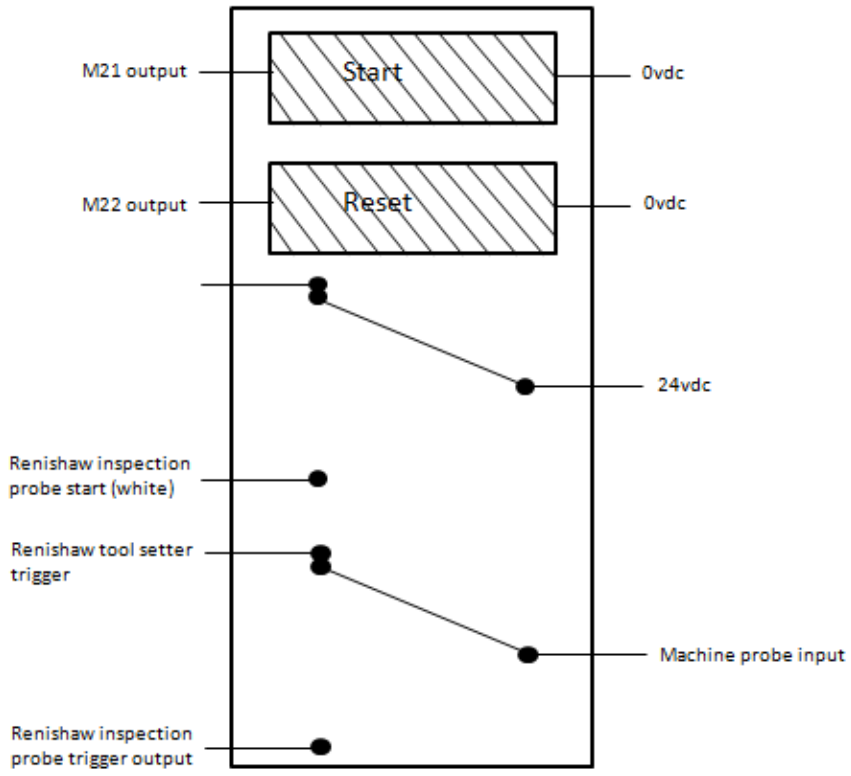


Dual system using 2 pulsed 24vdc M-codes and no finish (confirmation) signals.

M-code wave form

Example:
M21 probe on
M22 probe off

24vdc double pole latching relay

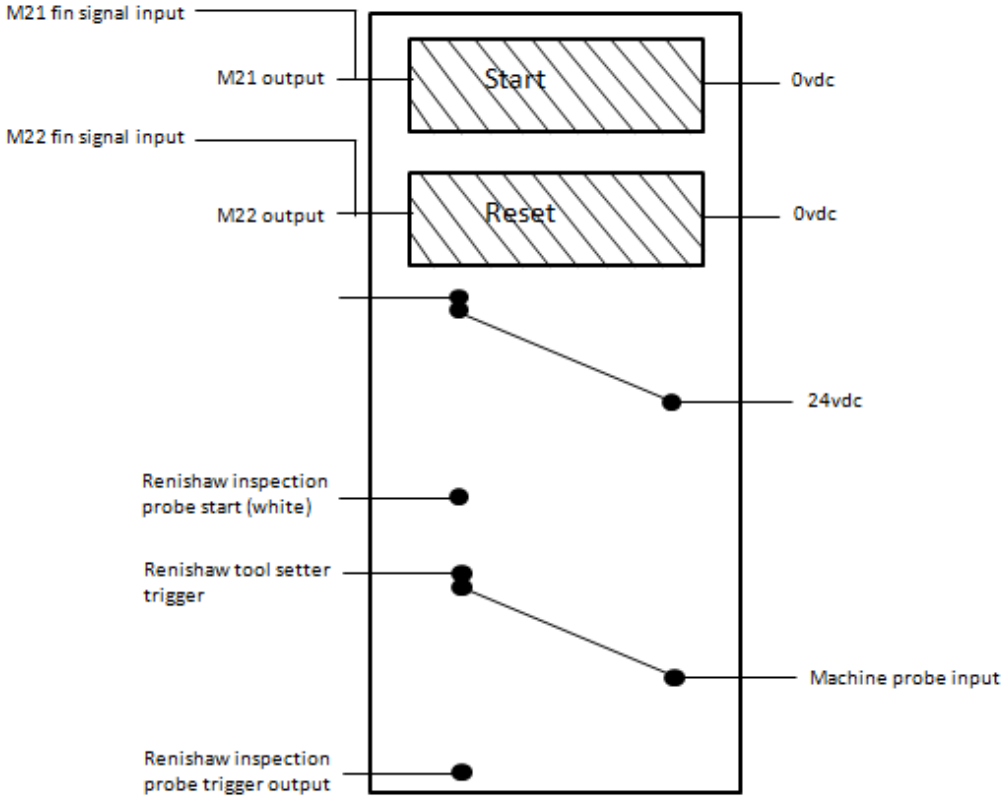


Dual system using 2 pulsed 24vdc M-codes and finish (confirmation) signal for both M-codes.

M-code wave form

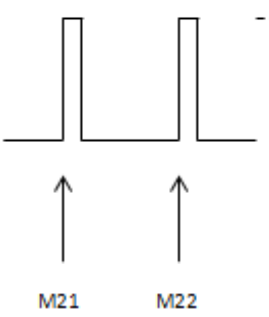
Example:
M21 probe on
M22 probe off

24vdc double pole latching relay

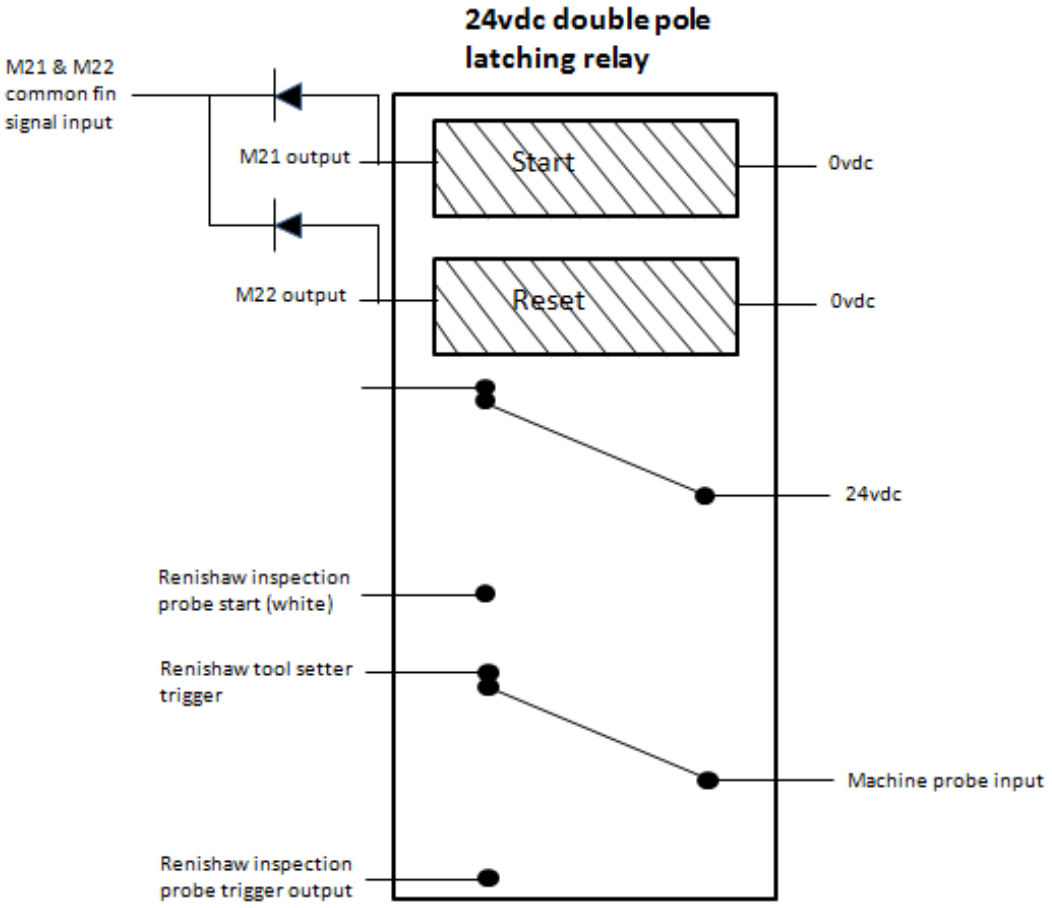


Dual system using 2 pulsed 24vdc M-codes and common finish (confirmation) signal for both M-codes..

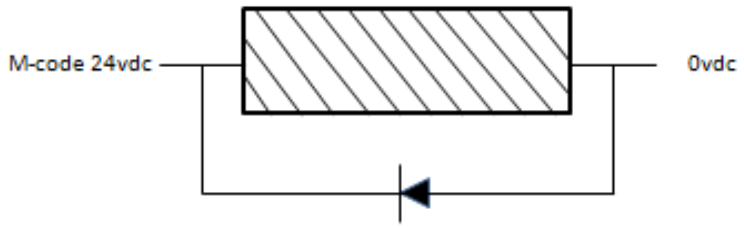
M-code wave form



Example:
M21 probe on
M22 probe off



The use of diodes as “spark killers” on 24vdc relay that are not polarised



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