

LINEAR POTENTIOMETERS

The Penny+Giles SLS and MLS range of linear potentiometers have been designed with motorsport applications in mind. They utilise established hybrid track technology to provide low electrical noise and high accuracy output over long operating life in the most extreme environments. With a sealing system tested to IP66 and a choice of mountings, these potentiometers have become the benchmark in suspension data acquisition systems for single seat, saloon car, motorcycle and truck racing.



Features

- Compact body to stroke length
- Sealing to IP66 and corrosion resistant rod-end bearings
- Integrally moulded rear cable assembly
 - Rotatable shaft
 - Reduced weight
 - Rapid despatch
 - CE approved

Benefits

- Reduced installation space
- Can be used in hostile environments
- Excellent cable strain relief with secure sealing
- Easy installation
- Ideal for motorsport applications
- Eliminates customer inventory
- Confidence in EMC performance

SLS095 LINEAR DISPLACEMENT SENSOR

SLS095 is designed to provide maximum performance benefits within an extremely compact body diameter of 9.5mm, with stroke lengths from 10 to 100mm. The miniature size of this sensor makes it ideal for applications in robotics, animatronics, medical equipment and motorsport data acquisition.

PERFORMANCE

Electrical stroke E	mm	10	20	30	40	50	75	100	
Resistance ±10%	kΩ	0.4†	0.8	1.2	1.6	2.0	3.0	4.0	†±15% for SLS 095/10
Independent linearity	±%	0.5	0.35	0.25	0.25	0.25	0.15	0.15	
Power dissipation at 20°C	W	0.2	0.4	0.6	0.8	1.0	1.5	2.0	
Applied voltage maximum	Vdc	8.9	17.9	26	40	44	67	74	
Resolution		Virtually infinite							
Hysteresis (repeatability)		Less than 0.01mm							
Operational temperature	°C	-30 to +100							
Output smoothness		To MIL-R-39023 grade C 0.1%							
Insulation resistance		Greater than 100MΩ at 500Vdc							
Operating mode		Voltage divider only - see Circuit Recommendation below							
Wiper circuit impedance		Minimum of 100 x track resistance or 0.5MΩ (whichever is greater)							
Operating force maximum									
sealed	gf	300 in horizontal plane							
unsealed	gf	100 in horizontal plane							
Life at 250mm per second		Typically greater than 100 million operations (50 x 10 ⁶ cycles) at 25mm stroke length							
Dither life		200 million operations (100 x 10 ⁶ cycles) at ±0.5mm, 60Hz							
Sealing		IP50 standard - IP66 see options							
Shaft seal life		20 million operations (10 x 10 ⁶ cycles)							
Shaft velocity maximum	m/s	2.5							
Vibration		RTCA 160D 10Hz to 2kHz (random) @ 4.12g (rms) - all axes							
Shock		40g 6ms half sine							

CIRCUIT RECOMMENDATION

Hybrid track potentiometers feature a high wiper contact resistance, therefore operational checks should be carried out only in the voltage divider mode. Hybrid track potentiometers should be used only as voltage dividers, with a minimum wiper circuit impedance of 100 x track resistance or 0.5MΩ (whichever is greater). Operation with wiper circuits of lower impedance will degrade the output smoothness and affect the linearity.

OPTIONS

IP 66 sealing

Designed to accept integral shaft seal to give IP66 rating

Mounting

Can be supplied with self aligning bearings or a plain body for use with body clamps or flange mounting kit.

ACCESSORIES

Mounting kits ———— Body clamp kit - SA200841
Flange kit - SA200842

AVAILABILITY

All configurations can be supplied within five days from the factory

ORDERING CODES

SLS095/...../...../...../.....

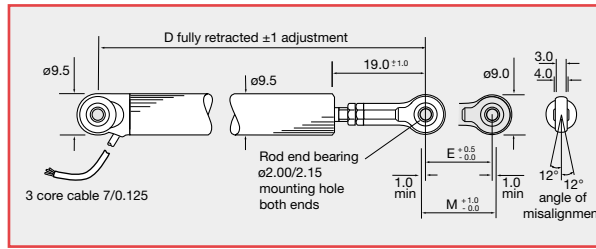
Electrical stroke ———— Sealing 50 = IP50, 66 = IP66

Resistance ———— Mounting option R = Self aligning bearing
P = Plain

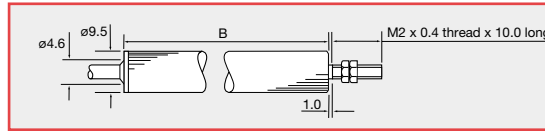
DIMENSIONS AND MOUNTING OPTIONS

Note: drawings not to scale

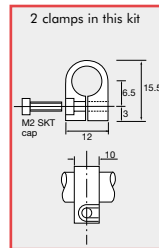
SELF ALIGNING BEARING MOUNTING



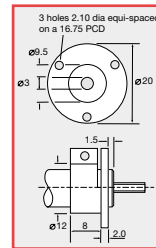
PLAIN BODY MOUNTING



MOUNTING OPTIONS



Body clamp
SA200841

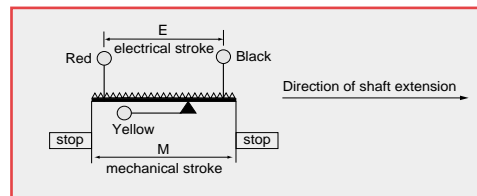


Flange mounting
SA200842

Electrical stroke E	mm	10	20	30	40	50	75	100
Mechanical stroke M	mm	12.5	22.5	32.5	42.5	52.5	77.5	102.5
Body length B	mm	45.5	55.5	65.5	75.5	85.5	110.5	135.5
Between centres D	mm	70	80	90	100	110	135	160
Weight approximate (mounting option R)	g	11	13	14.5	16	17.5	21.5	25.5

ELECTRICAL CONNECTIONS

3 core cable: PUR sheathed 0.3m long with PTFE insulated 7/0.125 cores.



SLS 130 LINEAR DISPLACEMENT SENSOR

The SLS130 range is designed to provide performance benefits within a compact, lightweight package in stroke lengths from 25 to 200mm. With a choice of mounting options and accessories, this sensor is ideally suited to a wide range of industrial applications, and is extensively used within the motorsport industry.

PERFORMANCE

		25	50	75	100	125	150	175	200
Electrical stroke E	mm	25	50	75	100	125	150	175	200
Resistance ±10%	kΩ	1	2	3	4	5	6	7	8
Independent linearity									
guaranteed	±%	0.25	0.25	0.15	0.15	0.15	0.15	0.15	0.15
typical	±%	0.15	0.15	0.15	0.10	0.10	0.07	0.07	0.07
Power dissipation at 20 °C	W	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
Applied voltage maximum	Vdc	22	44	67	74	74	74	74	74
Electrical output		Minimum of 0.5% to 99.5% applied volts							
Resolution		Virtually infinite							
Hysteresis (repeatability)		Less than 0.01mm							
Operational temperature	°C	-30 to +100 (tested to +130 for 12 hours duration)							
Output smoothness		To MIL-R-39023 grade C 0.1%							
Insulation resistance		Greater than 100MΩ at 500Vdc							
Operating mode		Voltage divider only - see Circuit Recommendation below							
Wiper circuit impedance		Minimum of 100 x track resistance or 0.5MΩ (whichever is greater)							
Operating force maximum									
sealed	gf	500 in horizontal plane							
unsealed	gf	250 in horizontal plane							
Life at 250mm per second		Typically greater than 100 million operations (50 x 10 ⁶ cycles) at 25mm stroke length							
Dither life		200 million operations (100 x 10 ⁶ cycles) at ±0.5mm, 60Hz							
Sealing		IP50 standard - IP66 see options							
Shaft seal life		20 million operations (10 x 10 ⁶ cycles) - replaceable							
Shaft velocity maximum	m/s	10							
Vibration		RTCA 160D 10Hz to 2kHz (random) @12.6g (rms) - all axes							
Shock		Less than 0.04% output change @2500g - all axes							

CIRCUIT RECOMMENDATION

Hybrid track potentiometers feature a high wiper contact resistance, therefore operational checks should be carried out only in the voltage divider mode. Hybrid track potentiometers should be used only as voltage dividers, with a minimum wiper circuit impedance of 100 x track resistance or 0.5MΩ (whichever is greater). Operation with wiper circuits of lower impedance will degrade the output smoothness and affect the linearity.

OPTIONS

Compact shaft	Compact shaft will reduce dimension D by 25mm
Integral shaft seal - IP 66	Designed to accept integral shaft seal to give IP66 rating
Extended cable length	10m output cable can be specified
Mounting	Body clamp, flange or quick release balljoint mounting kits can be supplied
Protective sleeve	For all stroke lengths - self aligning bearings only. See ordering code

ACCESSORIES

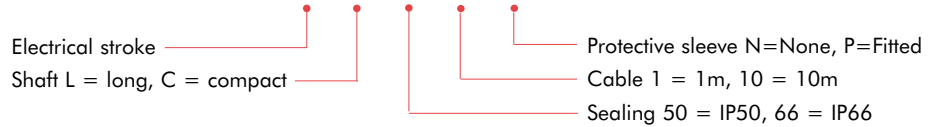
Mounting kits	<ul style="list-style-type: none"> — Body clamp kit - SA200264, Flange kit - SA200266 — Quick release balljoint (Heim) - SA200337
Protective sleeve - SA202984/...../.....	<ul style="list-style-type: none"> — Shaft L=Long, C=Compact — Electrical stroke (select to match SLS130 sensor)

AVAILABILITY

All options can be supplied within five days from the factory.

ORDERING CODES

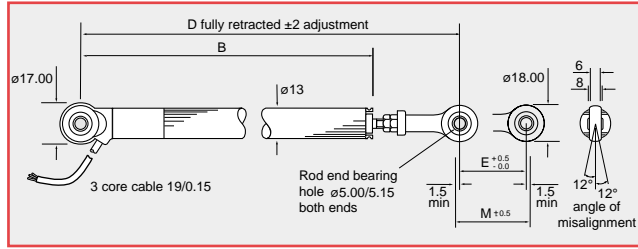
SLS130/...../...../...../...../.....



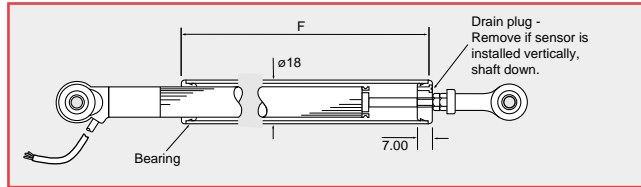
DIMENSIONS AND MOUNTING OPTIONS

Note: drawings not to scale

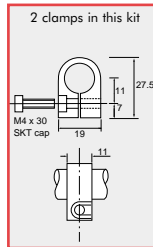
SELF ALIGNING BEARING MOUNTING



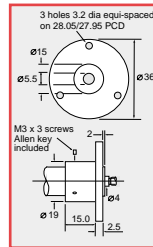
PROTECTIVE SLEEVE OPTION - P



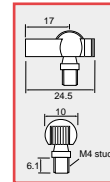
MOUNTING OPTIONS



Body clamp
SA200264



Flange mounting
SA200266

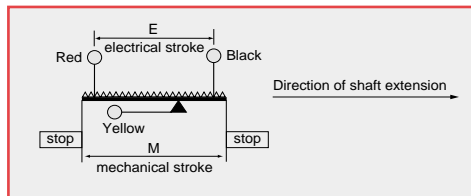


Quick release ball joint
SA200337

Electrical stroke E	mm	25	50	75	100	125	150	175	200
Mechanical stroke M	mm	29	54	79	104	129	154	179	204
Body length B	mm	110.5	135.5	160.5	185.5	210.5	235.5	260.5	285.5
Between centres D									
standard sensor (L)	mm	173.6	198.6	223.6	248.6	273.6	298.6	323.6	348.6
compact shaft sensor (C)	mm	148.6	173.6	198.6	223.6	248.6	273.6	298.6	323.6
Sleeve length F									
standard sensor (L)	mm	102	127	152	177	202	227	252	277
compact shaft sensor (C)	mm	77	102	127	152	177	202	227	252
Weight approximate									
standard sensor (L)	g	64	71	78	85	92	99	106	113
compact shaft sensor (C)	g	60	67	74	81	88	95	102	109

ELECTRICAL CONNECTIONS

3 core cable: PUR sheathed 1m long with ETFE insulated 19/0.15 cores.



MLS 130 LINEAR DISPLACEMENT SENSOR

The MLS130 sealed linear sensor is designed to provide superior performance within a compact, lightweight package in stroke lengths from 25 to 200mm. With a choice of mounting options, including metal rod end bearings, and an optional protective sleeve for extreme environmental conditions, this sensor is ideally suited to motorsport data acquisition applications on suspension and throttle position feedback, where high performance and reliability with competitive pricing and rapid despatch are vital. The sensor is supplied fully sealed to IP66, with an integrally moulded DR25 sheathed multicore cable.

PERFORMANCE

		25	50	75	100	125	150	175	200
Electrical stroke E	mm	25	50	75	100	125	150	175	200
Resistance ±10%	kΩ	1	2	3	4	5	6	7	8
Independent linearity									
guaranteed	±%	0.25	0.25	0.15	0.15	0.15	0.15	0.15	0.15
typical	±%	0.15	0.15	0.15	0.10	0.10	0.07	0.07	0.07
Power dissipation at 20°C	W	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
Applied voltage maximum	Vdc	22	44	67	74	74	74	74	74
Electrical output		Minimum of 0.5% to 99.5% applied volts							
Resolution		Virtually infinite							
Hysteresis (repeatability)		Less than 0.01mm							
Operational temperature	°C	-30 to +100 (tested to +130 for 12 hours duration)							
Output smoothness		To MIL-R-39023 grade C 0.1%							
Insulation resistance		Greater than 100MΩ at 500Vdc							
Operating mode		Voltage divider only - see Circuit Recommendation below							
Wiper circuit impedance		Minimum of 100 x track resistance or 0.5MΩ (whichever is greater)							
Operating force maximum	gf	500 in horizontal plane							
Sealing		IP66							
Shaft seal life (replaceable)		20 million operations (10 x 10 ⁶ cycles)							
Sensor track life at 0.25m/s		Greater than 100 million operations (50 x 10 ⁶ cycles) at 25mm stroke length							
Sensor track dither life		200 million operations (100 x 10 ⁶ cycles) at ±0.5mm, 60Hz							
Shaft velocity maximum	m/s	10							
Vibration		RTCA 160D 10Hz to 2kHz (random) @ 12.6g (rms) - all axes							
Shock		Less than 0.04% output change @ 2500g - all axes							

CIRCUIT RECOMMENDATION

Hybrid track potentiometers feature a high wiper contact resistance, therefore operational checks should be carried out only in the voltage divider mode. Hybrid track potentiometers should be used only as voltage dividers, with a minimum wiper circuit impedance of 100 x track resistance or 0.5MΩ (whichever is greater). Operation with wiper circuits of lower impedance will degrade the output smoothness and affect the linearity.

OPTIONS

Mounting

Metal rod end bearings, quick release balljoints or plain M4 stud

Protective sleeve

Available for all stroke lengths

ACCESSORIES

For maximum installation flexibility the following parts are available to purchase separately:

Metal rod end (rear)	P202605
Metal rod end (shaft)	P202604
Quick release balljoint assembly	SA200337
Locknut, M4	X63 - 072 - 340
Protective sleeve assembly	SA202984/stroke/C

A suitable stud lock compound should be used to secure the rear rod end or balljoint assembly. Use Loctite™ activator 7471 and Loctite™ 648 on metal rod end. Use Loctite™ 382 on quick release balljoint.

AVAILABILITY

All configurations can be supplied within five days from the factory.

ORDERING CODES

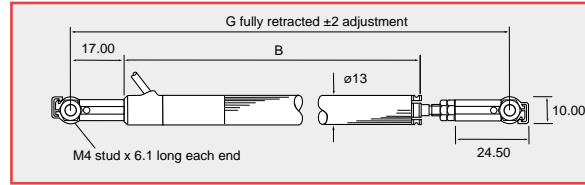
MLS130/...../...../.....

Electrical stroke _____ Protective sleeve N=None, P=Fitted
 Mounting _____
 Q=Quick release balljoints, R=Metal rod end bearings, S=M4 studs

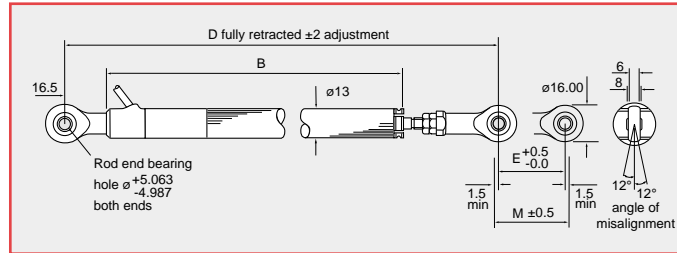
DIMENSIONS AND MOUNTING OPTIONS

Note: drawings not to scale

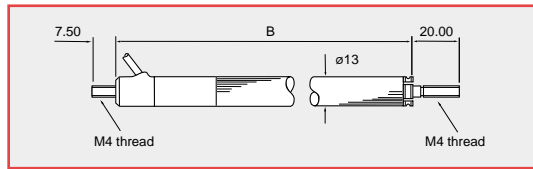
QUICK RELEASE BALLJOINTS (Q)



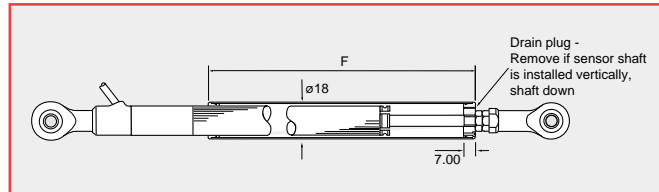
METAL ROD END BEARINGS (R)



M4 STUD END (S)



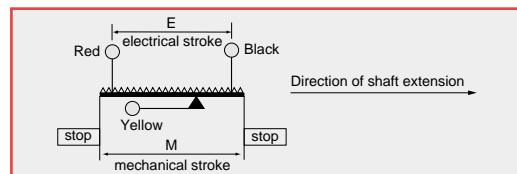
PROTECTIVE SLEEVE (P)



Electrical stroke E	mm	25	50	75	100	125	150	175	200
Mechanical stroke M	mm	29	54	79	104	129	154	179	204
Body length B	mm	110.8	135.8	160.8	185.8	210.8	235.8	260.8	285.8
Between centres D	mm	164.5	189.5	214.5	239.5	264.5	289.5	314.5	339.5
Between centres G	mm	153.6	178.6	203.6	228.6	253.6	278.6	303.6	328.6
Sleeve length F	mm	77	102	127	152	177	202	227	252
Weight approximate	g	80	87	94	101	108	115	122	129

ELECTRICAL CONNECTIONS

3 core cable: DR25 sheathed 1m long with ETFT insulated 19/0.15 cores.



SLS190 LINEAR DISPLACEMENT SENSOR

The SLS190 range is designed to provide maximum performance benefits within a compact package in stroke lengths from 25 to 350mm. With a choice of mounting options and accessories, this sensor is ideally suited to motorsport data acquisition applications.

PERFORMANCE

		25	50	75	100	125	150	175	200	225	250	275	300	325	350
Electrical stroke E	mm	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Resistance $\pm 10\%$	k Ω	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Independent linearity															
guaranteed	$\pm\%$	0.25	0.25	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
typical	$\pm\%$	0.15	0.15	0.15	0.10	0.10	0.07	0.07	0.07	0.07	0.05	0.05	0.05	0.05	0.05
Power dissipation at 20°C	W	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
Applied voltage maximum	Vdc	22	44	67	74	74	74	74	74	74	74	74	74	74	74
Electrical output		Minimum of 0.5% to 99.5% applied volts													
Resolution		Virtually infinite													
Hysteresis (repeatability)		Less than 0.01mm													
Operational temperature	°C	-30 to +100 (tested to +130 for 12 hours duration)													
Output smoothness		To MIL-R-39023 grade C 0.1%													
Insulation resistance		Greater than 100M Ω at 500Vdc													
Operating mode		Voltage divider only - see Circuit Recommendation below													
Wiper circuit impedance		Minimum of 100 x track resistance or 0.5M Ω (whichever is greater)													
Operating force maximum															
sealed	gf	500 in horizontal plane													
unsealed	gf	250 in horizontal plane													
Life at 250mm per second		Typically greater than 100 million operations (50 x 10 ⁶ cycles) at 25mm stroke length													
Dither life		200 million operations (100 x 10 ⁶ cycles) at ± 0.5 mm, 60Hz													
Sealing		IP50 standard - IP66 see options													
Shaft seal life		20 million operations (10 x 10 ⁶ cycles) - replaceable													
Shaft velocity maximum	m/s	10													
Vibration		RTCA 160D 10Hz to 2kHz (random) @ 12.6g (rms) - all axes													
Shock		Less than 0.04% output change @ 2500g - all axes													

CIRCUIT RECOMMENDATION

Hybrid track potentiometers feature a high wiper contact resistance, therefore operational checks should be carried out only in the voltage divider mode. Hybrid track potentiometers should be used only as voltage dividers, with a minimum wiper circuit impedance of 100 x track resistance or 0.5M Ω (whichever is greater). Operation with wiper circuits of lower impedance will degrade the output smoothness and affect the linearity.

OPTIONS

Compact shaft	Compact shaft will reduce dimension D by 25mm
Integral shaft seal - IP 66	Designed to accept integral shaft seal to give IP66 rating
Extended cable length	10m output cable can be specified
Mounting	Body clamp or flange mounting kits can be supplied
Protective sleeve	For all stroke lengths - self aligning bearings only. See ordering code

ACCESSORIES

Mounting kits ———— Body clamp kit - SA59019
Flange kit - SA59020

Protective sleeve - SA202986/...../.....

Shaft L = long, C = compact
Electrical stroke (select to match SLS190 sensor)

AVAILABILITY

All options can be supplied within five days from the factory.

ORDERING CODES

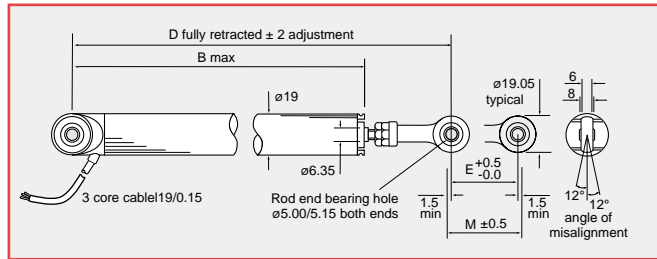
SLS190/...../...../...../...../.....

Electrical stroke _____ Protective sleeve N=None, P=Fitted
 Shaft L = long, C = compact _____ Cable 1 = 1m, 10 = 10m
 Sealing 50 = IP50, 66 = IP66

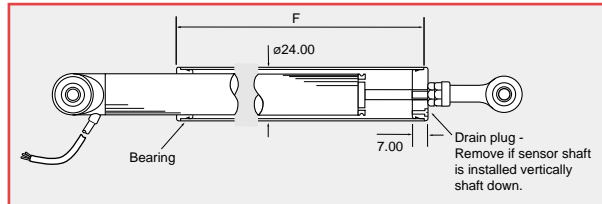
DIMENSIONS AND MOUNTING OPTIONS

Note: drawings not to scale

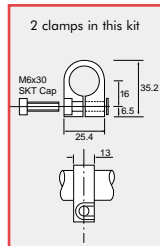
SELF ALIGNING BEARING MOUNTING



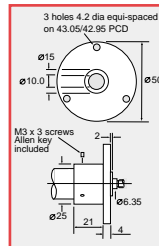
PROTECTIVE SLEEVE OPTION - P



MOUNTING OPTIONS



Body clamp
SA59019

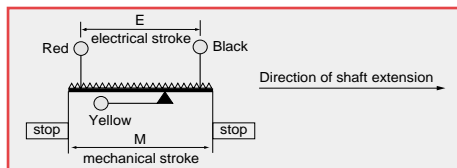


Flange mounting
SA59020

Electrical stroke E	mm	25	50	75	100	125	150	175	200	225	250	275	300	325	350
Mechanical stroke M	mm	29	54	79	104	129	154	179	204	229	254	279	304	329	354
Body length B	mm	110.5	135.5	160.5	210.5	235.5	260.5	285.5	310.5	333.5	360.5	385.5	435.5	460.5	485.5
Between centres D															
standard sensor (L)	mm	173.6	198.6	223.6	273.6	298.6	323.6	348.6	373.6	398.6	423.6	448.6	498.6	523.6	548.6
compact shaft sensor (C)	mm	148.6	173.6	198.6	248.6	273.6	298.6	323.6	348.6	373.6	398.6	423.6	473.6	498.6	523.6
Sleeve length F															
standard sensor (L)	mm	100	125	150	200	225	250	275	300	325	350	375	425	450	475
compact shaft sensor (C)	mm	75	100	125	175	200	225	250	275	300	325	350	400	425	450
Weight approximate															
standard sensor (L)	g	109	126	144	161	179	196	214	231	249	266	284	301	319	336
compact shaft sensor (C)	g	103	120	138	155	173	190	208	225	246	260	278	295	316	330

ELECTRICAL CONNECTIONS

3 core cable: PUR sheathed 1m long with ETFE insulated 19/0.15 cores.



Penny+Giles - one of the world's major suppliers of measurement and control sensors



throttle pedal position

gear select position indication



hydraulic reservoir level

front and rear suspension movement



throttle actuator position

steering angle position



gearbox actuator position

clutch pedal position



clutch actuator position

brake balance measurement

brake pad/disc wear indication

Penny+Giles

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Penny & Giles

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