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Installation guide
H-1000-5029-05-B

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PI 200 interface for the TP200 system



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Renishaw part no: H-1000-5029-05-B

Issued: 10 2007

PI 200

interface for TP200 probe system

installation guide

CE

FCC

Information to user (FCC section 15.105)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

Information to user (FCC section 15.21)

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

Special accessories (FCC section 15.27)

The user is also cautioned that any peripheral device installed with this equipment such as a computer, must be connected with a high-quality shielded cable to insure compliance with FCC limits.

TÜV

This equipment has been independently certified by TÜV Product Services in accordance with OSHA (US) and SCC (Canada) requirements to the standards UL61010-1 Second Edition and CAN/CSA-C22-2 No. 61010-1 Second Edition.

Care of equipment

Your Renishaw probe and accessories are precision instruments. Please use and maintain the products in accordance with these instructions. Retain the transit box for storing the components when not in use.

CAUTION: The TP200 probe contains sensitive strain sensors. Permanent damage may be caused if the probe is dropped or subjected to severe shock as may be caused by misuse.

Changes to Renishaw products

Renishaw plc reserves the right to improve, change or modify its hardware or software without incurring any obligations to make changes to Renishaw equipment previously sold.

Warranty

Renishaw plc warrants its equipment provided that it is installed exactly as defined in associated Renishaw documentation.

Consent must be obtained from Renishaw if non-Renishaw equipment (e.g. interfaces and/or cabling) is used or substituted. Failure to comply with this will invalidate the Renishaw warranty.

Claims under warranty must be made from authorised services centres only, which may be advised by the supplier or distributor.

Patents

Aspects of the TP200 system and aspects of similar systems are the subjects of the following patents and patent applications:

EP 0243766	JP 2,545,082	US 4813151	US 5,755,038
EP 0388993	JP 2,539,824	US 4817362	US 5,918,378
EP 242747 B	JP 2,647,881	US 4916339	US 6012230
EP 279828 B	JP 3,004,050	US 5,228,352	
EP 0470234	JP 3,346,593	US 5,327,657	
EP 0521703	JP 3,294,269	US 5,404,649	
EP 548328 B	JP 3,279,317	US 5,339,535	
EP 566719 B	JP 2,510,804	US 5,323,540	
EP 0501710	JP 3,634,363	US 5,505,005	
EP 0641427	JP 3,018,015	US 5,671,542	
EP 0392660	JP 3,546,057	US 4769919	
EP 0740768		US 5,088,337	WO 97/35164

Safety

If this product is not used in its intended manner, any protection provided may be impaired.

There are no user serviceable parts inside this equipment.

The PI 200 interface unit must be connected to a supply incorporating a protective earth conductor via a three-core mains cable (line cord).

Electrical ratings

Supply voltage range	100 - 240 V ac + 10%, -15%	
Power frequency range	47 Hz - 63 Hz	
Power consumption	10 W	
SSR contact ratings	±50 V pk.	±40 mA pk.

Operating conditions

The PI 200 interface unit is specified to operate under the following conditions as defined in BS EN 61010-1:2001.

Protection provided by enclosure	IP30
Altitude	Maximum 2000 m
Operating temperature	0 °C to +50 °C
Storage temperature	-10 °C to +70 °C
Relative humidity	Maximum 80% RH up to +31 °C, decreasing linearly to a maximum 50% at +40 °C.
Transient overvoltage	Installation category II
Pollution degree	2

The PI 200 is isolated from AC power by disconnection of the IEC mains connector on the rear panel. If any additional means of isolation is required, it must be specified and fitted by the machine manufacturer or the installer of the product. The isolator must be sited within easy reach of the CMM operator and comply with IEC61010 and any applicable national wiring regulations for the country of installation.

Contents

1 Introduction 7
2 Product description 9
2.1 System overview 9
2.2 Probe status signal (SYNC) 9
2.3 Trigger confirmation signal (HALT) 10
2.4 SYNC and HALT debounce 12
2.5 Probe damped signal (PDAMP) 13
2.6 Stylus mass and ambient temperature compensation 14
2.7 RESET button 14
2.8 Front panel indicators 15
2.9 Audible indicator 16
2.10 Rear panel switches and connectors 16
2.11 Configuration switches 17
2.12 Probe polarity switch 21
3 Connector pin-outs 22
3.1 PICS input connector 22
3.2 PICS output connector 23
3.3 Solid state relay (SSR) output connector 24
3.4 Stylus change rack (SCR) output connector 25
3.5 Remote reset 25
4 PI 200 dimensions and cable data 26
5 Part number summary 27
5.1 Replacements 28
5.2 Accessories 28
6 Installation procedure 29
6.1 Rack mounting 29
6.2 Mounting with older style Renishaw control units 30
6.3 System interconnection 31
6.4 Using TP200 with the ACR1 autochange system 36
6.5 SCR200 stylus change rack 37
6.6 Interconnection cables 38
6.7 Upgrading older probe systems to TP200 (retrofitment) 39

7 PICS terminations 40
8 Summary of changes from earlier versions 41
9 Maintenance 42
9.1 PI 200 42
9.2 TP200 probe and stylus module 42
9.3 SCR200 rack 42
10 Fault finding 43

1 Introduction

The TP200 probe system comprises the TP200 probe sensor and stylus module, the PI 200 interface and the optional SCR200 stylus change rack.

The TP200 is a 13.5 mm diameter touch-trigger probe with the facility to quickly change stylus configurations without the need for requalification. This is achieved by carrying the stylus on a detachable module that is located on the probe sensor body by a highly repeatable kinematic coupling and held in place by magnetic force. After initial qualification of the stylus tip, the module may be removed and replaced as required without additional requalification by simply recalling the initial qualification data.

The probe sensor uses electronic strain sensing techniques that provide better form measuring accuracy and operating life than can be achieved with kinematic switching probes.

The SCR200 stylus change rack provides storage for pre-qualified stylus assemblies and facilitates automatic stylus changing under measurement programme control.

The dedicated PI 200 interface supplies power and controls the operation of the TP200 probe and SCR200 rack. Communication with other Renishaw equipment and the CMM controller is via the PICS (product interconnection system) ports.

The TP200 system components (probe sensor, stylus module, PI 200 interface and SCR200 stylus change rack), illustrated in figure 1, are described in the TP200 probe system user's guide (Renishaw part number H-1000-5014).

A version number label (e.g. V9) on the PI 200 rear panel indicates the modification level of the unit. A summary of the changes made at each level is included later in this document.

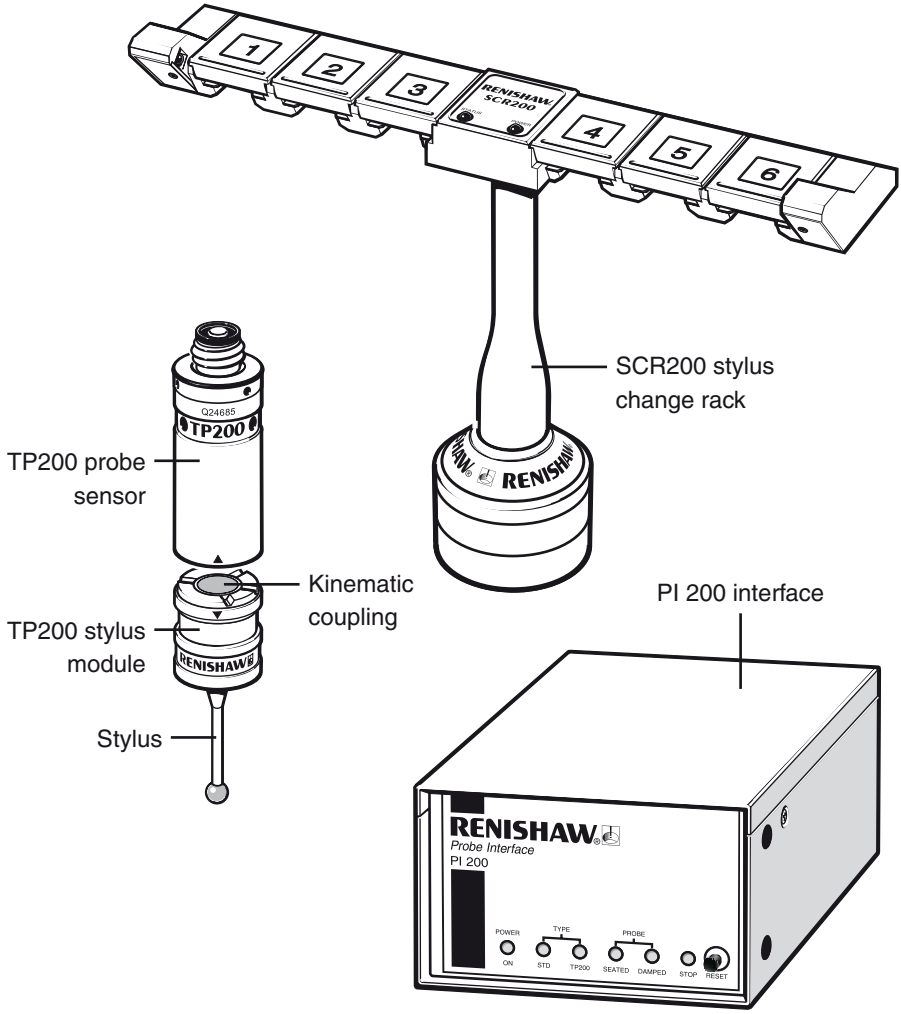


Figure 1 - TP200 precision touch-trigger probe system

2 Product description

2.1 System overview

A small deflection of the stylus tip produces a force which is applied via the stylus module and kinematic coupling to the strain sensing structure housed in the probe body. Electronic processing, based on a customised mixed signal integrated circuit and hybrid microcircuit construction contained within the probe, converts the sensor responses to a current proportional to strain. The probe output requires only two wires for transmission to the PI 200 interface, enabling the TP200 to use the existing M8 mounting connector system fitted to a wide range of probe heads and extension bars.

In the PI 200 interface, the probe current is compared with pre-set reference levels to determine the status of the probe, which may be armed (seated) or triggered. The probe status (SYNC) and the trigger confirmation (HALT) signals are asserted when the appropriate conditions are met.

At power-up, or when a probe is first connected, the PI 200 recognises whether the probe is a kinematic switching probe (TP20/TP6/TP2 type) or a TP200, and automatically selects the appropriate operating mode.

When using the SCR200 change rack to perform automatic stylus changing, the PI 200 inhibits probe triggers and resets the TP200 probe sensor to account for the loading effects of the new stylus assembly on the strain sensors. Collision damage is prevented by an overtravel mechanism and a limit switch in the base of the SCR200. A small displacement will cause the PI 200 to assert the SYNC, HALT and STOP signals to stop CMM motion.

2.2 Probe status signal (SYNC)

SYNC is the real time PICS trigger signal used to trigger recording of the machine scale coordinates when taking a gauge point. SYNC may also initiate the process of stopping and reversing CMM motion (sometimes called ‘back-off’) to the pre-hit point.

When the stylus contacts the workpiece, a change of strain occurs in the sensing structure, causing the probe current to increase. SYNC is asserted when the probe current exceeds the trigger reference level. When the stylus backs off from the workpiece, the probe current will fall below the trigger reference level and SYNC will be cleared to the armed state.

The timing relationships for an idealised probe signal are indicated in figure 2.

A solid state relay (SSR) output is provided which mimics the PICS-SYNC output for connection to older CMM controllers that require voltage-free contacts to simulate the trigger signal of a kinematic switching probe.

2.3 Trigger confirmation signal (HALT)

To allow the CMM controller to distinguish between a valid trigger and a spurious trigger caused by vibration or shock, a trigger confirmation signal (HALT) is provided on the PICS port. HALT will be asserted if the probe current remains greater than trigger level 2 for a pre-set delay time, determined by the settings of configuration switches 11 and 12. The timing relationships for an idealised TP200 probe signal are indicated in figure 2.

Should the probe current fail to reach the trigger level or drop below the reseat level before the delay time has expired, as might be the case for a vibration-induced signal, HALT will not be asserted. The CMM controller may then assume the trigger was spurious and reject the coordinate data.

When a kinematic switching probe (TP20, TP6, TP1, TP2) is connected, the HALT delay time is fixed at 5 milliseconds as indicated in figure 3.

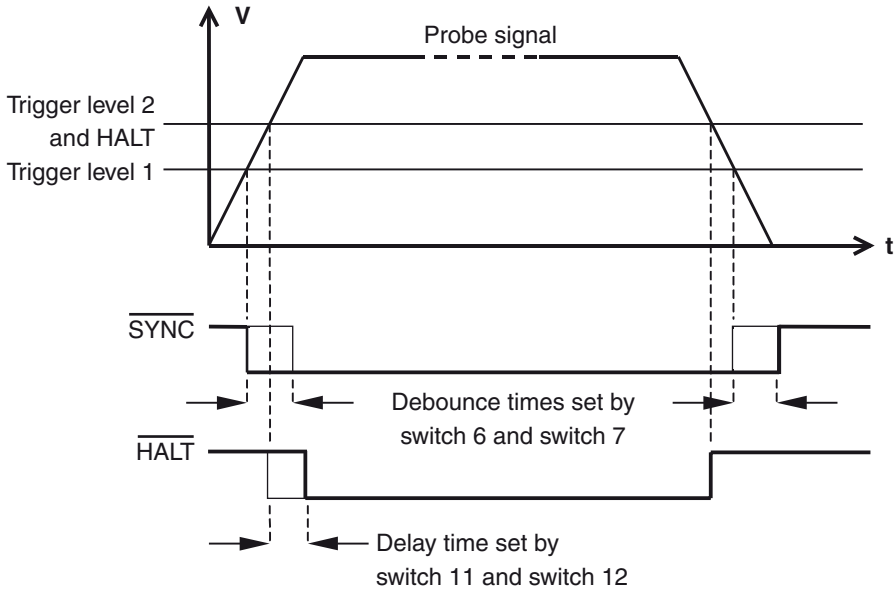


Figure 2 - SYNC and HALT signal timing for a TP200 gauge point

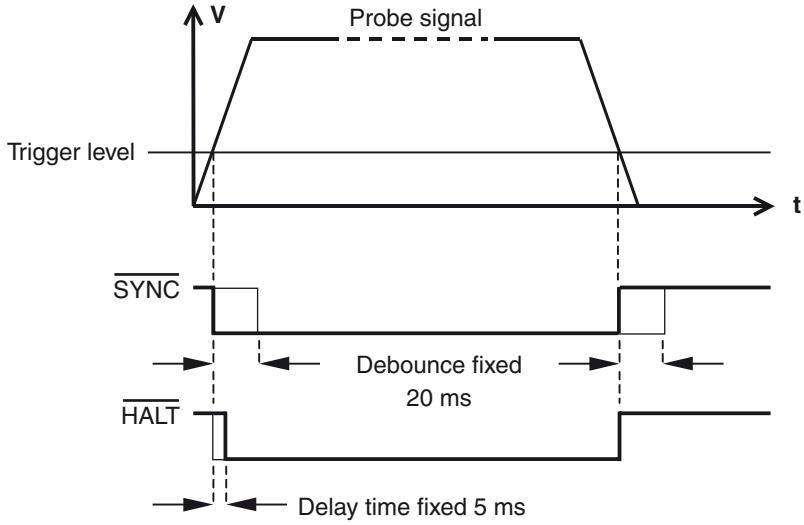


Figure 3 - SYNC and HALT signal timing for a gauge point when a kinematic probe is connected

2.4 SYNC and HALT debounce

The SYNC and HALT signals are debounced to prevent spurious triggers occurring as a result of CMM or stylus vibration when the stylus makes contact with or leaves the surface of the workpiece. A range of switch selectable timing options is provided to suit the requirements of different types of CMM. Alternatively, the debounce may be switched off to allow greater flexibility for the CMM's controller to manage the PICS signals. Refer to the section 'configuration switches' for more information on the debounce options.

The 'adaptive' settings ensure that combinations of CMM vibration and large stylus assemblies do not cause a false indication of probe status during the back-off move. Referring to figure 4, it may be seen that the debounce time increases in increments of either 20 milliseconds or 100 milliseconds until the probe signal remains below the trigger level for one complete timing period.

When a kinematic switching probe (TP20, TP6, TP1, TP2) is connected, the debounce times are fixed as indicated in figure 3.

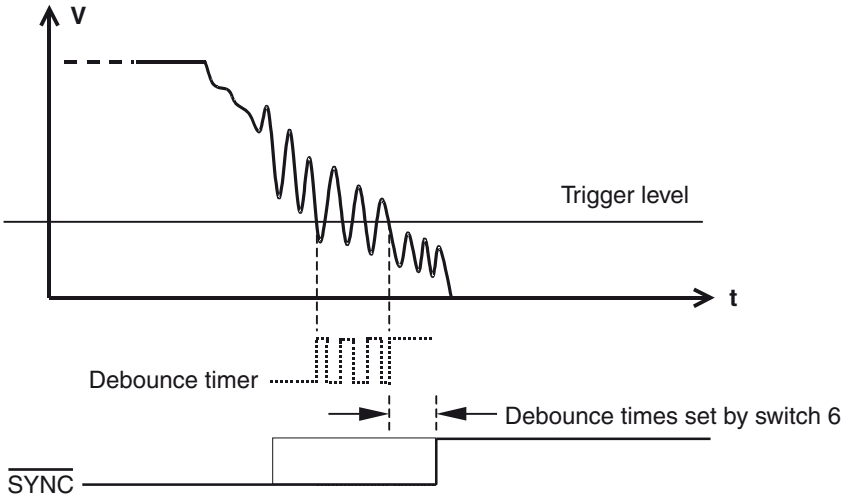


Figure 4 - Adaptive debounce

2.5 Probe damped signal (PDAMP)

During high-speed position moves (fast traverse), it is necessary to reduce probe sensitivity to prevent vibration causing unwanted triggers. The CMM controller must assert the PDAMP signal on the PICS port, to switch the PI 200 into the low sensitivity mode known as ‘probe damped’. In this mode, deflection of the stylus will generate SYNC and HALT simultaneously, but only if the probe signal remains above the damped trigger level for longer than the time delay selected by switches 11 and 12 as indicated in figure 5.

NOTE: The probe cannot take accurate points when damped mode is active, and the CMM controller must clear the PDAMP signal to return the probe to normal sensitivity before taking a gauge point. It is important that PDAMP is only cleared when vibrations of the CMM and probe stylus have reduced to a sufficiently low level to avoid spurious re-triggering at the end of the position move.

Probe damped mode is indicated by an LED on the PI 200 front panel.

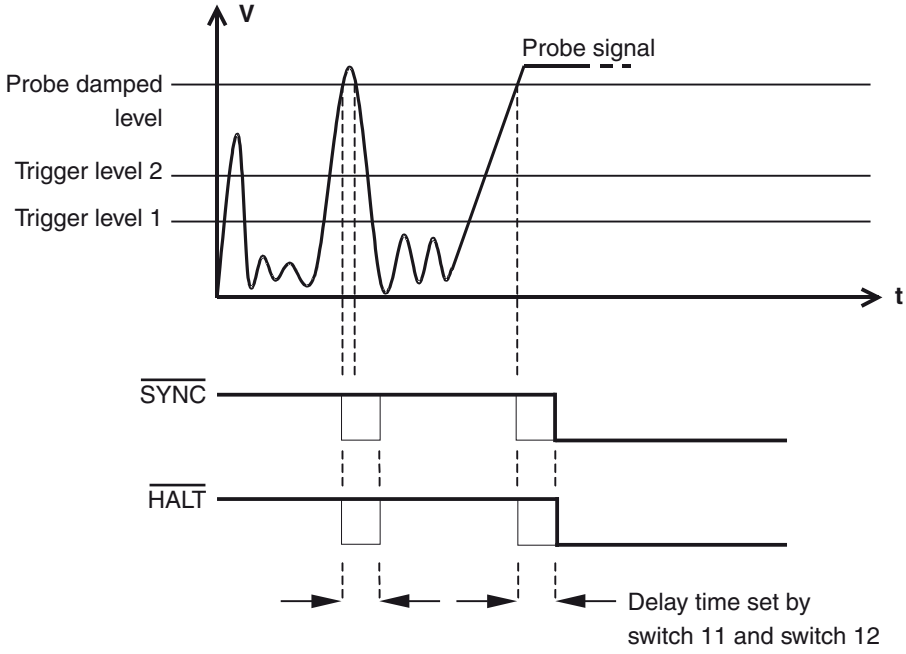


Figure 5 - SYNC and HALT signal timing for a trigger in damped mode

2.6 Stylus mass and ambient temperature compensation

In the TP200, probe a reference strain sensor, outside the strain path, adjusts the current in the active strain sensors to provide compensation for slow, uniform, changes of ambient temperature.

Fine compensation for thermal drift is provided by a system known as ‘autozero’ that nulls the sensor amplifiers at a slow rate when the probe is armed. Under the control of the PI 200 interface, the autozero automatically switches to a fast rate to reset the probe sensors during a stylus change with the SCR200 change rack or during reorientation of a motorised probe head.

When the probe is in the triggered state, the compensation is switched off. If the stylus remains deflected for longer than 10 seconds, drift of the zero reference may occur. The audible warning will sound after this period to indicate that the probe must be reset manually.

2.7 RESET button



CAUTION: Probe triggers are inhibited when the RESET button is pressed. Before pressing the button, the CMM must be stationary in manual mode with the probe stylus clear of the workpiece.

The RESET button on the front panel selects fast autozero to rapidly null the sensor amplifiers.

This may be necessary when:

1. The probe does not arm after manually changing the stylus.
2. The audible alarm is sounding a continuous tone to warn that the stylus has been deflected for longer than 10 seconds.

NOTE: Alternatively, the probe may be reset by the action of unlocking and locking the PH10T or PH10M motorised head. Refer also to the ‘remote reset’ section.

2.8 Front panel indicators

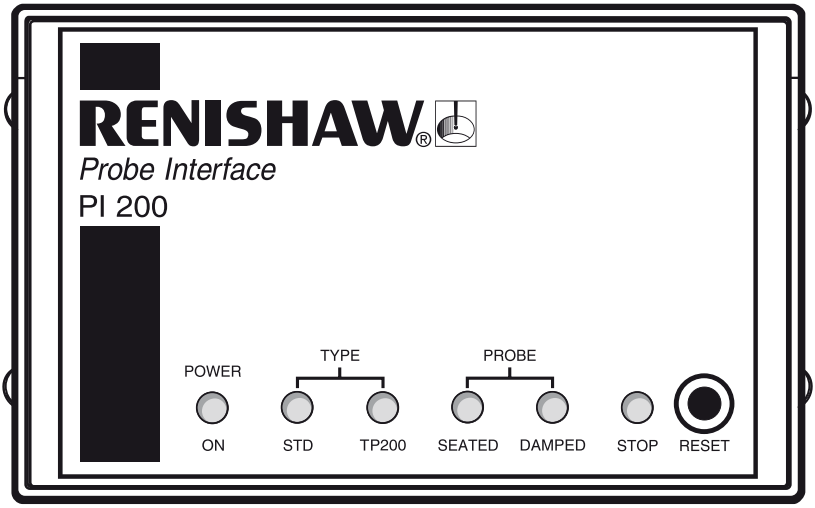


Figure 6 - PI 200 interface front panel

Table 1 - Front panel indicators			
Indicator		**Colour**	**Function**
POWER ON		Green	Mains power on
TYPE	STD	Green	Kinematic probe selected
	TP200	Green	TP200 probe selected
PROBE	SEATED	Green	ON - probe armed (seated) OFF - probe triggered or no probe connected
	DAMPED	Yellow	PICS - PDAMP asserted
STOP		Red	PICS - STOP asserted

2.9 Audible indicator

The audible indicator has two functions:

1. To provide a brief indication that a probe trigger has occurred. This function may be disabled by configuration switch 5.

2. To warn, by a continuous tone, that the stylus has remained deflected for longer than 10 seconds. The alarm can be cleared by operation of the RESET button on the front panel. Refer to the section ‘Reset button’ for more information on resetting the probe.

2.10 Rear panel switches and connectors

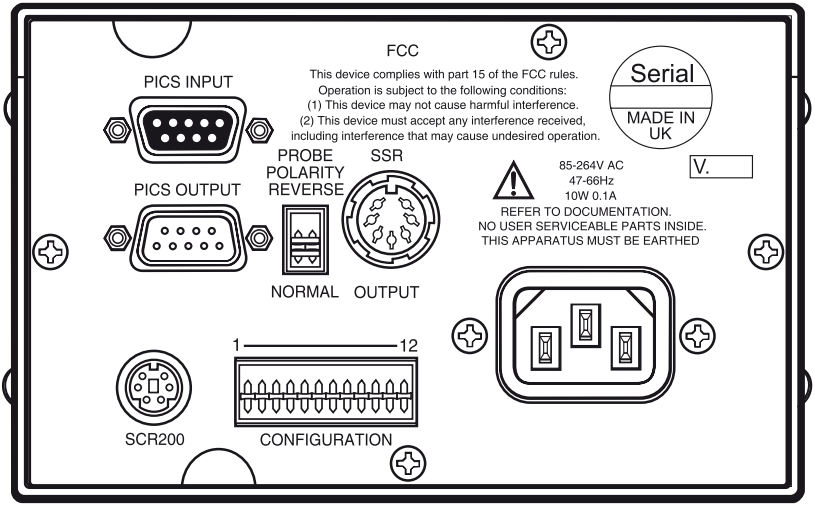


Figure 7 - PI 200 interface back panel

2.11 Configuration switches

CAUTION: Check the PI 200 version number on the rear panel. The switch information in table 2 refers to PI 200 versions V9 or later. Refer to the 'Summary of changes from earlier versions' section in this handbook for details of previous revisions.

All switches are hardware controlled and a change to any switch setting is effective immediately.

Table 2 - Configuration switch functions

Switch number	Function	Switch position	Description
1	HALT polarity	UP DOWN	HALT active HIGH HALT active LOW
2	Head LED control	UP DOWN	External control via PICS LED mimics SYNC
3	STOP disabled	UP DOWN	PI 200 ignores PICS - STOP STOP asserts HALT/SYNC
4	SYNC polarity	UP DOWN	SYNC HIGH and SSR closes on trigger SYNC LOW and SSR opens on trigger
5	Audible indicator	UP DOWN	No beep on trigger Indicator beeps on trigger
6	Debounce time		Selects SYNC debounce time Refer to figure 8
7	Debounce mode		Selects SYNC debounce mode Refer to figure 8
8	Zero debounce	UP DOWN	Sets debounce time <2 ms Debounce set by switches 6 and 7
9	Probe signal filter	UP DOWN	Filter active Filter off
10	Trigger level	UP DOWN	Trigger level 2 selected Trigger level 1 selected
11 12	PDAMP/HALT filter delay		Coded to select delay time Refer to table 3

Switch 1:

Inverts the polarity of the HALT output.

Switch 2:

Selects control of the LEDOFF output to either internal PI 200 control according to the status of SYNC, or sets the output to high impedance for control of the head LED by external switching.

Switch 3:

Sets the PI 200's response to STOP when asserted from an external source. When enabled, the PI 200 will assert SYNC, HALT and open the SSR relay.

Switch 4:

Inverts the polarity of the SYNC and SSR relay outputs.

Switch 5:

When enabled, a tone will sound for approximately 160 milliseconds when the probe triggers and SYNC is asserted. When disabled, the tone will activate only when the stylus has remained deflected for 10 seconds.

Switches 6 and 7:

These switches select the debounce time and mode of operation as indicated in figure 8.

Switch 8:

Overrides the settings of switches 6 and 7, reducing the trigger and reseat debounce times to less than 2 milliseconds.

Switch 9:

The probe signal filter has a 300 µs time constant to reduce the effects of stylus vibration when the stylus makes contact with the workpiece. Renishaw recommends that this switch is set to the UP position for normal use.

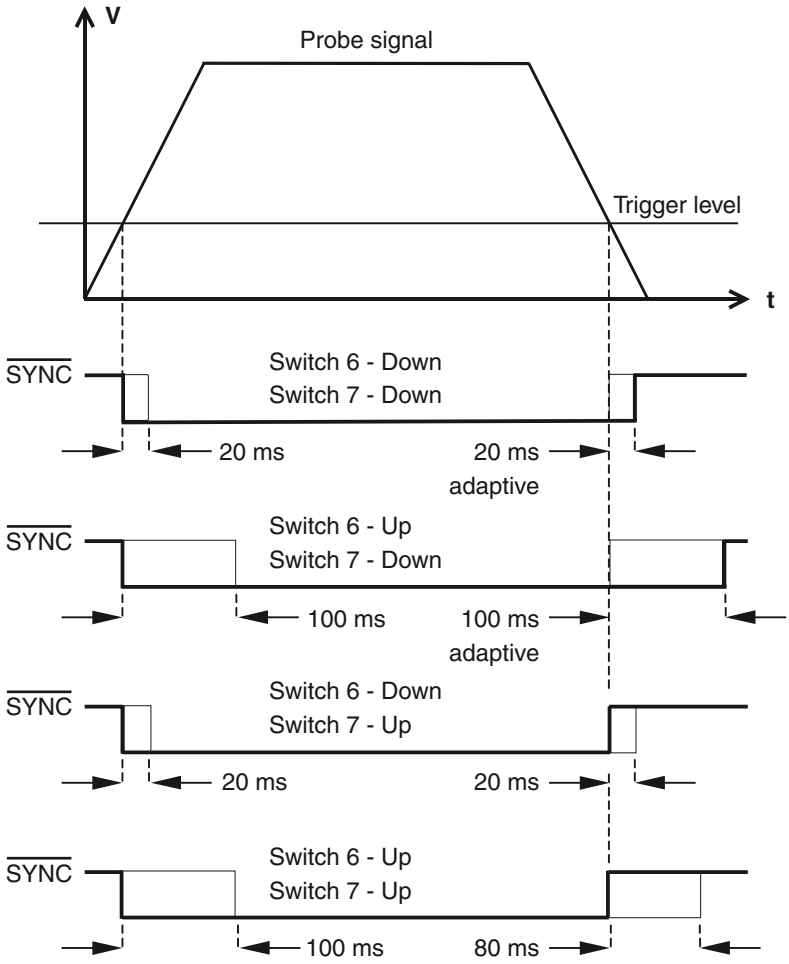


Figure 8 - SYNC debounce options

Switch 10:

In operating situations where there is an unusually high level of background vibration, it may be necessary to reduce the sensitivity of the TP200 to avoid false 'air' triggers. These may occur on some types of CMM when large steel stylus arrangements are used or where the CMM is inadequately isolated from the floor transmission of vibration from nearby machinery or vehicle traffic.

Trigger level 1 is the highest sensitivity mode and provides the best measuring performance.

Trigger level 2 reduces the vibration sensitivity from level 1 for a small loss of measuring accuracy.



CAUTION: All stylus tips must be requalified if the trigger level is changed.

Switches 11 and 12:

To prevent a HALT signal (or HALT and SYNC if probe damped mode is set) from being falsely asserted when the probe is subjected to vibration, a time delay filter is applied. Refer to the description in 'trigger confirmation signal (HALT)' section.

If a collision occurs at fast traverse speed (i.e. a position move), the filter delay time will incur additional CMM overtravel before motion stops. It is important that the CMM motion can stop within the available overtravel, particularly if collisions can occur directly along the main axis of the probe in the +Z direction. To minimise the overtravel in a collision situation, the filter delay time must be set to the shortest possible time that will prevent 'air' triggers from occurring during fast traverse moves when probe damped mode is asserted.

Switches 11 and 12 are used to select the nominal filter times indicated in table 3.

Table 3 - Function of switches 11 and 12

Time delay	Switch 11	Switch 12
2.0 ms	DOWN	DOWN
7.5 ms	DOWN	UP
15.0 ms	UP	DOWN
50.0 ms	UP	UP

2.12 Probe polarity switch

The TP200 probe is polarity sensitive and must be connected to the PI 200 such that the centre contact of the M8 connector is positive and the thread is ground (0 V). A reversed polarity connection will cause the POWER and STOP indicators to be illuminated on the front panel. Sliding the switch to the REV position should allow normal operation. Incorrect setting of the polarity switch should not damage the probe.

3 Connector pin-outs

3.1 PICS input connector

The PICS input connector is a 9 pin ‘D’ type socket. The pin numbers are illustrated in figure 9 and their functions are shown in table 4.

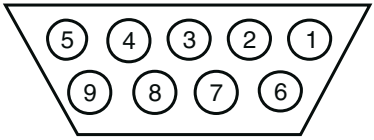


Figure 9 - PICS input connector pin numbers

Table 4 - PICS input connector	
Pin number	**Description**
1	STOP
2	PPOFF
3	Ground (0 V)
4	Reserved
5	Probe signal input
6	STOP +5 V pull-up
7	PDAMP
8	LEDOFF
9	Probe signal ground
Shell	Screen

3.2 PICS output connector

The PICS output connector is a 9 pin ‘D’ type plug. The pin numbers are illustrated in Figure 10 and their functions are shown in table 5.

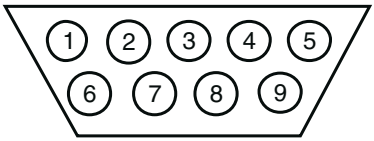


Figure 10 - PICS output connector pin numbers

Table 5 - PICS output connector	
Pin number	**Description**
1	STOP
2	PPOFF
3	Ground (0 V)
4	Reserved
5	SYNC
6	HALT
7	PDAMP
8	LEDOFF
9	Not used
Shell	Screen

3.3 Solid state relay (SSR) output connector

The solid state relay output connector is a 7 pin DIN socket. The pin numbers are illustrated in figure 11 and their functions are shown in table 6.

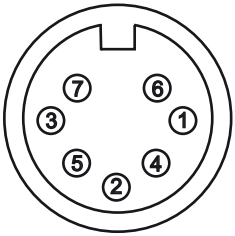


Figure 11 - SSR output connector (view on rear panel)

Table 6 - SSR output connector	
Pin number	**Description**
1	Not used
2	Screen
3	Not used
4	SSR 1
5	SSR 2
6	Not used
7	Not used
Shell	Screen

3.4 Stylus change rack (SCR) output connector

The SCR200 stylus change rack is connected to the PI 200 via a 6 pin miniature DIN socket. The pin numbers are illustrated in figure 12 and their functions are shown in table 7.

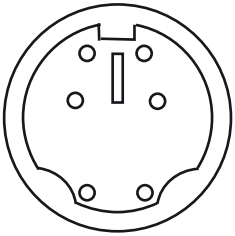


Figure 12 - SCR200 output connector (view on rear panel)

Table 7 - SCR output connector	
Pin number	**Description**
1	Reset
2	Fault
3	Inhibit
4	+5 V
5	Ground (0 V)
6	Not used

3.5 Remote reset

There are two methods of connection to a remote push button that will achieve the same effect as the RESET button on the front panel of the PI 200 interface. Such a facility may be useful if manual stylus changing is to be frequently used, or if the PI 200 is difficult for the operator to access.

A momentary action push button or switch may be connected to pins 1 and 5 on the SCR200 miniature DIN connector on the rear panel. If the connector is already in use for connection of a SCR200 stylus change rack, a dual rack cable type PL97 (refer to table 8, cable no. 11) may be used to provide an additional connector.

Alternatively, the button may be directly wired to the PPOFF and ground (0 V) pins (pins 2 and 3) on either of the PICS connectors on the rear panel of the PI 200.

4 PI 200 dimensions and cable data

Dimensions	1/3 rack wide x 2U high 140 mm x 88 mm x 183 mm deep
Weight	1.25 kg
Mounting method	19 in rack or freestanding
Mounting screws	M5 x 8 mm maximum penetration
Probe voltage (open circuit)	12.4 V
Probe cable resistance	Max. 5 W/conductor
Probe cable length	Max. 50 m
Wire gauge	0.22 mm^2

5 Part number summary

PI 200 interface A-1207-0050

Contents: PI 200 interface unit
Installation guide
Rubber feet (self-adhesive)

Rack mounting hardware:

1/3 x 2U blanking panel	A-1018-0123
Rack mounting bracket	A-1018-0124
Link bracket	A-1018-0126

TP200 probe kit - standard force A-1207-0001

TP200 probe kit - low force A-1207-0002

Contents: TP200 probe sensor
Stylus module (standard or low force)
Tools/cleaning kit
Test certificate
User's guide

Stylus module - standard force A-1207-0010

Stylus module - low force A-1207-0011

Stylus change rack kit - standard force A 1207-0030

Stylus change rack kit - low force A-1207-0070

Contents: 1 x SCR200 rack
3 x stylus modules (standard or low force)
Mounting kit
Datuming stylus (PS2R)

SCR200 cable - 5 m long (PL63) A-1016-7630

SCR200 cable - 10 m long (PL64) A-1016-7631

SCR200 cable - 20 m long (PL65) A-1016-7632

Dual SCR200 cable adaptor (PL97) A-1016-7660

M12 location piece (for SCR200) M-1371-0298

5.1 Replacements

TP200 probe system user's guide (English + multilingual CD)	H-1000-5014
PI 200 interface for TP200 probe system installation guide (English)	H-1000-5029
Cleaning material	A-1085-0016
S1 'C' spanner	A-1042-1486
S9 double-ended 'C' spanner	A-1047-3932
S7 M2 stylus pin spanner	M-5000-3540
Hexagon key 1.5 mm AF	P-TL03-0150
Datuming stylus (PS2R)	A-5000-3603
Rubber feet (for PI 200)	P-FE01-0003

5.2 Accessories

Refer to 'Probing systems for coordinate measuring machines' (Renishaw part number H-1000-5050) for details of the available range of probe heads, extension bars and other accessories.

High performance GF stylus kit	A-5003-2310
Autojoint to M8 adaptor: PAA1	A-1051-0417
Rotary adjustment module: M8 - M8	A-1047-7022
Rotary adjustment module: autojoint to M8	A-1051-0679

Module storage rack for manually operated stylus changing applications:

MSR1 (wall mounted)	A-1371-0330
MSR1 (CMM table mounted)	A-1371-0347

6 Installation procedure

WARNING: Ensure the PI 200 is disconnected from the mains supply during installation.

WARNING: Take care not to exceed the operation ambient of 50 °C around the unit. Do not install near sources of heat. Forced cooling may be required in final installation.

6.1 Rack mounting

The PI 200 may be mounted in a standard 19 in equipment rack either alone or alongside a Renishaw controller as indicated in figures 13 and 14.

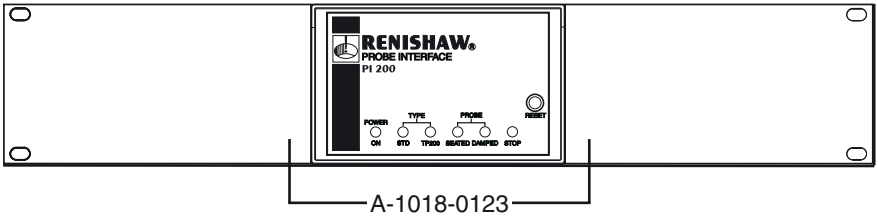


Figure 13 - Mounting the PI 200

To mount the PI 200 as indicated in figure 13 requires 2 x 1/3 blanking panel kits (part number A-1018-0123). Remove the blanking plugs from both sides of the PI 200 and fit the panels using the M5 x 6 mm long screws provided.



Figure 14 - PI 200 with PHC10-2

To mount the PI 200 adjacent to a Renishaw controller, as indicated in figures 14 and 15, the following parts are required:

- Rack mounting bracket - part number A-1018-0124
- Enclosure link bracket - part number A-1018-0126

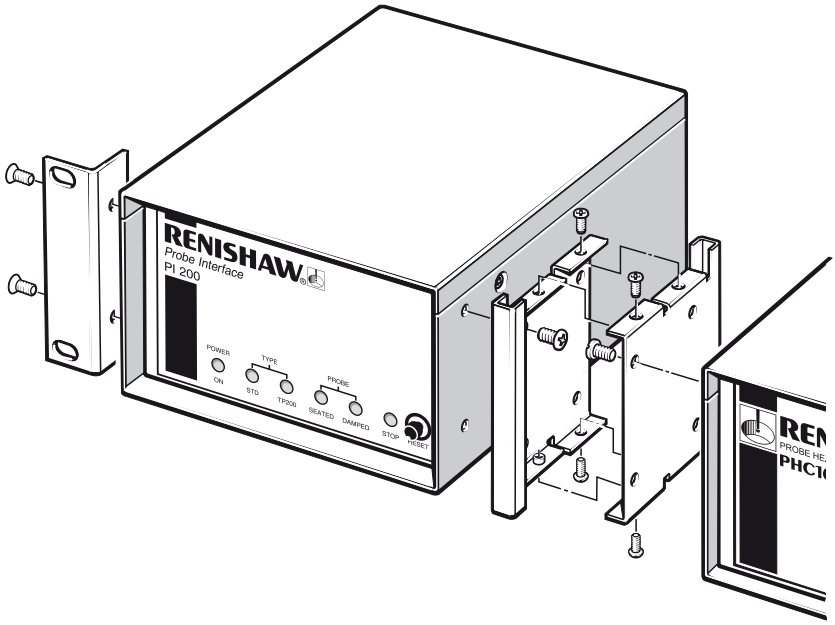


Figure 15 - Mounting the PI 200 adjacent to the Renishaw PHC10-2

Remove the blanking plugs from the sides of each unit. Separate the halves of the link bracket and screw them to the interface/controller units, using the M5 x 6 mm long screws provided. Bring the units together and screw the brackets together. Screw the rack mounting brackets to the free ends of each unit and assemble into the equipment rack.

6.2 Mounting with older style Renishaw control units

To fit the PI 200 into an existing installation adjacent to an older style PHC10 or ACC2 (with extruded aluminium side panels), a link bracket (part no. M-1018-0097) and 2 × M5 × 6 mm long screws (part no. P-SC29-0506) are required.

Remove the blanking plugs from the sides of the PI 200 and screw the bracket in place. On the older style enclosure, prise out the rubber cover from the corner moulding and loosen the two screws at the top and bottom of the moulding. Locate the bracket between the corner moulding and the unit's front panel, tighten the screws and replace the rubber cover. Fit the rack mounting bracket to the other end of the PI 200 and assemble into the equipment rack.

6.3 System interconnection

Interconnection diagrams for the most common product combinations are given in figures 16 - 21. The standard interconnection cables are listed in table 8. Contact Renishaw for other cable lengths, cable specification or special configurations.

Consult the appropriate product installation guide for information about setting the configuration switches of the PHC10-2 or ACC2-2 system controllers:

- PH10 series installation guide - part number H-1000-5071
- Autochange system installation guide - part number H-1000-6010

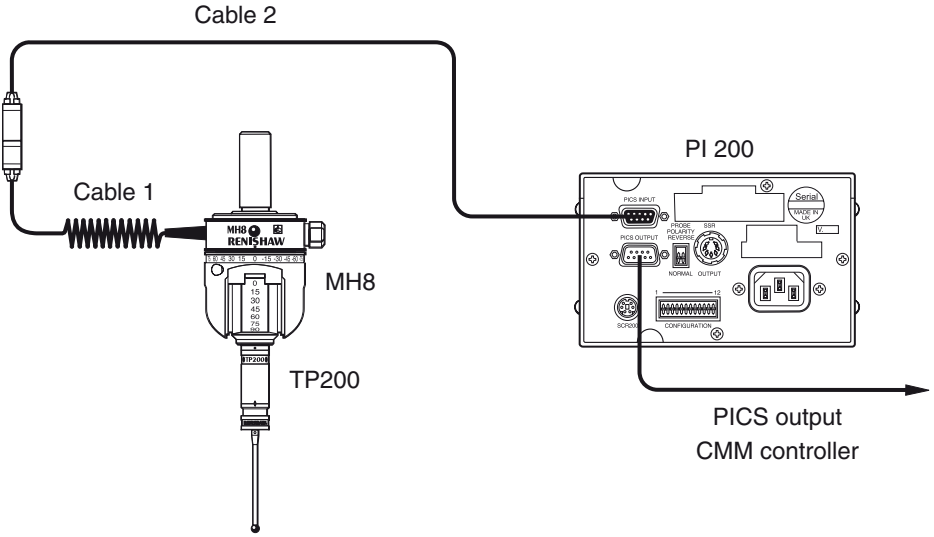


Figure 16 - System interconnection - MH8 head

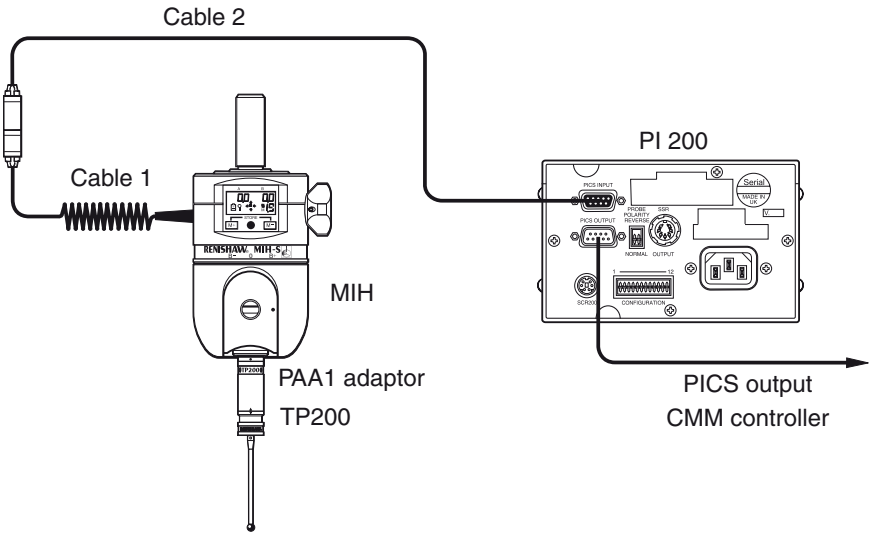


Figure 17 - System interconnection - MIH head

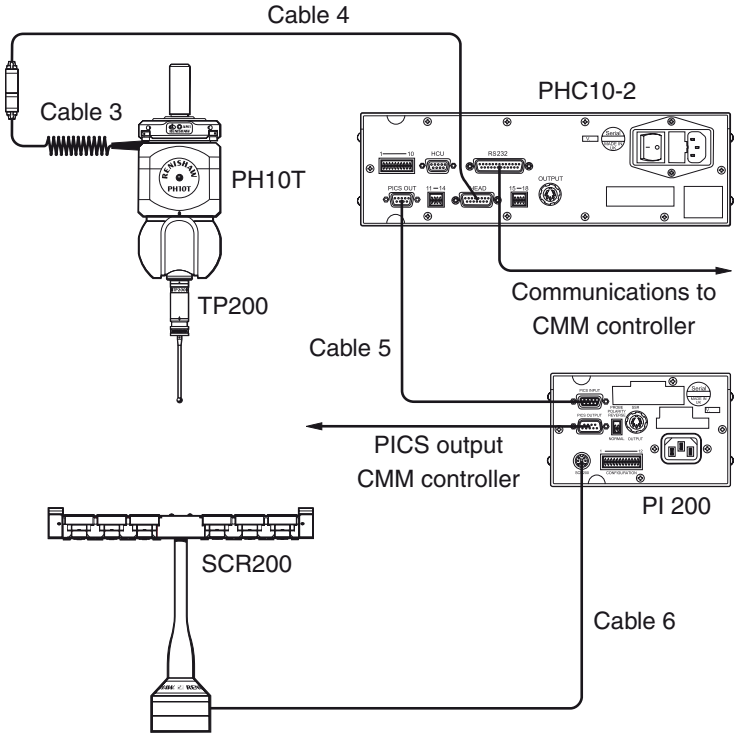


Figure 18 - System interconnection - PH10T head

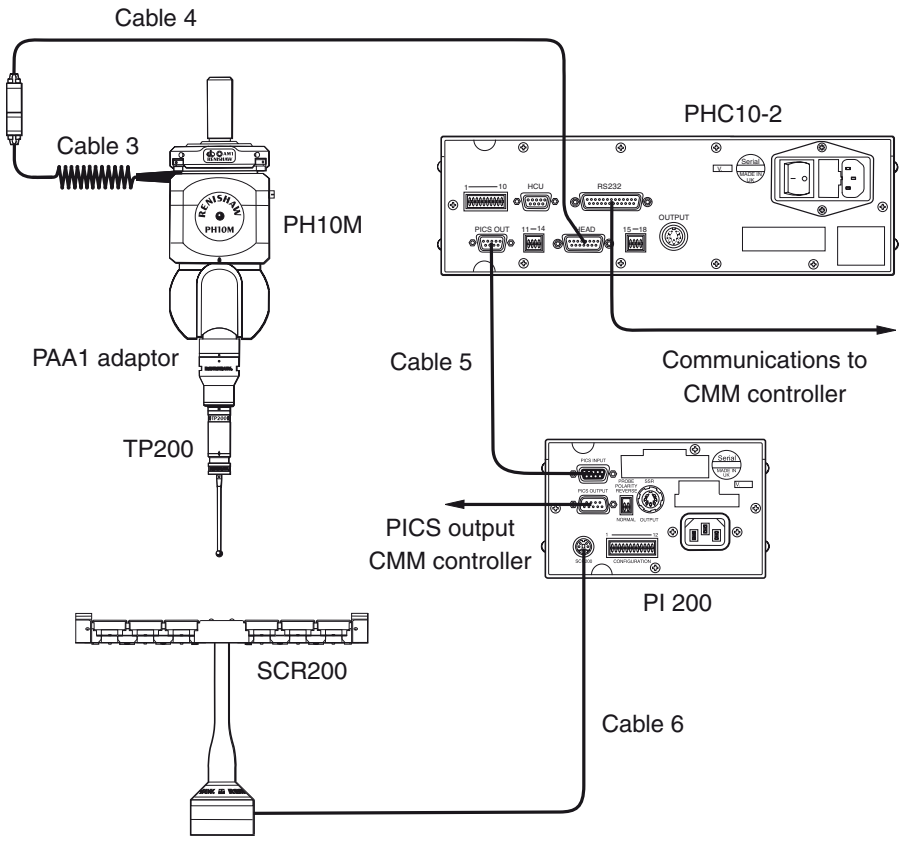


Figure 19 - System interconnection - PH10M head

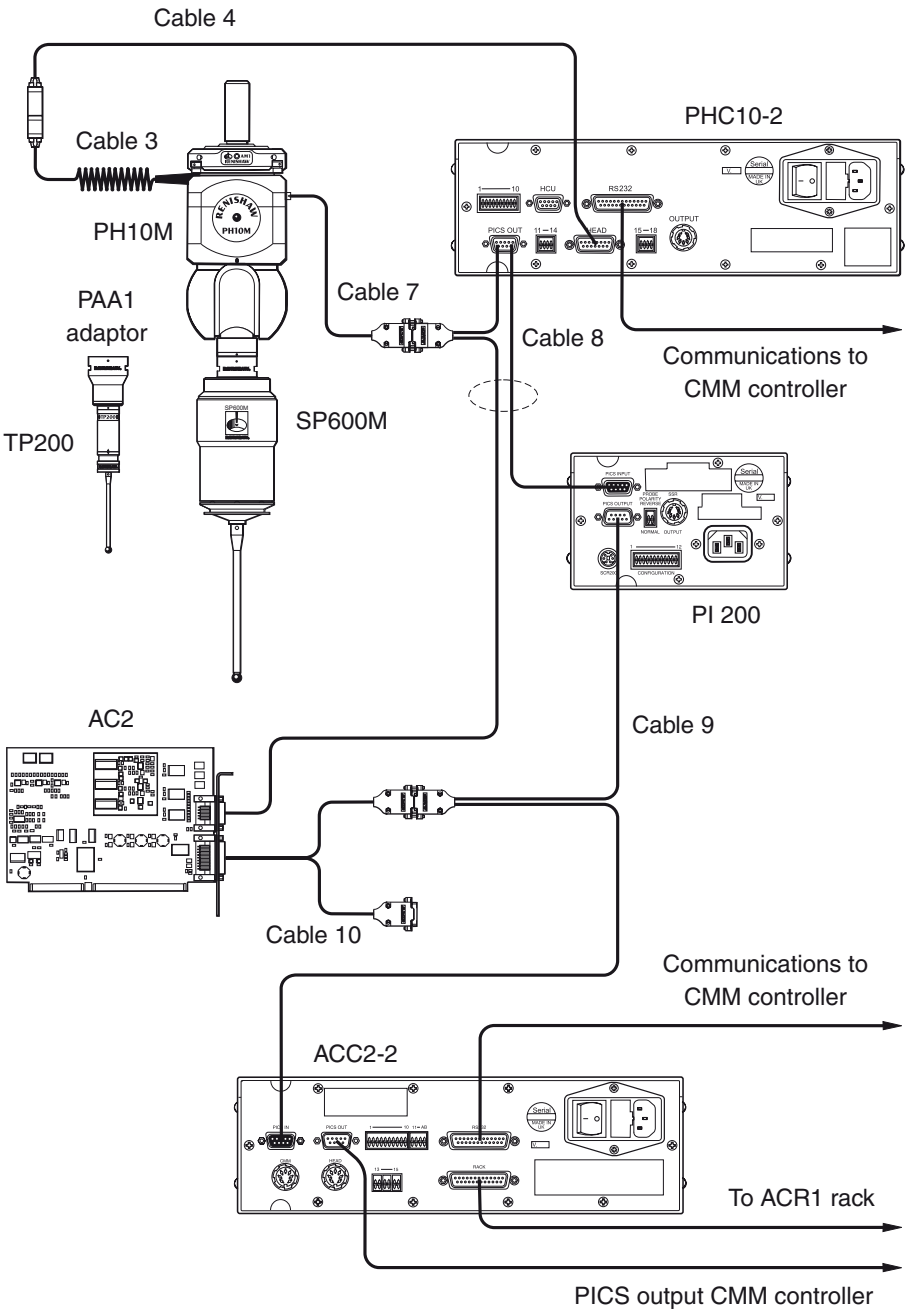


Figure 20 - System interconnection - SP600M scanning probe and autochange

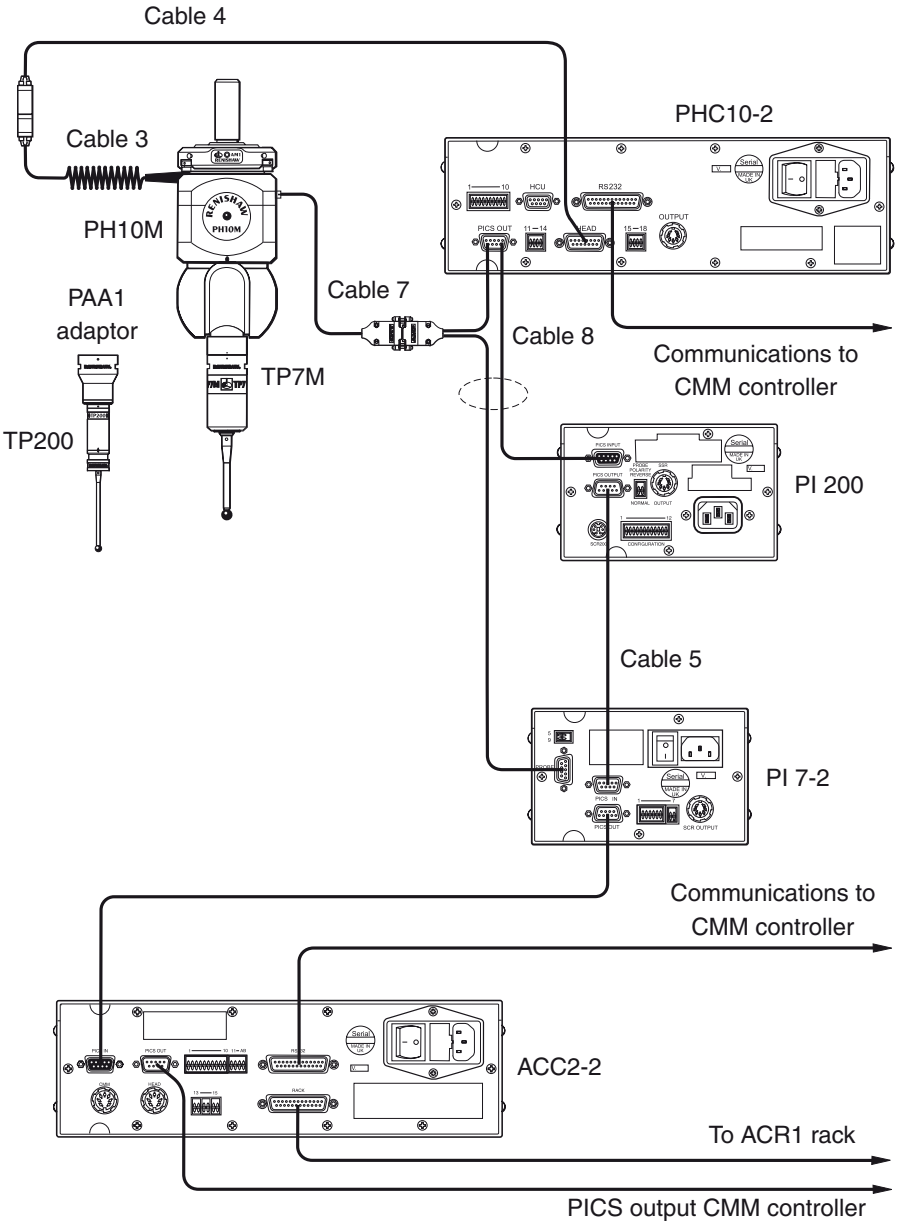


Figure 21 - System interconnection - TP7M touch-trigger probe and autochange

6.4 Using TP200 with the ACR1 autochange system

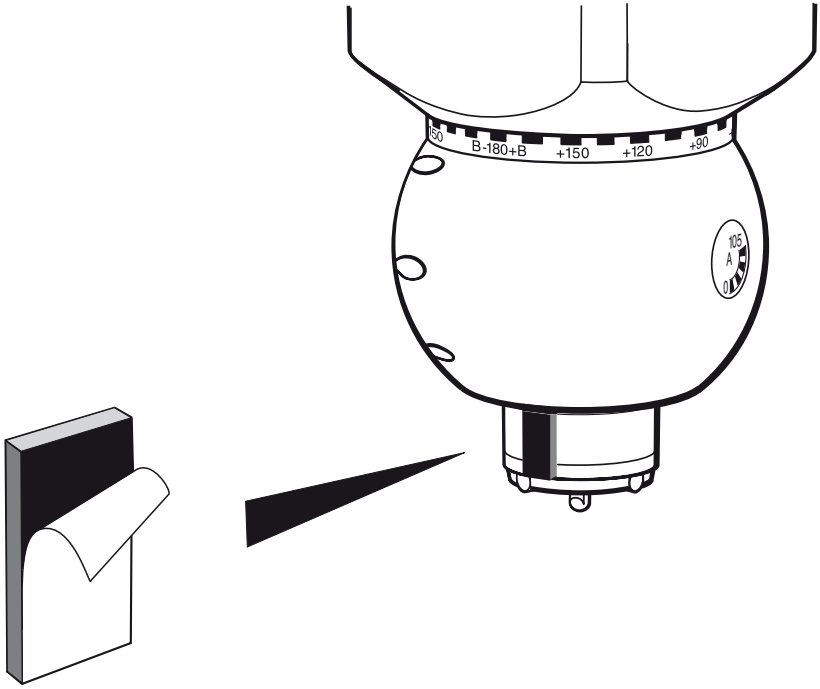


Figure 22 - Shock absorbing pad fitted to PH10M

The CMM controller must assert the probe damping signal (PDAMP) on the PICS port when the probe is approaching the rack, to prevent a false trigger being generated when the probe contacts the docking port lid.

If this is not possible, a shock absorbing pad (part number A-1085-0294 supplied with ACR1) must be fitted to the autojoint connector on the probe head at the point of contact with the port lid. Refer to figure 22.

6.5 SCR200 stylus change rack

The miniature DIN connector on the base of the SCR200 rack is connected to the ‘SCR200’ connector on the PI 200 rear panel using cable PL63/PL64/PL65 according to the length required. Refer to table 8, cable number 12.

For applications requiring two racks, a dual rack splitter cable is needed. Refer to table 8, cable number 11 and figure 23.

The dual SCR200 adaptor cable must be fitted at the PI 200 end.

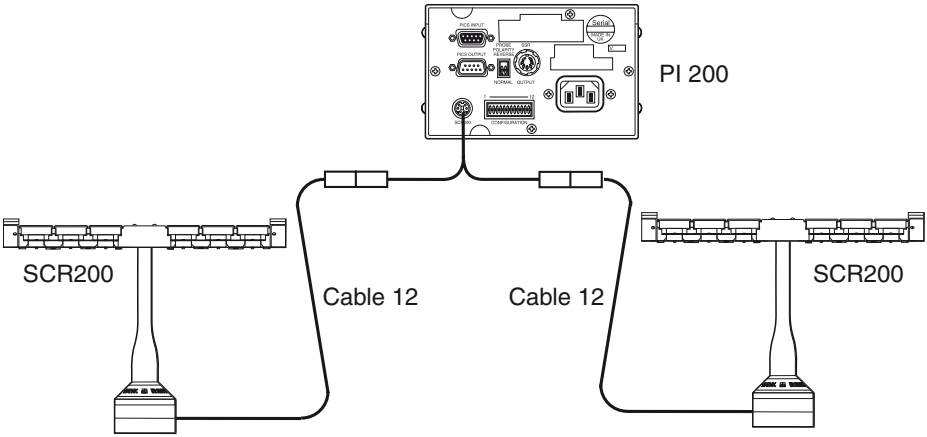


Figure 23 - Connection of dual SCR200 stylus change racks

Refer to the ‘TP200 and SCR200 user’s guide’ (Renishaw part number H-1000-5014) for information on setting up and operating the SCR200 rack.

6.6 Interconnection cables

Table 8 - Interconnection cables				
Cable number	**Cable ident.**	**Length (m)**	**Part number**	**Notes**
1	PL1	0.26 - 0.71	A-1016-0004	Coiled
	PL2	0.41 - 1.27	A-1016-0006	Coiled
	PL3	0.68 - 2.32	A-1016-0012	Coiled
	PL4	4.5	A-1016-0001	Plain
	PL27	0.225	A-1016-6370	Coiled
	PL29	0.74	A-1016-6420	Coiled
2	PL22	0.4	A-1057-0131	
3	PL5	0.40 - 0.80	A-1016-0131	Coiled
	PL6	0.80 - 1.60	A-1016-7673	Coiled
	PL12	0.10	A-1016-7674	Plain
	PL13	0.10 - 0.20	A-1016-7675	Coiled
4	PLM6	6	A-1016-7564	Unterminated one end
	PLM7	4	A-1016-7563	Unterminated one end
	PLM8	6	A-1016-7677	
	PLM9	4	A-1016-7678	
5	PL25	0.30	A-1016-0124	
6	PL63	5	A-1016-7630	
	PL64	10	A-1016-7631	
	PL65	20	A-1016-7632	
7	PL38	25	A-1016-7625	Unterminated one end
	PL42	15	A-1016-7624	Unterminated one end
	PL56	12	A-1016-7626	Unterminated one end
	PL44	8	A-1016-7627	Unterminated one end
	PL46	3.7	A-1016-7628	Unterminated one end
	PL45	1.8	A-1016-7629	Unterminated one end
8	PL70	2	A-1016-7634	
9	PL76	1	A-1016-7643	

Table 8 - Interconnection cables continued				
Cable number	**Cable ident.**	**Length (m)**	**Part number**	**Notes**
10	PL112	1	A-2172-0004	
11	PL97	0.25	A-1016-7660	
12	PL63	5	A-1016-7630	
	PL64	10	A-1016-7631	
	PL65	20	A-1016-7632	

6.7 Upgrading older probe systems to TP200 (retrofitment)

To successfully retrofit a TP200 probe system, the following points will need to be considered:

- The CMM controller must service the PICS - PDAMP control signal. Upgrade of the controller may be necessary if this signal is not available.
- The probe signal wires from the M8 connector on the probe head must be routed directly to the PI 200 interface. If an in-line interface for kinematic switching probes (TP1/TP2/TP6) is present, it must be removed.
- The signal wire resistance must be less than 5 ohms per conductor.
- Some experimentation with typical stylus arrangements may be necessary to obtain a satisfactory setting for the PDAMP/HALT filter delay time. The trigger/reseat debounce time and other configuration options will also need to be set. Refer to the ‘configuration switches’ section for more information.
- If upgrading from TP2, measurement programs may need to be changed to suit the length of the TP200, which is 5 mm longer than the TP2.
- If upgrading from TP2, star or offset (cranked) stylus arrangements will require a minimum 5 mm extension piece to be added for use with the TP200.
- If cables other than those supplied by Renishaw are used, equivalent cable screening and connector bonding must be used to maintain compliance with the EMC standards.

7 PICS terminations

The Renishaw product interconnection system (PICS) has been developed to standardise the format for real-time communications between Renishaw products and the CMM controller. PICS facilitates the integration of multiple probe interfaces and system controllers without the need for additional hardware or software overheads on the CMM controller.

Refer to the section ‘connector pin-outs’ for the pin assignments used on the 9 way ‘D’ type PICS connector ports.

Refer to figures 16 - 21 in the section ‘system interconnection’ for examples of the PICS connections for typical installations. Note that the order in which the system components are connected is important. In particular, the autochange controller

(ACC2-2) should be the last in the chain before the CMM controller (figures 20 and 21) to allow it to disable probe damping (PDAMP) during the ACR1 set-up procedure.

Installations incorporating the PI 800-2 probe interface are an exception and the TP800-2 installation guide (Renishaw part number H-1000-5111) should be consulted for further information.

For further information, please refer to the PICS installation guide (H-1000-5000).

8 Summary of changes from earlier versions

The table below summarises the changes made from version V7 - V11 as indicated by the label on the rear panel of the PI 200.

NOTE: No changes have been made that affect measuring accuracy.

Table 9 - Summary of changes from earlier versions

Part number	Version label	Summary of changes
A-1207-0050-10	V11	PCB layout and component changes due to component obsolescence. Layout of rear panel changed and IEC mains connector now unfiltered. Text appearance changed on front panel and RESET button now adjacent to STOP LED. New PLD, mains power supply and 5 V to 15 V dc-dc converter. Functionality identical.
A-1207-0050-09	V10	Withdrawn.
A-1207-0050-08	V9	Additional PDAMP filter delay time option (2.0 ms and 7.5 ms) added. Switches 11 and 12 coded to offer the four delay options. Switch 10 function deleted - now trigger level selector (was switch 11). Mounting brackets removed from kit.
A-1207-0050-07	V8	PL25 and PL26 cables removed from the top level kit. Circuit changes to improve immunity to ESD applied to the probe stylus when in TP2 mode.
A-1207-0050-06	V7	Early reseat, short debounce option (switch 7 UP, switch 6 DOWN) changed from 20/80 ms to 20/20 ms. Fault corrected that caused fast autozero to latch on if PI 200 was powered up with PPOFF asserted and no TP200 connected. Change to prevent a false audible alarm after a rapid series of soft (low signal level) triggers.

9 Maintenance

9.1 PI 200

Periodically check the security of mounting screws and electrical connectors.

Periodic electrical safety checks should include inspection of the mains cable for damage and safe connections. An earth continuity (ground bonding) test may be applied between the protective earth pin of the mains connector and the metal case at a test current no greater than 25 A.

Remove dust from the external surfaces with a proprietary cleaning cloth.

9.2 TP200 probe and stylus module

The kinematic coupling mechanism, connecting the probe sensor to the stylus module, incorporates precision ball/V groove seatings. The coupling mechanism has been tested in a wide range of environments and is highly tolerant of non-metallic dust, but regular inspection and cleaning with the material supplied is recommended to ensure continued high performance.

Instructions for use are included with the cleaning material (Renishaw part number A-1085-0016).

The user should determine the frequency of cleaning according to the conditions of use.

Stylus balls, threads and mating faces should be cleaned with proprietary cloths or solvent.

Stylus modules that are not in use should be stored in spare ports in the SCR200 rack or in their transport boxes.

9.3 SCR200 rack

Periodic cleaning of the rack ports, lids and outer surfaces using a proprietary cloth is recommended to prevent contamination of the modules.

10 Fault finding

Table 10 - The CMM will not register a probe trigger, but the probe operates normally when the stylus is deflected by hand.	
PI 200 indicators:	'STOP' LED is ON. 'TP200' LED is ON. 'SEATED' LED operates normally.

Possible cause	Checks/remedies
• The CMM controller or a Renishaw system has activated the STOP signal. • The SCR200 overtravel mechanism is deflected.	• Check the status of the Renishaw motorised probe head or other systems. • Check the status of the Renishaw motorised probe head or other systems.

Table 11 - The probe fails to trigger and the probe LEDs glow only dimly when the stylus touches the workpiece, but the probe operates normally when the stylus is deflected by hand.	
PI 200 indicators:	'SEATED' LED is ON.

Possible cause	Checks/remedies
• The trigger speed is too slow. • The stylus is too heavy.	• Probe normally to the workpiece surface. • Increase the gauging speed.

Table 12 - The probe will not arm or the probe does not stay armed when the RESET button is released. The probe LEDs are always OFF.	
PI 200 indicators:	'STD' LED is ON. 'SEATED' LED is OFF.

Possible cause	Checks/remedies
• The probe sensor is faulty. • The probe wiring is open circuit.	• Remove the probe and test by substitution. • Check the wiring from the probe to the PI 200 interface.

Table 13 - The probe will not arm or the probe does not stay armed when the RESET button is released. The probe LEDs are always ON.	
PI 200 indicators:	'TP200' LED is ON. 'SEATED' LED is OFF.

Possible cause	**Checks/remedies**
• The probe sensor is faulty or has been damaged by a collision.	• Remove the probe and test by substitution.

Table 14 - False ('air') triggers occur while the CMM is stationary and the probe LEDs flicker.	
PI 200 indicators:	'TP200' LED is ON. 'SEATED' LED operates normally.

Possible cause	**Checks/remedies**
• The probe sensor is faulty.	• Remove the probe and test by substitution.
• The probe is loose in the probe head.	• Correctly tighten the probe.
• There is excessive vibration from an external source.	• Remove the cause or isolate the CMM.
• There is excessive vibration from the CMM.	• Check the CMM's air supply. • Maintain the CMM's air bearing system.

Table 15 - False ('air') triggers occur at gauging speed and the probe LEDs flicker.	
PI 200 indicators:	'DAMPED' LED is OFF. 'SEATED' LED operates normally.

Possible cause	**Checks/remedies**
• The stylus is too large or too heavy.	• Use stylus arrangements within recommendations.
• There is excessive vibration from the CMM.	• Check the CMM's air supply. • Maintain the CMM's air bearing system.

Table 16 - False ('air') triggers occur at traverse speed and the probe LEDs flicker.	
PI 200 indicators:	'DAMPED' LED is ON. 'SEATED' LED operates normally.

Possible cause	Checks/remedies
• The stylus is too large or too heavy. • There is excessive vibration from the CMM. • The traverse speed is too high.	• Use stylus arrangements within recommendations. • Check the CMM's air supply. • Maintain the CMM's air bearing system. • Reduce the traverse speed.

Table 17 - The probe triggers during an SCR200 stylus change.	
PI 200 indicators:	'SEATED' LED operates normally.

Possible cause	Checks/remedies
• The SCR200 is not connected to the PI 200. • Incorrect SCR200 operating mode.	• Check the SCR200 indicator lamps. • Reconnect the cable.

Table 18 - There is an unexpected loss of accuracy.	
PI 200 indicators:	‘TP200’ LED is ON. ‘SEATED’ LED operates normally.

Possible cause	Checks/remedies
• The stylus ball is damaged or dirty. • The stylus is too large or too heavy. • The probe is loose or not correctly assembled. • The kinematic coupling is damaged or dirty. • The gauging speed has been changed. • The trigger threshold has been changed.	• Clean the stylus ball, or replace and requalify the stylus. • Use stylus arrangements within recommendations. • Check the stylus joints. • Ensure the module is correctly seated and the probe is tight in the probe head. • Inspect and clean the kinematic coupling. • Requalify the stylus tips.

Table 19 - The deflection alarm is active.	
PI 200 indicators:	Audible indicator is ON.

Possible cause	Checks/remedies
• The stylus is or was deflected for longer than 10 seconds. • The stylus module was changed manually.	• Move the stylus clear of any obstruction and press the RESET button.

Table 20 - TP200 fails to work.	
PI 200 indicators:	‘STOP’ LED ON. ‘POWER’ LED ON.

Possible cause	Checks/remedies
• The M8 bush polarity is incorrect.	• Change the PI 200 probe polarity switch to the opposite state.

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