

APCA and APCS tool setting probes



Original instructions – translation of these original instructions are available on request

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CNC machines

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

Care of the APC

Keep system components clean (for more information see “Service and maintenance” on page 30).

Equipment operation

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired or could cause injury.

Patents

Features of the APCA and features of similar Renishaw products, are the subject of one or more of the following patents and/or patent applications:

EP 3850299

Intended use

APCA and APCS are tool setting probes for CNC lathes and multi-tasking machines. APCA and APCS can be used for initial tool setting, tool replacement cycles, tool wear, tool breakage, and thermal growth monitoring. A pneumatic cover ensures the stylus is fully protected when not in use. Cover is extended using air and retracted using either air (APCA) or a spring (APCS).

Declaration of conformity



Renishaw plc hereby declares that APCA and APCS tool setting probes are in compliance with the essential requirements and other relevant provisions of:

- the applicable EU directives
- the relevant statutory instruments under UK law

The full text of the declaration of conformity is available at:
www.renishaw.com/mtpdoc

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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, contact your local waste disposal service or Renishaw distributor.

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Information required by Article 33(1) of Regulation (EC) No. 1907/2006 ("REACH") relating to products containing substances of very high concern (SVHCs) is available at: www.renishaw.com/REACH

Product marking

Please refer to markings on the product for year of manufacture.

FCC information to user (USA only)

Supplier's Declaration of Conformity 47 CFR § 2.1077
Compliance Information Unique Identifier: APCA and APCS tool setting probes.

Responsible Party – U.S. Contact Information

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Illinois IL 60118 United States Telephone number:
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FCC Compliance Statement

47 CFR Section 15.19

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

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

47 CFR 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.

47 CFR 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 the user will be required to correct the interference at their own expense.

47 CFR Section 15.27

This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance.

ICES information to user (Canada only)

Class A Equipment Statement (Non-residential)

CAN ICES-003(A) / NMB-003(A).

Safety

Information for the user

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

Remove power before performing any maintenance operations.

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 documentation, 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 probe signals to stop machine movement.

The expected method of providing an emergency stop for Renishaw products is to remove power.

Information for the machine supplier/installer

The automatic probe cover (APC) system must be installed by a competent person, observing relevant safety precautions. Before starting work, ensure that the machine tool is in a safe condition with the power switched OFF and the power supply to the HSI or HSI-C disconnected.

Warnings

The following residual risks of this device need to be managed to an acceptable level by the integrator:

- Sound pressure level: this device emits noise as an essential part of its operation and has been measured at 76 dB(A).
- Pinch point: when this device operates there is a pinching hazard between the stylus cube and the cover
- Care must be taken when installing or cleaning the product inside the machine tool to ensure sharp objects are avoided.
- Ejection of debris: when "air bleed" is activated debris (including metal particles) can be ejected from the cover
- Installation of this pneumatically powered device presents foreseeable pneumatic and mechanical hazards so should only be installed by a competent person.
- The sound pressure level, pinch point and "air bleed" hazards identified above will need to be managed during maintenance of the machine or this device.

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安全须知

用户须知

在所有涉及使用机床或坐标测量机 (CMM) 的应用中，建议采取保护眼睛的措施。

在执行任何维护作业之前，请先断开电源。

机床制造商有责任确保用户了解操作中存在的任何危险（包括雷尼绍产品文件中提到的危险），并确保提供充分的防护装置和安全联锁装置。

在某些情况下，有误发测头已复位状态信号的可能。切勿单凭测头信号来停止机床运动。

紧急关闭雷尼绍产品的方法是断开电源。

机床供应商/安装商须知

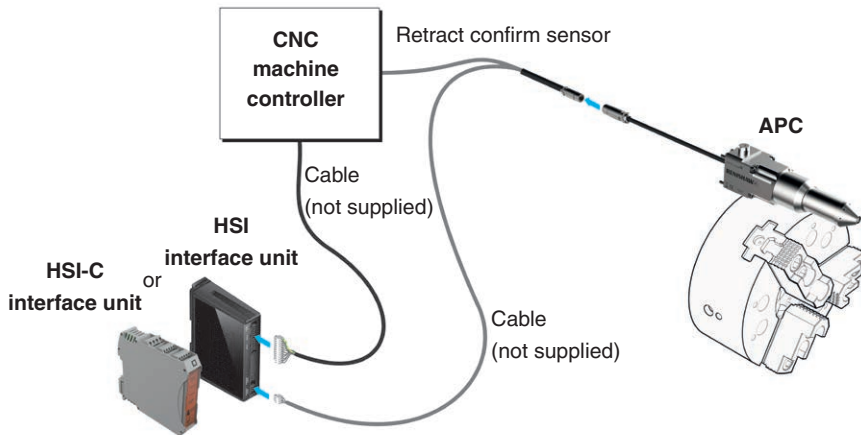
自动测针保护罩 (APC) 系统必须由有资质的人员在遵守相关安全措施的前提下进行安装。在开始工作之前，须确保机床电源关闭，处于安全状态，并且HSI或HSI-C的电源已断开。

警告

集成商必须将该设备的以下残余风险控制在可接受范围内：

- 声压级：该设备运行时的一个基本特点是发出噪声，噪声值为76 dB(A)。
- 注意卷夹：当设备运行时，在方形测针和保护罩之间存在夹伤危险。
- 在机床内安装或清洁该产品时，必须谨慎操作以确保避开尖锐物体。
- 碎屑弹出：当吹气系统启动时，可能会有碎屑（包括金属颗粒）从保护罩内弹出。
- 该气动设备的安装操作存在可预见的气动和机械危险，因此必须由有资质的人员进行安装。
- 对机床或该设备进行维护时，必须对上述声压级、卷夹和吹气系统可能存在的危险进行管控。

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Introduction

The automatic probe cover (APC) is a tool setting probe that features a pneumatically-operated protection cover for lathes and multi-tasking machines. The APC is designed to protect the stylus when it is mounted in a hazardous environment within a machine tool.

The APC is typically used when the probe is mounted in a harsh environment; for example, where exposed to large pieces of flying swarf, or long strands of swarf wrapping around the stylus that can damage the probe when pulled away. The pneumatically-operated cover will protect the probe's stylus and allow it to operate in this hazardous environment.

APC probe family

The APC family of tool setting probes currently consists of:

- APCA air extension and air retraction
- APCS air extension and spring retraction

The term APC used throughout this installation and user's guide refers to both versions.

Features

The APC features an "air bleed" function. "Air bleed" is where air flows through the APC mechanism at a constant rate over the stylus cube when the APC cover is extended or retracted to help prevent build up of contamination on the stylus cube.

The APC also features an air blast port.

The customer can supply, fit and control an air blast pipe to suit their requirements. For example this could be used for cleaning the stylus or cutting tool before measuring.

NOTE: A retract confirm sensor provides the machine controller with a signal to indicate that the APC cover is retracted.

**HSI interface unit**

Introduction

An HSI or HSI-C interface unit is required to convert the signals from the APC unit into voltage-free solid-state relay (SSR) outputs for transmission to the CNC machine controller, which responds to the probe inputs.

WARNING: Before installing the interface unit, ensure that the machine is safe to work on. Switch off machine power when working in the control cabinet.

**HSI-C interface unit**

In addition to the features of the HSI, the HSI-C enables the user to select a suitable level of immunity to false triggering (caused by machine vibrations or accelerations) for the connected APC unit. The HSI-C can also respond to a configuration override input that switches the probe to the highest level of immunity to false triggering when manoeuvring to a measure position at high speed.

The interface unit should be installed in the CNC controller cabinet. Where possible, locate the unit away from potential sources of interference such as transformers and motor controllers.

Installing the interface unit

Install and configure the interface unit as described in the *HSI hard-wired system interface* installation guide (Renishaw part no. H-5500-8554), or the *HSI-C hard-wired system interface – configurable* installation guide (Renishaw part no. H-6527-8501).

Principle application	Tool setting probe with automatic protection cover for lathes and multi-tasking machines. Contamination management available with “air bleed”.	
Dimensions	Length	189.4 mm (7.46 in) extended
	Width	45.0 mm (1.77 in)
	Depth	48.25 mm (1.90 in)
Transmission type	Hard-wired transmission	
Compatible interfaces	HSI or HSI-C	
Weight	1200 g (42.33 oz) with 0.5 m (1.64 ft) cable and connector.	
Cable	0.5 m (1.6 ft) minimum, M12 connector IEC 61076-2-101. A-standard male ¹ .	
Sense directions	±X, ±Y, +Z	
Unidirectional repeatability	1.50 μm (59 μin) 2σ ²	
Stylus trigger force ³	XY plane (low force)	0.49 N, 50.25 gf (1.77 ozf)
	XY plane (high force)	0.90 N, 92.21 gf (3.25 ozf)
	+Z direction	6.79 N, 692.88 gf (24.44 ozf)
Supply voltage	12 Vdc to 30 Vdc	
Supply current	HSI	40 mA @ 12 Vdc, 23 mA @ 24 Vdc
	HSI-C	110 mA @ 12 Vdc, 80 mA @ 24 Vdc
Pneumatic supply	Supply must conform to BS ISO 8573-1: Class 4.6.3. or better. Maximum operating pressure 6.5 bar (94.27 psi), minimum operating pressure 4.5 bar (65.27 psi).	
Input pneumatic connections ^{4 5}	Three push fit fittings for Ø4 mm (0.16 in) tubing (ISO/TS 11619:2014).	

Output connection	Blanked DIN EN ISO 228–G 1/8 outlet for customer configurable “air blast stalk”.
Mounting	M4 × 50 mm (1.97 in) long (ISO 4762 grade 12.9) or equivalent × 4
Retract confirm sensor	Operating voltage 12 Vdc to 30 Vdc, no load current 3 mA, rated operating current 150 mA, output resistance open collector, switching output PNP normally open (NO). When the cover is extended, the output is LOW. When the cover is retracted it is HIGH. (12 Vdc to 30 Vdc).
Sealing	IPX6 and IPX8, BS EN 60529:1992+A2:2013 Connector sealed to IP67 when mated.
Storage temperature	–25 °C to +70 °C (–13 °F to +158 °F)
Operating temperature	+5 °C to +55 °C (+41 °F to +131 °F)

¹ When wiring the APC to the machine control the installer should ensure the screen is connected (see pages 10 and 11).

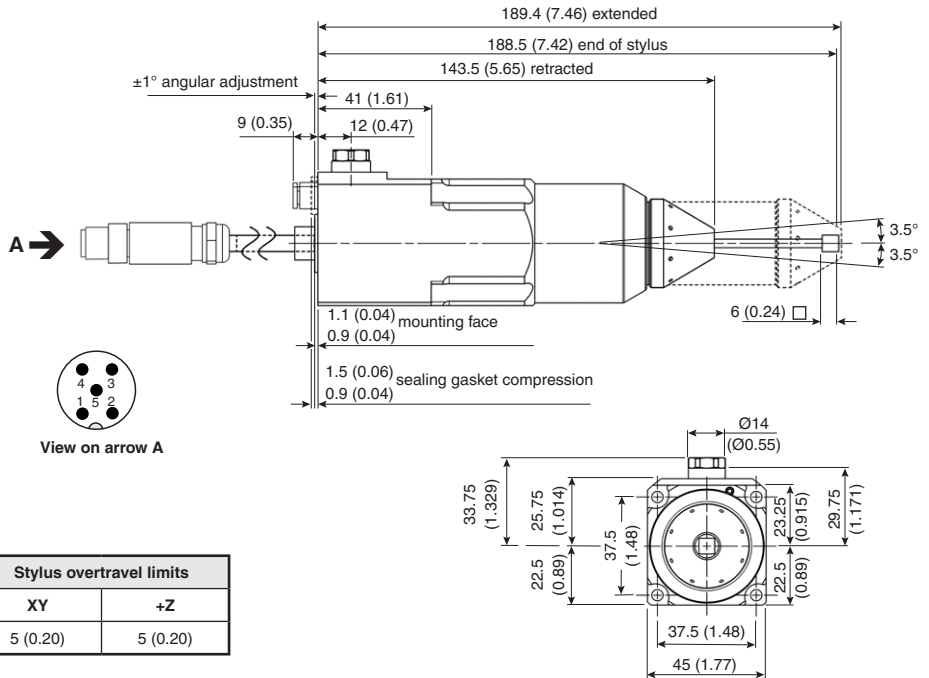
² Performance specification is tested at a standard test velocity of 480 mm/min (18.9 in/min). Significantly higher velocity is possible depending on application requirements.

³ Using a 60 mm stylus.

⁴ Connections:

Product	Port 1	Port 2 (see note 5)	Port 3
APCA with or without “air bleed”	Retract and “air bleed”	Air blast	Extend
APCS	Exhaust	Air blast	Extend
APCS with “air bleed”	“Air bleed”	Air blast	Extend

⁵ Can be configured by customer to provide air blast functionality.



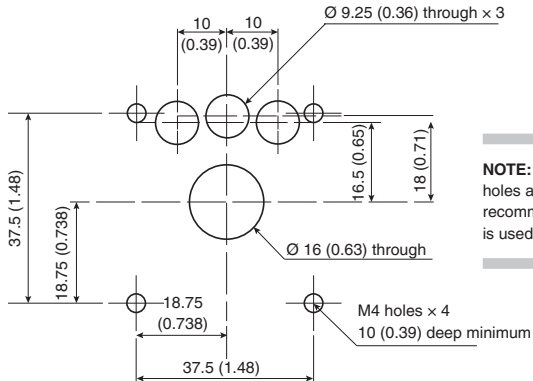
Dimensions in mm (in)

Introduction

The APC is designed to be mounted to a suitable machine bulkhead, surface bulkhead or panel, and requires through holes to fix it in place. The bulkhead or panel must be stiff and not transfer excessive vibration to the APC during operation.

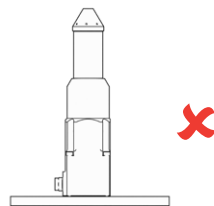
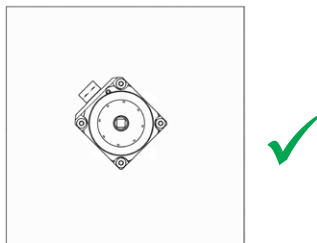
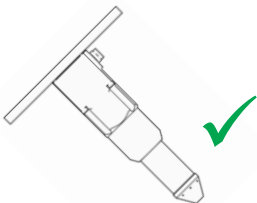
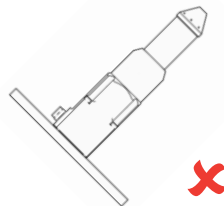
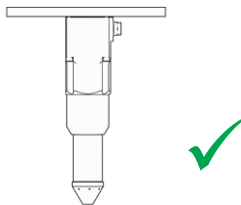
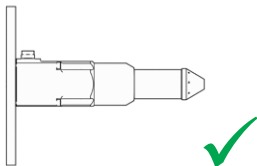
CAUTION: The APC is designed to be mounted horizontally or at any angle between horizontal and vertical with the nose cone facing down. It must NOT be mounted with the nose cone at any angle above horizontal (see diagram on page 9).

Machine cutout (orientation to suit installation)

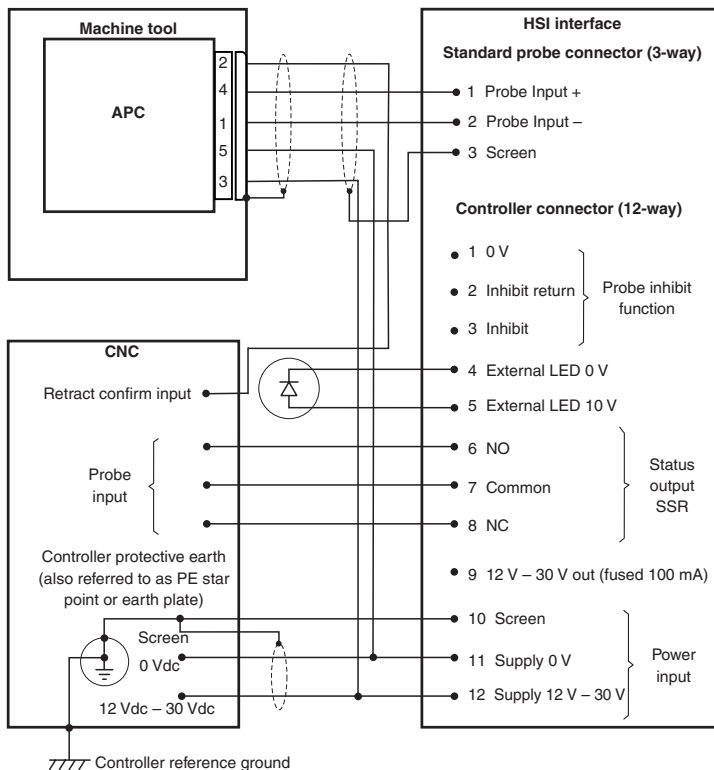


NOTE: If the 4 M4 screw holes are through holes, it is recommended that a sealant is used on these holes.

Acceptable orientation of the APC



Recommended



NOTES:

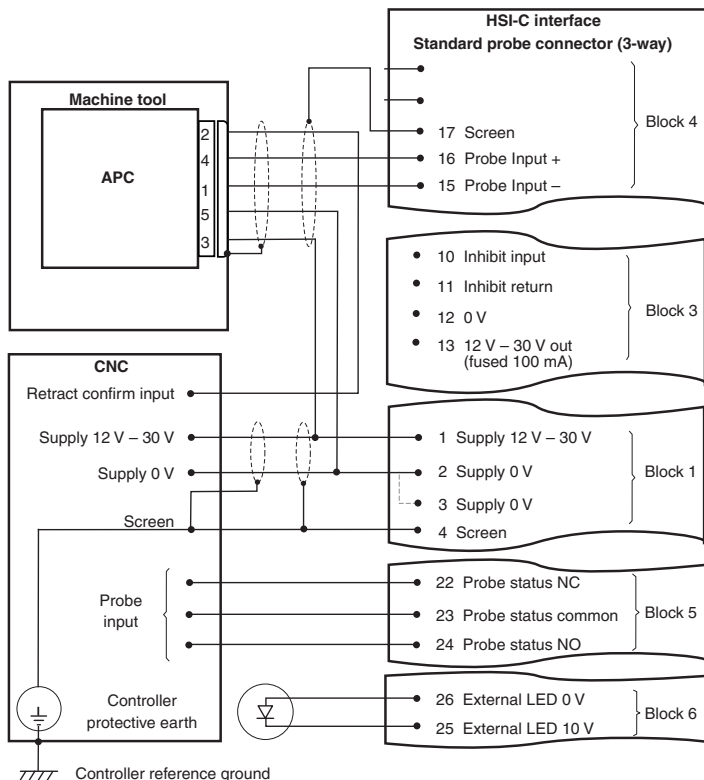
When the APC is not being used, it is recommended that the inhibit function is enabled. The retract confirm output could be used to set the inhibit function (for more information see "Probe inhibit function" on page 12).

When connecting the APC to the HSI interface, use the connection labelled STANDARD PROBE.

Connect either pin 6 or pin 8, but do not connect both wires.

Status	Normally open (NO)	Normally closed (NC)
Probe triggered	Closed	Open
Probe seated	Open	Closed

Pin	APC connections
2	Retract confirm sensor
4	Probe input +
1	Probe input -
5	Supply 0 V
3	Supply 12 V - 30 V



NOTES:

When the APC is not being used, it is recommended that the inhibit function is enabled. The retract confirm output could be used to set the inhibit function (for more information see "Probe inhibit function" on page 12).

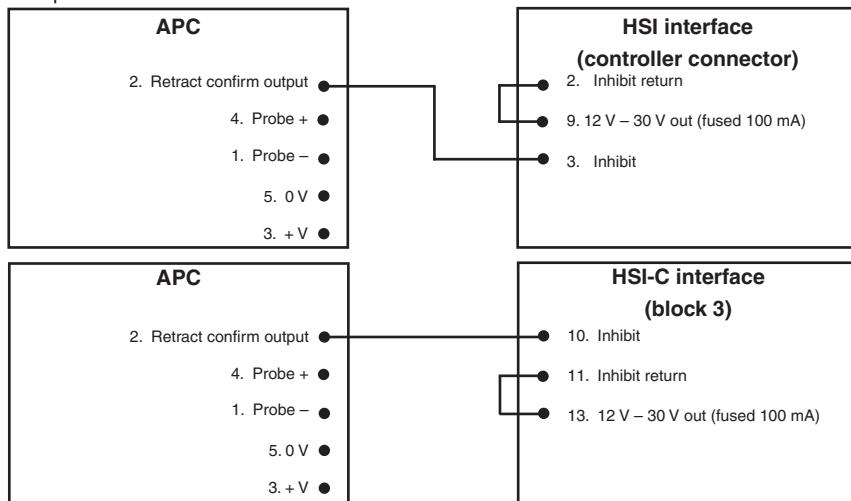
When connecting the APC to the HSI-C interface, use terminals 15 and 16.

Connect either pin 22 or pin 24, but do not connect both wires.

Status	Normally open (NO)	Normally closed (NC)
Probe triggered	Closed	Open
Probe seated	Open	Closed

Pin	APC connections
2	Retract confirm sensor
4	Probe input +
1	Probe input -
5	Supply 0 V
3	Supply 12 V – 30 V

The probe inhibit function is used to switch off the probe and can be deactivated by using the retract confirm output.



When the cover is extended, APC pin 2 output is low and inhibit is active (probe inhibited).

When the cover is retracted, APC pin 2 output is high and inhibit is off (probe not inhibited).

NOTE: The retract confirm output must be connected to the machine tool controller; for more information see “Connecting the APC to an HSI interface and the CNC” on page 10 or “Connecting the APC to an HSI-C interface and the CNC” on page 11.

Introduction

The APC is a pneumatically operated probe cover that is available in two main configurations:

- APCA where pressure is required for both extending and retracting the cover.
- APCS where pressure is required for extending the cover and an internal spring retracts the cover.

“Air bleed” configuration

Both APCA and APCS can be configured to provide an “air bleed” function. “Air bleed” is where air flows at a constant rate over the stylus cube when the APC cover is extended or retracted to help prevent build-up of contamination on the stylus cube and within the mechanism.

“Air bleed” is recommended when the cover is extended and the machine tool is cutting.

It is also recommended to activate “air bleed” momentarily when the cover is retracted prior to measurement.

A flow control valve can be fitted to regulate the “air bleed”.

NOTES:

“Air bleed” is not guaranteed to remove all debris. This is dependent on the application and the environment.

“Air bleed” is created when a pressure limited seal is activated by the control circuit. This will occur when pressure is applied to Port 1 when the cover is fully retracted, or when pressure is applied to Port 1 when the cover is extended and held with a pressure greater than 4.5 bar (65.3 psi) on Port 3.

Logic table APCA

	Pressure	Pressure	Pressure	Pressure
Port 1	0 bar	0 bar	≥ 4.5 bar (65.3 psi)	≥ 4.5 bar (65.3 psi)
Port 3	0 bar	≥ 4.5 bar (65.3 psi)	0 bar	≥ 4.5 bar (65.3 psi)
Cover	Unknown	Extend	Retract	Extend
“Air bleed”	Off	Off	On	On

Logic table APCS

	Pressure	Pressure
Port 1	0 bar	0 bar
Port 3	0 bar	≥ 4.5 bar (65.3 psi)
Cover	Retract	Extend
“Air bleed”	N/A	N/A

Logic table APCS with “air bleed”

	Pressure	Pressure	Pressure	Pressure
Port 1	0 bar	0 bar	≥ 4.5 bar (65.3 psi)	≥ 4.5 bar (65.3 psi)
Port 3	0 bar	≥ 4.5 bar (65.3 psi)	0 bar	≥ 4.5 bar (65.3 psi)
Cover	Retract	Extend	Retract	Extend
“Air bleed”	Off	Off	On	On

Position monitoring

Probe protected (cover extended)

The options are to constantly apply pressure to port 3 or to fit a pressure switch that is connected to port 3 and set it to 4.5 bar (65.3 psi) minimum and monitor when extended.

Safe to access the probe (cover retracted)

This is confirmed by the retract confirm sensor. Monitor while measuring.

Mechanical protection

To protect the probe and APC mechanics it is necessary to restrict the extension speed of the cover to a minimum of 1 second. A directional speed control valve should be used that restricts the extend time but does not restrict the retract time.

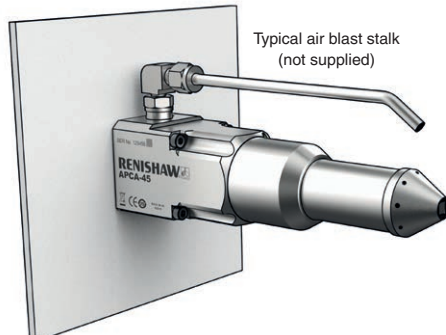
NOTE: It is recommended that the extend operation is completed before “air bleed” is activated.

Air blast stalk

An independently fed DIN EN ISO 228–G 1/8 outlet for an “air blast stalk” is provided for customer implementation.

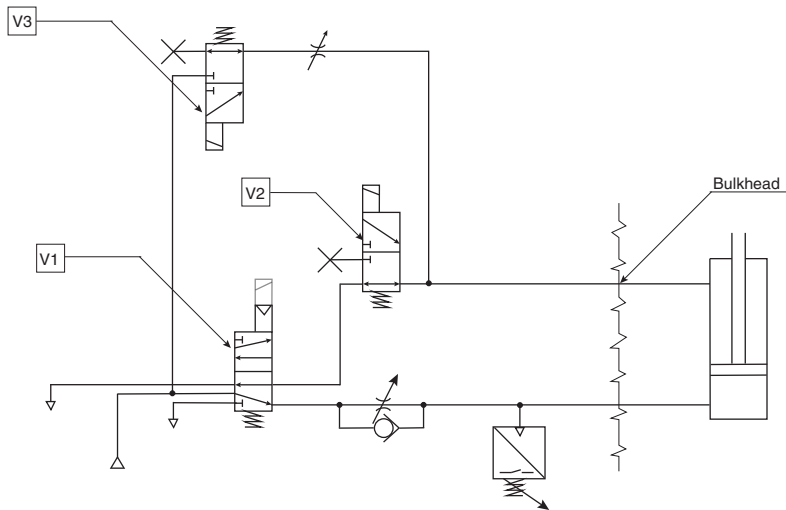
This can be used to blow air over the stylus cube or the cutting tool being measured when the APC cover is retracted during the measuring cycle.

NOTE: Air blast stalk not provided by Renishaw.



APCA with “air bleed” (circuit 1)

The following pneumatic circuits are provided as examples of possible implementations of APC control.

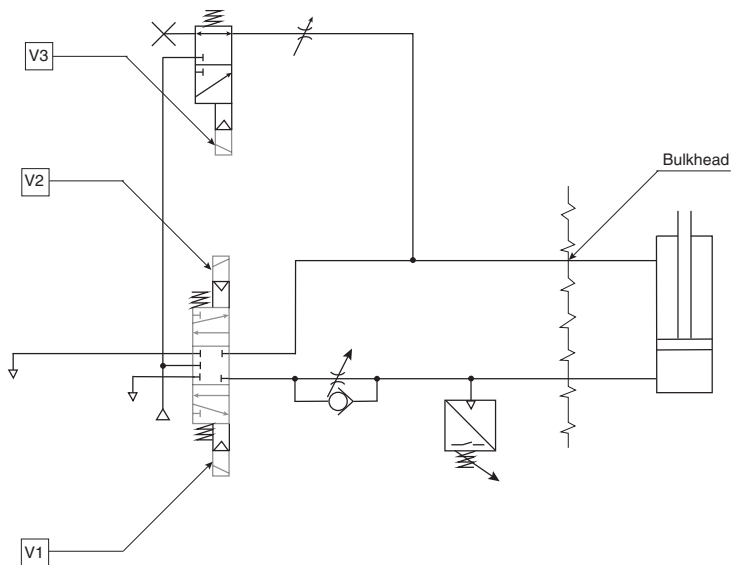


Operation sequence (circuit 1)

NOTE: V2 cannot be a pilot assisted valve.

	Operation sequence	Stylus	Solenoid valve 1 (V1)	Solenoid valve 2 (V2)	Solenoid valve 3 (V3)	End of sequence trigger	Monitor	Variable to set	Comment
1	Cover extend	Protected	0	0	0	Pressure switch activation	Pressure switch		
2	"Air bleed" on (extended)	Protected	0	1	1	Time	Pressure switch	Bleed time	Pressure switch must read ≥ 4.5 bar (65.3 psi). Activate valve 2 before valve 3
3	"Air bleed" off (extended)	Protected	0	0	0	Time		Sequence hold time	Pressure switch must read ≥ 4.5 bar (65.3 psi). Deactivate valve 2 before valve 3
4	Cover retract	Accessible	1	0	0	Retract sensor	Retract sensor		Will "air bleed" at end of travel
5	"Air bleed" on (retracted)	Accessible	1	1	1	Time	Retract sensor	Bleed time	Allow independent control of "air bleed" flow
6	"Air bleed" off (retracted)	Accessible	1	1	0	Time	Retract sensor	Sequence hold time	Not pressure locked in position
1	Cover extend	Protected	0	0	0	Pressure switch activation	Pressure switch		

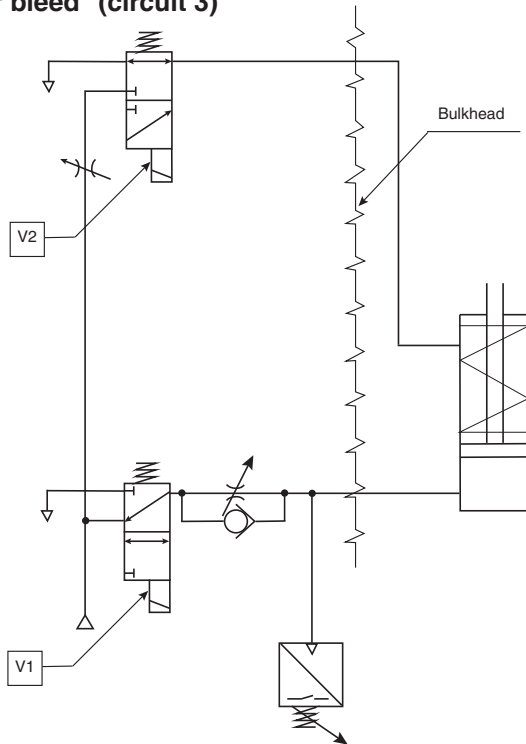
APCA with "air bleed" (circuit 2)



Operation sequence (circuit 2)

	Operation sequence	Stylus	Solenoid valve 1 (V1)	Solenoid valve 2 (V2)	Solenoid valve 3 (V3)	End of sequence trigger	Monitor	Variable to set	Comment
1	Cover extend	Protected	1	0	0	Pressure switch activation	Pressure switch		
2	"Air bleed" off (extended)	Protected	0	0	0	Time	Pressure switch	Sequence hold time	Pressure switch must read ≥ 4.5 bar (65.3 psi)
3	"Air bleed" on (extended)	Protected	0	0	1	Time	Pressure switch	Bleed time	Pressure switch must read ≥ 4.5 bar (65.3 psi)
4	"Air bleed" off (extended)	Protected	0	0	0	Time	Pressure switch	Sequence hold time	Pressure switch must read ≥ 4.5 bar (65.3 psi)
5	Cover retract	Accessible	0	1	0	Retract sensor	Retract sensor		Will "air bleed" at end of travel
6	"Air bleed" on (retracted)	Accessible	0	1	1	Time	Retract sensor	Bleed time	Allow independent control of "air bleed" flow
7	"Air bleed" off (retracted)	Accessible	0	0	0	Time	Retract sensor	Sequence hold time	Not pressure locked in position
1	Cover extend	Protected	1	0	0	Pressure switch activation	Pressure switch		

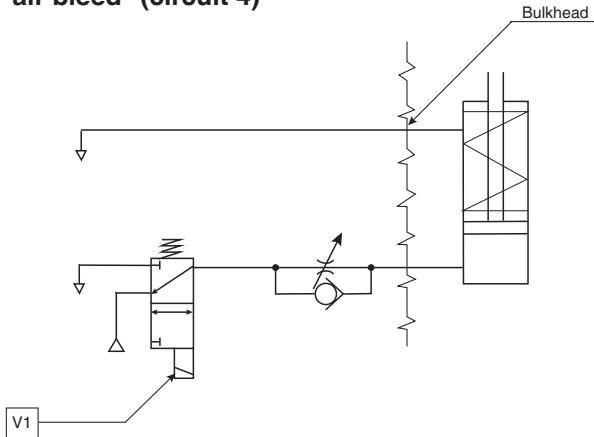
APCS with "air bleed" (circuit 3)



Operation sequence (circuit 3)

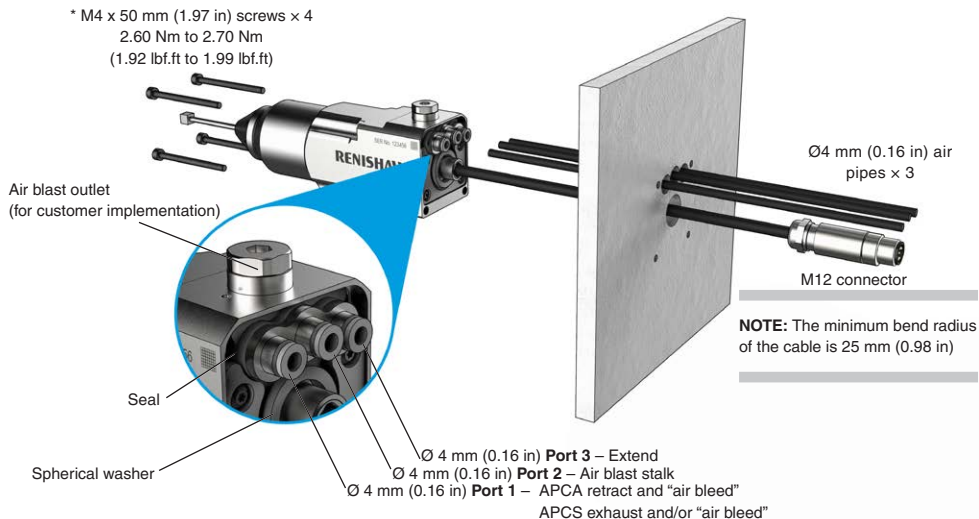
	Operation sequence	Stylus	Solenoid valve 1	Solenoid valve 2	End of sequence trigger	Monitor	Variable to set	Comment
1	Cover extend	Protected	0	0	Pressure switch activation	Pressure switch		Default state
2	"Air bleed" off (extended)	Protected	0	0	Time	Pressure switch	Sequence hold time	
3	"Air bleed" on (extended)	Protected	0	1	Time	Pressure switch	Bleed time	System pressure ≥ 4.5 bar (65.3 psi)
4	"Air bleed" off (extended)	Protected	0	0	Time	Pressure switch	Sequence hold time	
5	Cover retract	Accessible	1	0	Retract sensor	Retract sensor		
6	"Air bleed" on (retracted)	Accessible	1	1	Time	Retract sensor	Bleed time	Allow control of "air bleed" flow
7	"Air bleed" off (retracted)	Accessible	1	0	Time	Retract sensor	Sequence hold time	
1	Cover extend	Protected	0	0	Pressure switch activation	Pressure switch		"Default state" stylus protected

APCS with no “air bleed” (circuit 4)



Operation sequence (circuit 4)

Operation sequence	Stylus	Solenoid valve	End of sequence trigger	Monitor	Variable to set
1 Cover extend	Protected	0	Pressure switch activation	Pressure switch	Time
2 Cover retract	Accessible	1	Retract sensor	Retract sensor	
1 Cover extend	Protected	0	Pressure switch activation	Pressure switch	Time



* **NOTE:** To torque up the M4 x 50 screws, an extended 3 mm hexagon driver bit may be used (RS components 875-7026 is recommended).

Best practices – pneumatics

WARNING: Before installing the pneumatics, ensure that the machine is safe to work on by isolating the air supply.

NOTE: Valve Kv (Cv) flow coefficient, pipe length and pipe diameter will affect operating performance. Exhaust lines from valves must be routed to a clean isolated area away from any electrical connections. An exhaust silencer/filter is recommended.

For air supply see “Pneumatic supply” in specification on page 5.

- Where possible, tap into the air supply that exits the machine air supply filter/regulator unit. Do not connect the APC to an oiled air supply.
- Before connecting the air pipe to the inlet of the APC unit, briefly switch on the air supply to clear out any debris from the pipe. When no more debris is emitted, switch off the air supply and connect to the APC.
- When installing the air pipe supply to the APC, keep runs as short as possible to minimise pressure drop.
- If the temperature of the air supply is greater than +5 °C (+41 °F) above ambient and is humid, an air dryer will be required.

Pneumatic connection

Connect the two standard and one optional Ø4.0 mm (0.16 in) air pipes to the connectors on the back of the unit (see “Installation” diagram on page 23).

Both pneumatic connectors on the APCs (Port 1 and 3) must be connected with pipe. For APCs with no “air bleed” Port 1 must be connected to an exhaust/breather line routed to a clean isolated area away from any electrical connections. An exhaust silencer/filter is recommended.

Electrical connection

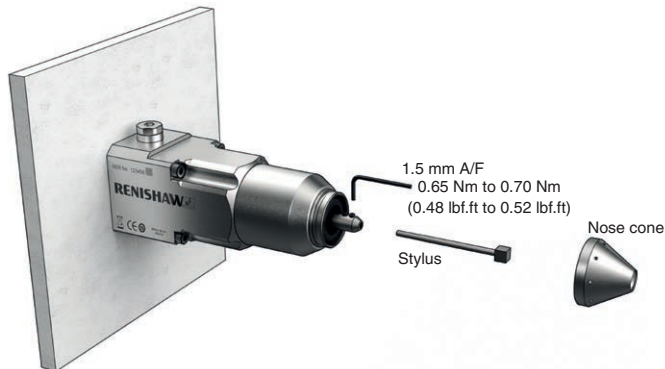
Connect the M12 connector to the mating cable (not supplied). For more information see “Connecting the APC to an HSI interface and the CNC” on page 10 or “Connecting the APC to an HSI-C interface and the CNC” on page 11 and “Retract confirm sensor” on page 12.

Mounting the APC to the machine

1. Mount the APC to fitting location using 4 × M4 screws (supplied). Leave the screws semi-tight.
2. Set the APC base perpendicular to the mounting face. The gap will be approximately 1 mm (0.04 in). Torque all four screws to between 2.60 Nm and 2.70 Nm (1.92 lbf.ft and 1.99 lbf.ft).

Fitting the stylus

1. Ensure the APC Cover is retracted.
2. Unscrew by hand, and remove the APC nose cone so the stylus mounting position is accessible.
3. Fully insert the stylus in place and rotate so the side face is approximately parallel to the machine datums.
4. Secure with 2 × M3 grub screws (supplied) and torque to between 0.65 Nm and 0.70 Nm (0.48 lbf.ft. and 0.52 lbf.ft.). For more information see “Adjusting stylus to align with machine axis” on page 27.



Adjusting stylus to align with machine axis

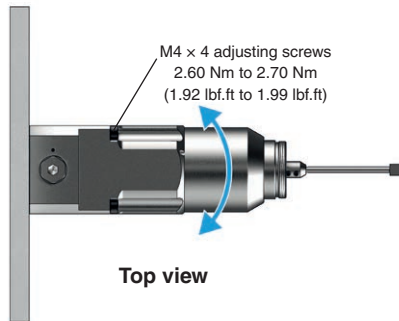
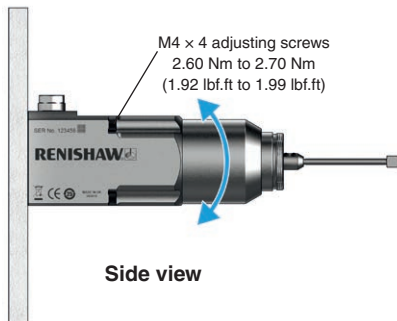
1. Check angular misalignment across the front face of the cube in both X and Y (top to bottom and side-to-side) relative to the machine datum. The recommended target is $\pm 10 \mu\text{m}$ ($393.70 \mu\text{in}$) across any side face.

2. Adjust the alignment, starting with the axis with greatest angular error.

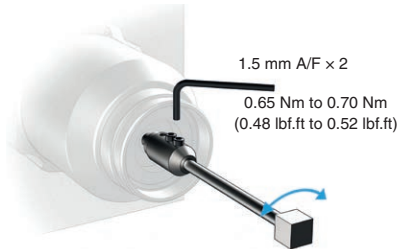
As shown below, the adjusting screws are used to align the axes and secure the APC into position.

Verify the alignment. Repeat the process until the desired alignment is achieved.

IMPORTANT: Tighten all adjusting screws to between 2.60 Nm and 2.70 Nm (1.92 lbf.ft and 1.99 lbf.ft) when checking alignment and to secure the APC into position.



- When the stylus has been adjusted to the desired setting, check that all four adjusting screws are torque tightened to between 2.60 Nm and 2.70 Nm (1.92 lbf.ft and 1.99 lbf.ft).
- Check the rotational alignment of the stylus cube. Recommended target is $\pm 10 \mu\text{m}$ ($393.70 \mu\text{in}$) across any side face.
- Align by loosening the 2 \times M3 grub screws shown in diagram below and rotate the stylus by the amount of error. Retighten the grub screws to between 0.65 Nm and 0.70 Nm (0.48 lbf.ft and 0.52 lbf.ft).
- Check perpendicularity and repeat until desired setting is achieved.
- Fit the nose cone and hand tighten until fully secure.



To operate the APC

Operating the probe cover is dependent on model and functionality. Refer to the appropriate logic table on page 14.

NOTE: A retract confirm sensor provides the machine controller with a signal to indicate that the APC cover is retracted.

Service

You may undertake the maintenance routines described in these instructions.

Equipment requiring repair, overhaul or attention under warranty should be returned to your supplier.

Maintenance

WARNING: Compressed air can cause physical injuries.

CAUTION: The APC is a precision tool and must be handled with care.

NOTE: Ensure the APC is firmly secured to its mounting. Build-up of swarf on or around the APC will be detrimental to its operation.

The APC requires minimal maintenance as it is designed to operate as a permanent fixture on CNC machine tools, where it is subject to a hot chip and coolant environment. Service interval will depend on operating environment and must be adjusted accordingly; see “Cleaning instructions” on page 31.

Cleaning instructions



WARNING: Before working on the APC, ensure that it is safe to work on and unable to operate.

Remove any swarf build-up on or around APC daily (as a minimum, it is recommended to clean out any swarf build-up in the APC once per week).

1. Fully retract APC cover.

2. Unscrew by hand, and remove the APC nose cone.
3. Clean the inside of the APC and the nose cone to remove all the residue swarf or other debris.

Refer to the diagram opposite and use a soft brush and low pressure coolant jet.

CAUTION: Do not use compressed air, a sharp tool or a degreasing agent.

4. Fit the nose cone and hand tighten until fully secure and return to service.

Symptom	Cause	Action
Poor system repeatability.	Mounting screws not fully tightened.	Tighten screws to specified torque.
	Loose stylus.	Check 2 securing screws M3 × 3 are tight. If stylus is still loose, check tightness of stylus mount with tool M-5000-3707.
	Swarf on stylus cube.	Remove swarf. Enable “air bleed” or air blast.
	APC not mounted as recommended.	Mount on solid base.
	Probing feedrate is too high for the machine controller.	Perform repeatability trials at various feedrates.
	Temperature variation is causing excessive movement of the machine and the APC.	Minimise machine and APC temperature changes. Increase the frequency of calibration.
	Machine has poor repeatability due to loose encoders, backlash, tight slideways and/or accidental damage.	Perform health check on machine.
No probe output.	Wiring fault.	Check wiring.
	Probe has failed.	Return APC to Renishaw for service.
“Air bleed” not working.	“Air bleed” supply not connected or faulty.	Check air connections.

Symptom	Cause	Action
No air from air blast.	Air blast supply not connected.	Connect air supply.
	Air blast nozzle blocked.	Clear blockage.
Cover not extending or retracting	Faulty air supply or swarf build up inside or outside the APC.	Check air supply. Clean the APC (see "Cleaning instructions" on page 31).
APCS cover not retracting.	Spring is faulty.	Return APCS to Renishaw for service.

Type	Part number	Description
APCA	A-6596-0001	APCA system, dual air with standard probe mechanism, installation and user's guide and packaging.
APCS	A-6596-0002	APCS system, air extension and spring retraction with standard probe mechanism, installation and user's guide and packaging.
Stylus	A-6560-7584	Length 59.25 mm (2.33 in), diameter 3 mm (0.12 in). Cube tip 6 mm (0.23 in), tungsten carbide.
Stylus tool	M-5000-3707	Tool only for use in case of stylus mount becoming unscrewed.
Nose cone	A-6596-0057	APC nose cone.
HSI interface	A-5500-1000	HSI probe system interface, quick-start guide and packaging.
HSI-C interface	A-6527-1000	HSI-C probe system interface, quick-start guide and packaging.
Cable	A-6596-0277	5 m cable, 5 W M12 connector. A-standard female.
Cable	A-6596-0278	10 m cable, 5 W M12 connector. A-standard female.
Cable	A-6596-0279	25 m cable, 5 W M12 connector. A-standard female.

Type	Part number	Description
Publications. These can be downloaded from our web site at www.renishaw.com .		
HSI	H-5500-8554	Installation guide for HSI.
HSI-C	H-6527-8501	Installation guide for HSI-C.

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