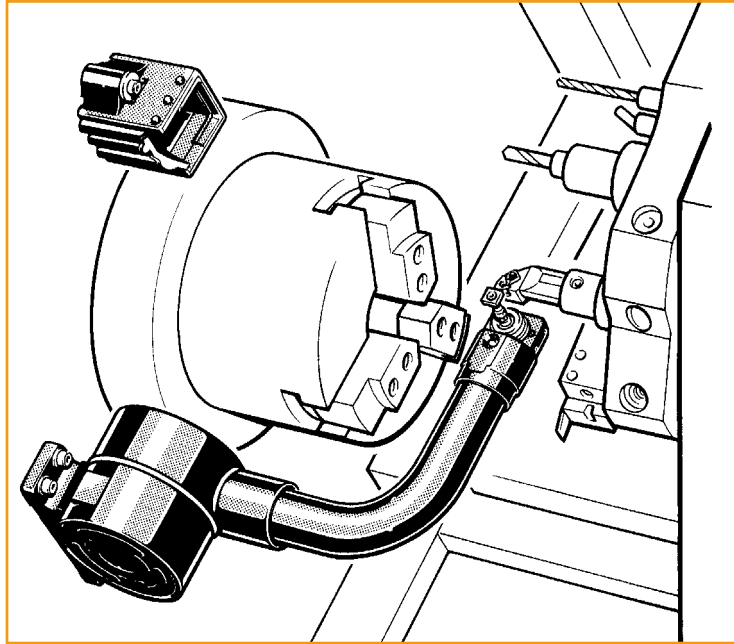



HPMA high precision motorised arm



The HPMA is a motorised swingdown tool setting arm, featuring the RP3 three axis probe

The patented rotary kinematic design ensures highly repeatable stylus positioning each time the HPMA is swung down into its 'ARM READY' position.

The design also provides a positive engagement into position at both the 'ARM READY' and 'MACHINE READY' positions. A bicolour LED indicates probe status and also informs the operator that the system is ready for use.

 **WARNING:** HPMA is designed specifically for use with the TSI3 interface. Do not use the HPMA with any other interface.

System components

- **Arm/hub assembly with probe**

The arm/hub assembly is a fully sealed, compact design available in a range of sizes to suit most machines. Renishaw has recommended arm configurations for all standard chuck sizes. The data sheet includes top level kit numbers for machine chuck sizes 6 in, 8 in, 10 in, 12 in, 15 in, 18 in and 24 in.

Renishaw also has recommended stylus configurations for all standard tooling sizes.

The data sheet includes top level part numbers for tooling sizes 16 mm, 20 mm, 25 mm, 32 mm, 40 mm and 50 mm. Where these are not suitable, arms can be configured by Renishaw to suit the particular requirement.*

* Contact Renishaw's Styli and Custom Products Division for information on other arms options.

- **Probe enclosure**

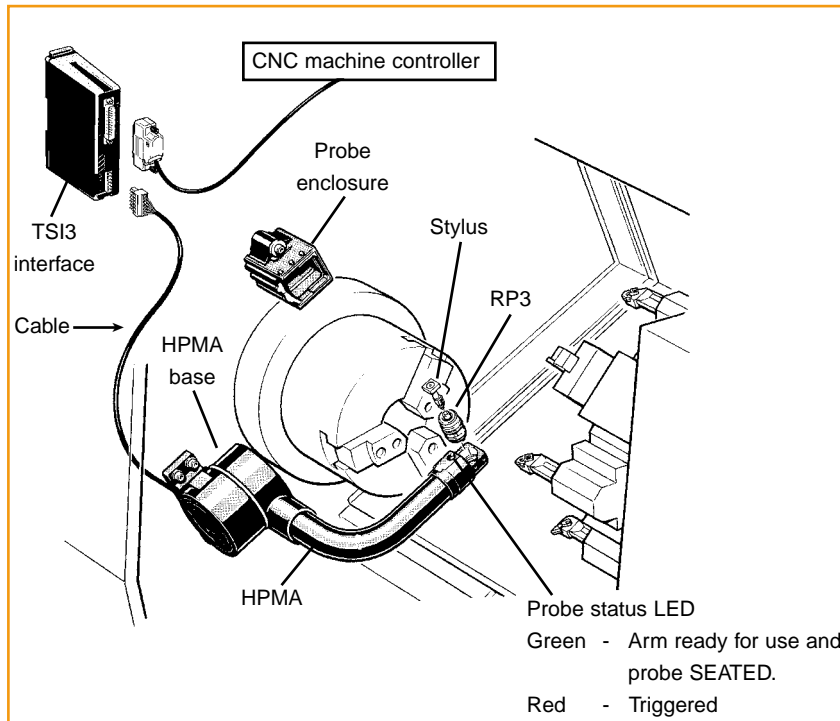
A separate enclosure protects the probe when the arm is not in use.

- **TSI3 interface**

The interface processes signals between the probe and the machine's control allowing simple integration. The unit is DIN rail mounted and features an 'Easy fit' location mechanism. There are two connectors for simple wiring to the HPMA (6-way) and machine controller (25-way 'D' type).

Data sheet
HPMA high precision motorised arm

HPMA system



Standard kit contents	
1	HPMA arm assembly
2	RP3 probe
3	Stylus kit
4	TSI3 interface
5	Probe enclosure
6	Installation and user's guide
7	Base fixing kit
Cable (optional)	
1	2 m, 5 m or 10 m cable assembly - arm to TSI3

Benefits

- Tool setting times up to 90% faster.
- Recommended OEM arm configurations for all standard chuck sizes.
- Positional repeatability typically 5 μm (0.0002 in) 2σ
- Renishaw's rugged design ensures fault free operation in the harshest of machine tool environments.
- Sealed to IPX8 (static).
- LED indicator to show probe status and arm READY FOR USE.
- Stylus "break stem" protects the probe if stylus overtravel limits are exceeded.
- Stylus configurations to suit 16 mm, 20 mm, 25 mm, 32 mm, 40 mm and 50 mm tooling.

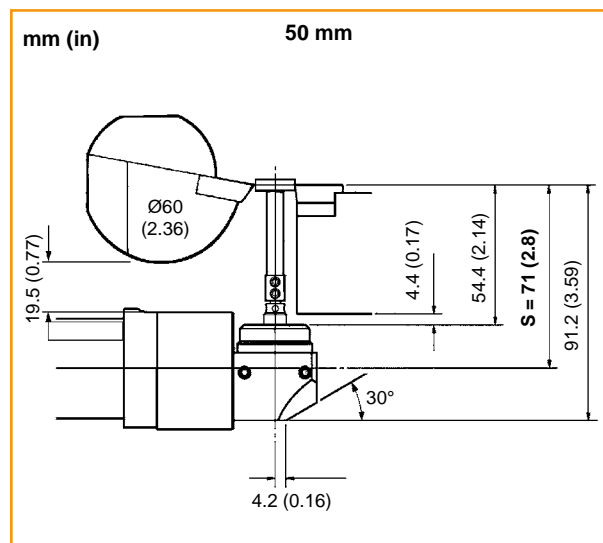
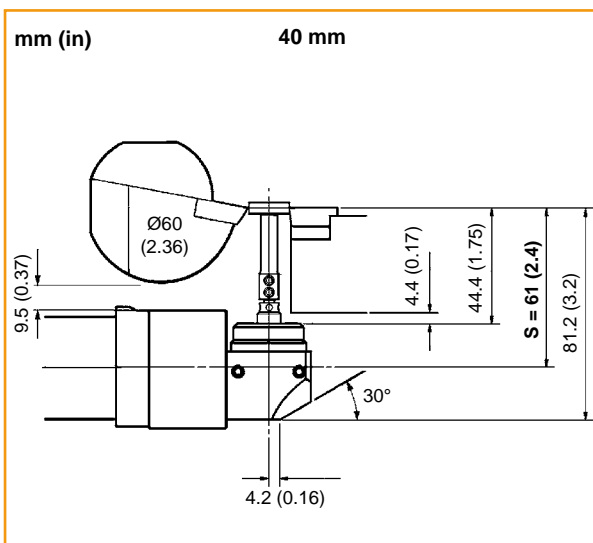
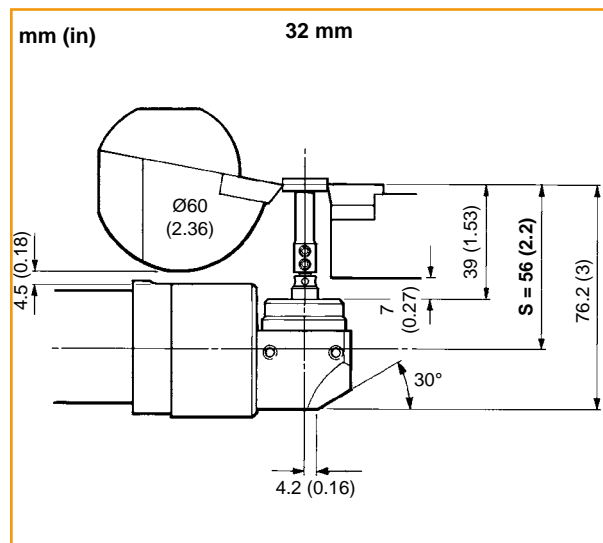
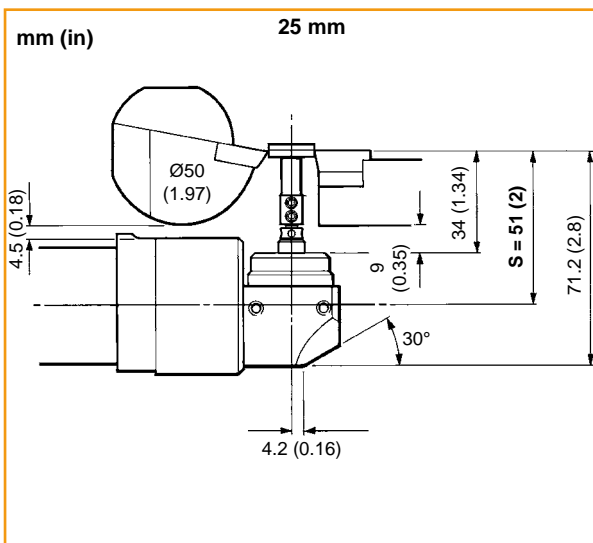
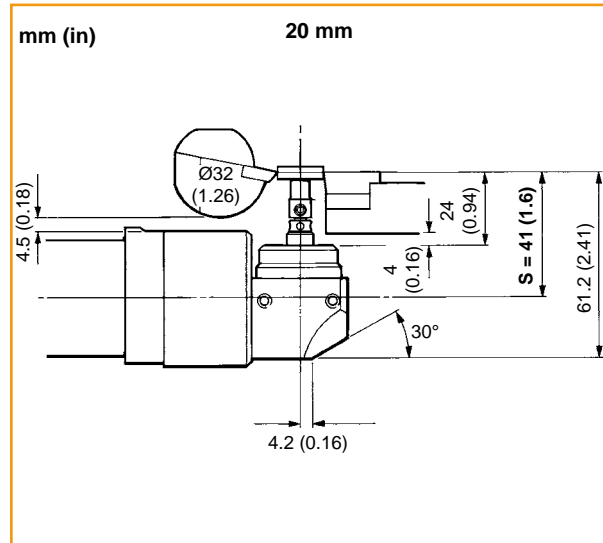
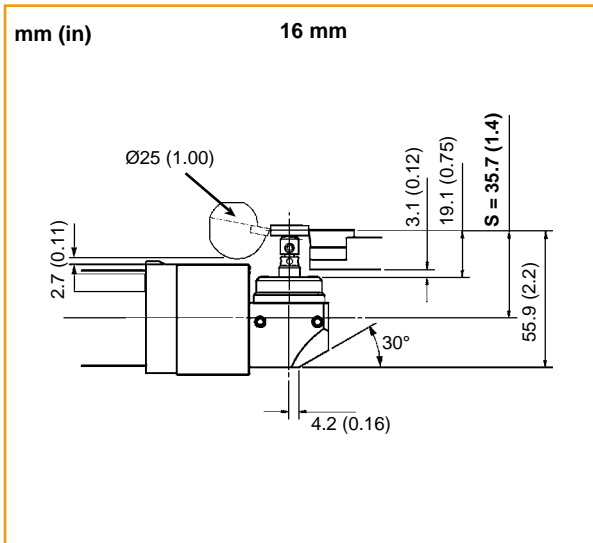
System specification

Application	CNC lathe tool setting and tool breakage detection.	
Sense directions	Probe	$\pm X, \pm Y, +Z$
	Machine	$\pm X, \pm Z, +Y$
Typical positional repeatability (at gauging speed of 36 mm/min)	6 in - 15 in chuck arms	5 μm 2σ X/Z
	18 in - 24 in chuck arms	8 μm 2σ X/Z
Environmental protection	IPX8 (static)	
Operating temperature	5 °C to 60 °C (41 °F to 140 °F)	
Storage temperature	-10 °C to 70 °C (14 °F to 158 °F)	
Arm sweep angle	91° / 90° (If Renishaw probe enclosure is not used, note maximum arm sweep angle of 91°)	

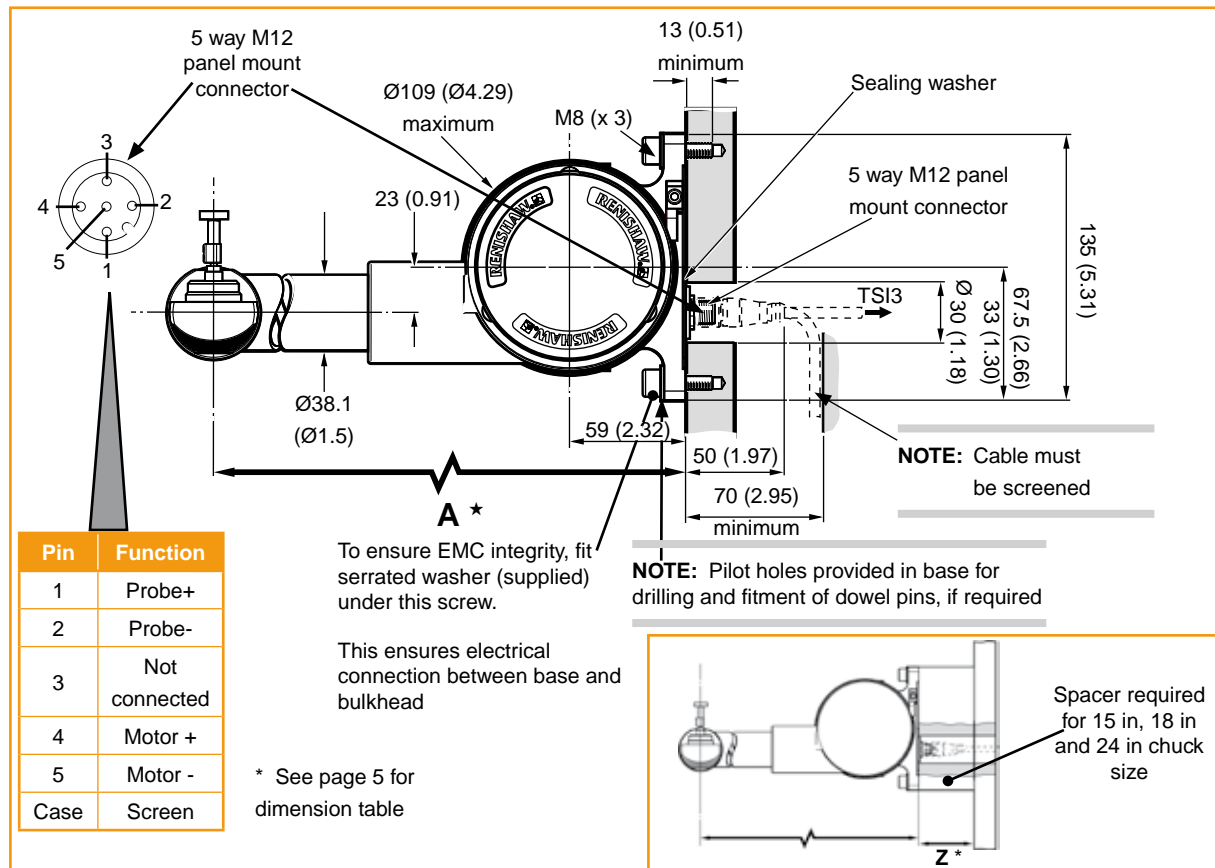
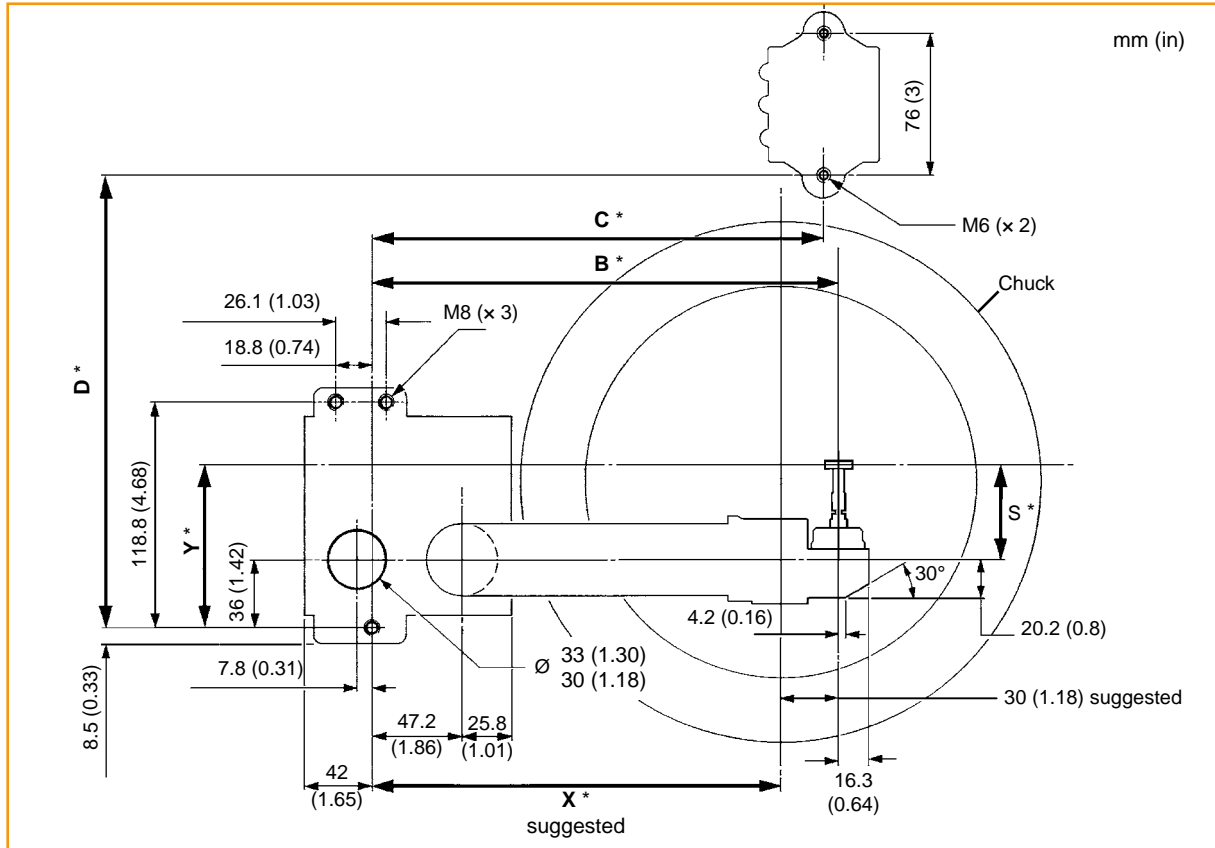
RP3 probe data

RP3 stylus trigger force	Machine XZ	3.5 N / 350 gf (12.3 ozf) max. in high force direction.
	Machine XZ	1.5 N / 150 gf (5.3 ozf) max. in low force direction.
	Machine Y	12 N / 1200 gf (42.3 ozf) max.
RP3 stylus overtravel	Machine X	9°
	Machine Z	9°
	Machine Y	2 mm (0.08 in)

Stylus dimensions by tool size

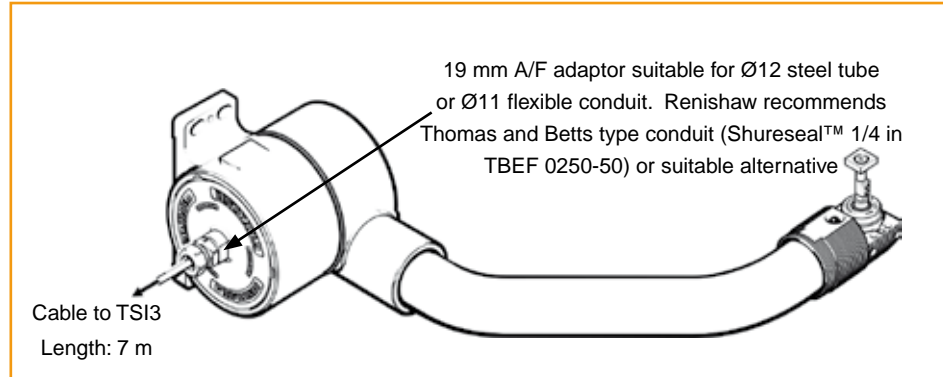


Mounting dimensions


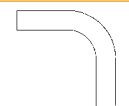
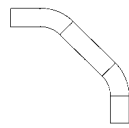
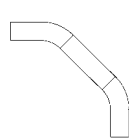
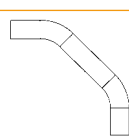
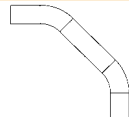
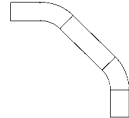


Side exit version

Colour	Function
Blue	Probe+
Grey/black	Screen
Green	Probe-
Red	Motor+
Yellow	Motor-

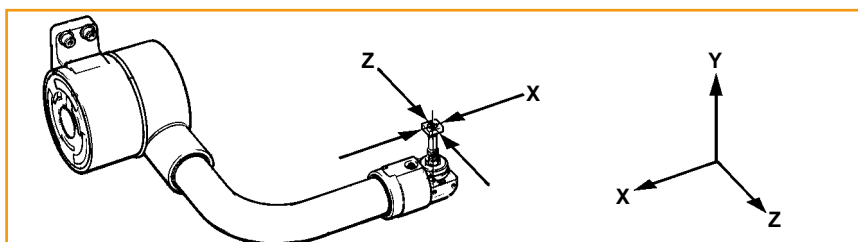


Dimensions mm (in)

Chuck size	Tooling size	Arm size		C	D	S*	X	Y	Z	Tube shape
		A	B							
6 in	16 mm	250 (9.84)	219.2 (8.63)	212 (8.35)	212 (8.35)	35.7 (1.4)	189.2 (7.45)	71.7 (2.82)	N/A	
	20 mm					41 (1.6)		77 (3.03)		
	25 mm					51 (2)		87 (3.42)		
	32 mm					56 (2.2)		92 (3.62)		
8 in	16 mm	286 (11.26)	249.2 (9.81)	242 (9.53)	248 (9.76)	35.7 (1.4)	219.2 (8.63)	71.7 (2.82)	N/A	
	20 mm					41 (1.6)		77 (3.03)		
	25 mm					51 (2)		87 (3.42)		
	32 mm					56 (2.2)		92 (3.62)		
10 in	16 mm	335 (13.19)	298.2 (11.74)	291 (11.46)	297 (11.69)	35.7 (1.4)	268.2 (10.56)	71.7 (2.82)	N/A	
	20 mm					41 (1.6)		77 (3.03)		
	25 mm					51 (2)		87 (3.42)		
	32 mm					56 (2.2)		92 (3.62)		
	40 mm					61 (2.4)		97 (3.82)		
12 in	16 mm	368 (14.49)	298.2 (11.74)	291 (11.46)	330 (12.99)	35.7 (1.4)	268.2 (10.56)	71.7 (2.82)	N/A	
	20 mm					41 (1.6)		77 (3.03)		
	25 mm					51 (2)		87 (3.42)		
	32 mm					56 (2.2)		92 (3.62)		
	40 mm					61 (2.4)		97 (3.82)		
15 in	20 mm	400 (15.75)	343.2 (13.51)	336 (13.23)	362 (14.25)	41 (1.6)	313.2 (12.33)	77 (3.03)	60 (2.36)	
	25 mm					51 (2)		87 (3.42)		
	32 mm					56 (2.2)		92 (3.62)		
	40 mm					61 (2.4)		97 (3.82)		
	50 mm					71 (2.8)		107 (4.21)		
18 in	25 mm	469 (18.46)	383.2 (15.09)	376 (14.80)	431 (16.97)	51 (2)	353.2 (13.91)	87 (3.42)	60 (2.36)	
	32 mm					56 (2.2)		92 (3.62)		
	40 mm					61 (2.4)		97 (3.82)		
	50 mm					71 (2.8)		107 (4.21)		
	24 in					51 (2)		87 (3.42)		
24 in	25 mm	555 (21.85)	458.2 (18.04)	451 (17.76)	517 (20.35)	51 (2)	428.2 (16.86)	87 (3.42)	120 (4.72)	
	32 mm					56 (2.2)		92 (3.62)		
	40 mm					61 (2.4)		97 (3.82)		
	50 mm					71 (2.8)		107 (4.21)		

* Stylus height, S, is adjustable by ±1.5 mm.

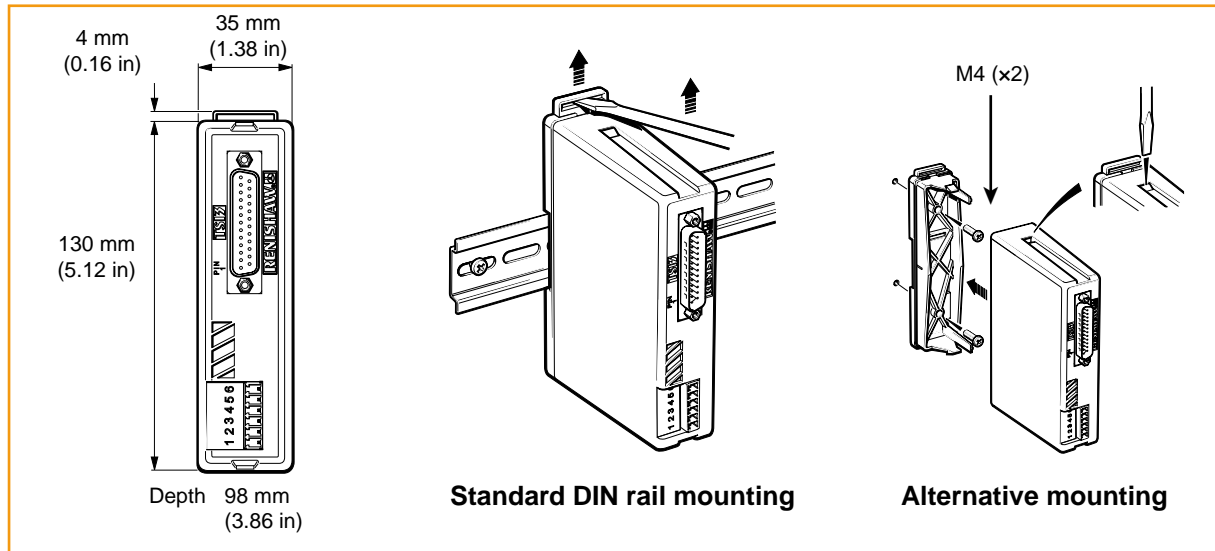
Machine X - Z axis application (standard)



Please contact the Styli and Custom Products Division for further information regarding machine Y axis applications.

Data sheet
 HPMa high precision motorised arm

TSI3 interface

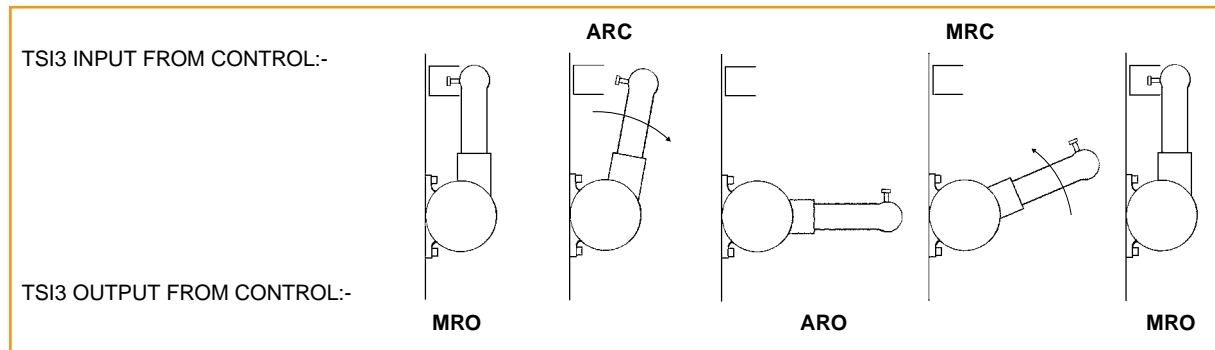


Arm control

Two separate machine tool control outputs are required to command the arm to move to “MACHINE READY POSITION” (MRC) and “ARM READY POSITION” (ARC). The user must ensure that both outputs are never active at the same time. There must be a minimum time delay of 0.1 seconds (100 ms) between one command being de-activated and the other being

activated. If both outputs are active at the same time then the arm is unable to determine what to do and will stop. This condition can only be overcome by de-activating both outputs.

Two machine tool control inputs are required to receive arm position confirmation signals for “MACHINE READY” (MRO) and “ARM READY” (ARO).



Probing

Four probe status outputs have been provided. Any one of these can be configured to provide an output signal to the machine controller. Where “four wire” inputs are required, all four outputs are utilised (i.e. Fanuc inputs +MIT1 (X+), -MIT1 (X-), +MIT2 (Z+), -MIT2 (Z-)). This requires four direction outputs from the machine tool.

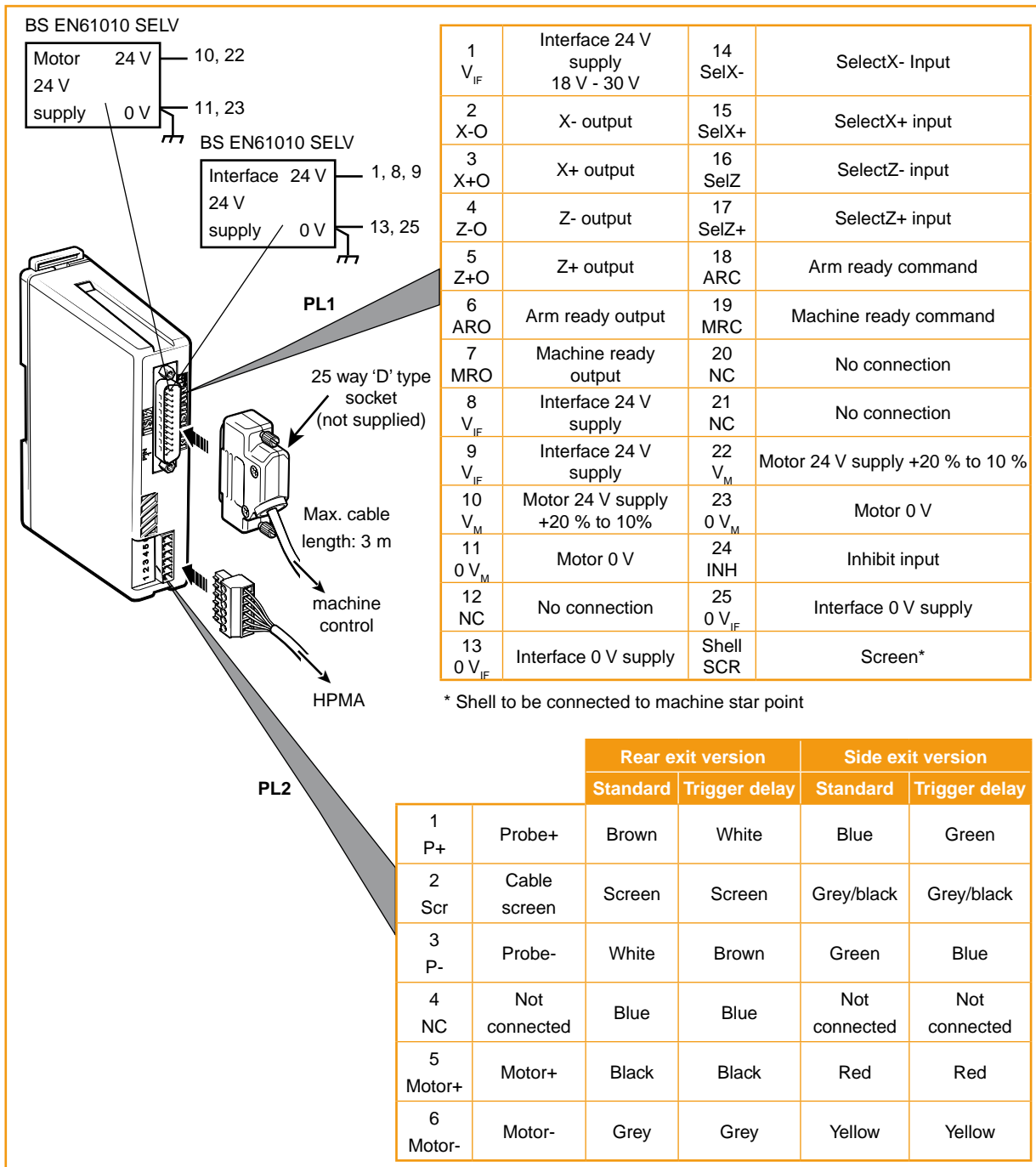
Inputs:- All internally pulled down (2K4) ACTIVE HIGH inputs

Probe signal outputs

- (PL1-2) X-O
 - (PL1-3) X+O
 - (PL1-4) Z-O
 - (PL1-5) Z+O
- Unipolar ACTIVE HIGH outputs $V_{IF} - 3.8 V @ \text{max. source } 120 \text{ mA (one probe signal only)}$
 $V_{IF} - 2.4 V @ 20 \text{ mA}$

Arm ready (ARO) / machine ready (MRO) outputs

- (PL1-6) ARO
 - (PL1-7) MRO
- Unipolar ACTIVE HIGH outputs $V_{IF} - 2.4 V @ \text{max. source } 20 \text{ mA}$



NOTE:

V_{IF} = 24 Vdc 18 to 30 V

This supply powers the system electronics which includes the probe circuit.

I_{MAX} = 100 mA (Not including output load currents)


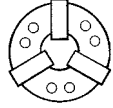
V_M = 24 Vdc + 20 % to 10 %

This supply powers the motor drive.

I_{MAX} = 2.5 A while motor is running (typical 2 seconds).

Circuit protection: Power supply protected against overcurrent and reverse connection.

HPMA kit selection list *

HPMA part number and critical dimension matrix															
															
		16 mm		20 mm		25 mm		32 mm		40 mm		50 mm		'A' mm (in)	'B' mm (in)
		RE	SE	RE	SE	RE	SE	RE	SE	RE	SE	RE	SE		
	6 in	0420	0604	0421	0605	0422	0606	0423	0607					250 (9.84)	219.2 (8.63)
	8 in	0424	0608	0425	0609	0426	0610	0427	0611					286 (11.26)	249.2 (9.81)
	10 in	0428	0612	0429	0613	0430	0614	0431	0615	0432	0616			335 (13.19)	298.2 (11.74)
	12 in	0433	0617	0434	0618	0435	0619	0436	0620	0437	0621	0438	0622	368 (14.49)	298.2 (11.74)
	15 in			0439	0623	0440	0624	0441	0625	0442	0626	0443	0627	400 (15.75)	343.2 (13.51)
	18 in					0444	0628	0445	0629	0446	0630	0447	0631	469 (18.46)	383.2 (15.69)
	24 in					0448	0632	0449	0633	0450	0634	0451	0635	555 (21.85)	458.2 (18.04)
'S' mm (in)		35.7 (1.4)		41 (1.6)		51 (2)		56 (2.2)		61 (2.4)		71 (2.8)			

HPMA kit part no. = A-2181-XXXX (XXXX from above)

*RE = rear exit SE = side exit

Parts list – please quote the part number when ordering equipment

Type	Part no.	Description
Stylus kit	A-2197-0157	Stylus kit for 16 mm tooling
Stylus kit	A-2197-0158	Stylus kit for 20 mm tooling
Stylus kit	A-2197-0159	Stylus kit for 25 mm tooling
Stylus kit	A-2197-0160	Stylus kit for 32 mm tooling
Stylus kit	A-2197-0161	Stylus kit for 40 mm tooling
Stylus kit	A-2197-0162	Stylus kit for 50 mm tooling
TSI3 interface	A-2181-0465	TSI3 tool setting arm interface
Fuse	P-FS02-1A25	250 mA quick-blow fuse for TSI2
RP3 probe kit	A-2197-0049	RP3 probe assembly and user's guide
RP3 OEM kit	A-2197-0007	RP3 probe assembly, user's guide and OEM PCB
RP3 front cover kit	A-2197-0006	Front cover, eyelid and eyelid spring
Stylus break stem	M-2197-0150	Stylus break stem for 25 mm - 50 mm tooling styli
Mirco break stem	M-2197-0156	Stylus break stem for 16 mm - 20 mm tooling styli
Probe enclosure	A-2275-0098	HPPA probe enclosure
Probe enclosure seal	M-2275-0076	HPPA probe enclosure seal
2 m cable	P-CA82-1010	2 m cable to connect HPMA to TSI3
5 m cable	P-CA82-1009	5 m cable to connect HPMA to TSI3
10 m cable	P-CA82-1011	10 m cable to connect HPMA to TSI3
Tool kit	A-2176-0636	Standard HP arm tool kit
Tool kit	A-2176-0639	Micro HP arm tool kit
Base fixing kit	A-2275-0113	HPPA/HPMA base fixing kit
Publications. These can be downloaded from our web site at www.renishaw.com		
RP3	H-2000-2014	Data sheet
RP3	H-2000-5187	User's guide
HPMA	H-2000-5141	Installation and user's guide
Machine tool styli	H-1000-3200	Brochure

For worldwide contact details, please visit our
main web site at www.renishaw.com/contact

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