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### Measuring Spark Plug M14x1,25

Type 6118B...

## with Integral 3 mm Cylinder Pressure Sensor and Replaceable Cable

Measuring spark plug Type 6118B... allows cylinder pressure measurement without the effort of providing a separate measuring bore. It incorporates the world's smallest piezoelectric high-temperature cylinder pressure sensor.

This sensor is mounted flush with the wall of the combustion chamber to keep its natural frequency at about 65 kHz. It is therefore also suitable for readings at high engine speeds and for knock control.

- Replaceable sensor cable and ceramic insulator
- Measurement without combustion analysis bore
- Highest natural frequency for high speeds
- Front of sensor flush with wall of combustion chamber for good accuracy
- Suitable for knock control
- Different heat values and spark positions possible

#### Description

Space to incorporate the sensor has been created by positioning the ceramic insulator slightly (0,6 mm) eccentrically. The sensor can be replaced if repair is necessary.

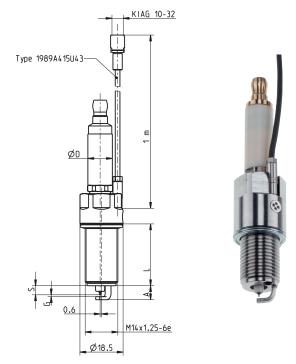
It is inserted from the underside of the plug and secured with a perforated screw, which also provides flame protection.

The 1 m long Viton® cable of the sensor uses a screw connection for easy user replacement.

Measuring spark plug Type 6118B... is also available with PiezoSmart<sup>®</sup>. PiezoSmart<sup>®</sup> is an active system for automatic identification of individual pressure sensors. It allows automated configuration of measuring chains ("plug and measure") (see PiezoSmart brochure, Doc. No. 100-421 for more information). The ceramic insulator is mounted in position for ease of replacement in the event of damage. If the insulator breaks, it can be replaced with repair kit Type 6998B... . This contains a ceramic insulator, two seals and a screw. The ordering key for the repair kit matching the measuring spark plug has the same ending as the plug. For example, Type 6998BFD16 is the repair kit matching spark plug Type 6118BFD16.

#### Technical Data

Pressure range	bar	0 200
Calibrated partial range at 200 °C	bar	0 50
		0 100
		0 150
Overload capacity	bar	250



Sensitivity at 200 °C	pC/bar	≈–10
Natural frequency (acoustic)		
spark plug with integral sensor	kHz	≈65
Linearity at RT	% FSO	≤±0,5
Acceleration sensitivity		
axial and radial	bar/g	<0,005
Operating temperature range, sensor	°C	-20 350
Operating temperature range, cable	°C	-20 200
Sensitivity drift over range: 200 ±50 °C	%	<±1
Thermal shock		
at 1 500 min <sup>-1</sup> , 9 bar p <sub>mi</sub>		
$\Delta$ p (short-term drift)	bar	<±0,6
$\Delta p_{mi}$	%	<±3
$\Delta p_{max}$	%	<±1,5
Insulation resistance, sensor		
at 20 °C	Ω	>10 <sup>13</sup>
at 200 °C	Ω	>10 <sup>11</sup>
Insulation resistance of plug at		
room temperature		
between central electrode and		
plug body at 1 000 V	ΜΩ	>100
Final electronic test of plug		
spark discharge at		7 bar/20 kV

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Type 6118B...

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#### Technical Data (cont.)

Dielectric strength	kV	<35
Torque wrench setting for plug	N⋅m	From table
		on page 2
Capacitance of sensor		
with 1 m cable	pF	110
Weight	g	50

#### Application

Cylinder pressure measurement with a spark plug is used where a separate measuring bore needs be avoided to minimize the cost of the sensor system. Flush mounting of the front of the sensor gives a high-quality signal free from pipe oscillation interference. A typical example is ECU engine mapping in standard or racing engines.

#### Mounting

The measuring spark plug is screwed into the spark plug bore with a mounting wrench Type 1300A4.

A bore 21 mm in diameter is necessary.

The diameter of the ceramic insulator is matched up by drawing an insulating sheath onto it. The reduction of the air gap between ceramic insulator and spark plug connector allows the

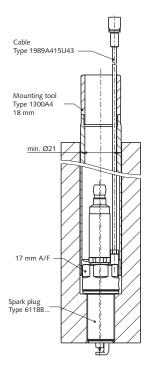


Fig. 1: Mounting measuring spark plug

voltage to be supplied without interference for perfect ignition. To reduce electrical interference, the cable from the sensor to the charge amplifier should be kept as short as possible.

The insulating sheath 3.221.5... allows matching to the standard diameter of the ceramic insulator of 10,5 mm and mounting with the standard spark plug connector, or with an ignition rail.

**Note:** Use grease Type 1067 to connect the standard spark plug connector or mount the ignition rail. This ensures good insulation and makes removal more straightforward.

#### Heat value

The heat value is a measure of the thermal loading capacity of the spark plug.

Kistler measuring spark plugs are classified on the BERU/BOSCH scale:

NEW	10	9	8	7	6	5	4	3	09	80	07	
	Hot				Me	dium				Colc	ł	

Since each manufacturer uses its own numbering system, cross comparison is only possible using a commercial reference book. See Kistler's engine brochure Doc. No. 100-460 for an overview.

Wherever possible, the original heat value should be used. A plug can always be replaced with a colder, but never with a hotter plug. For example, a plug with a heat value of 6 can be replaced with one with a heat value of 5, but not the other way round.

#### Torque in N·m

Thread	Cylinder head material				
	Cast iron	Light alloy			
Flat seal					
	20 35	15 30			
M14x1,25	20 35	15 50			
Conical seal					
M14x1,25	15 25	12 20			

Table 1: Mounting torque

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Fig. 2:

Fig. 3:

Available types

#### Available Versions of the M14x1,25 Measuring Spark Plug Type 6118B...

Туре		BCD25	BCD27	BCD27Q01	BF107Q01	BFD16	BFD16Q01	BFD18	BFD18Q01	BFD35	BFD35Q03
Thread length L	mm	25	25	17,5	21,5	19	19	19	9,5	26,5	19
Seal		conical	conical	conical	flat	flat	flat	flat	flat	flat	flat
Heat value		5	7	7	07	6	6	8	8	5	5
Spark position S	mm	4,2	4,2	4,2	0,3	3,55	5,3	2,8	2,8	3,9	3,9
Max. depth A	mm	6,3	6,3	6,3	0,3	5,65	7,7	4,8	4,8	6	6
Plug gap G	mm	0,8	0,8	0,8	1,2	0,8	1,1	0,7	0,7	0,8	0,8
Dia. of ceramic											
insulator D	mm	10,5 <sup>4)</sup> (7,7)	10,5 <sup>2)</sup> (7,7)	10,5 <sup>2)</sup> (7,7)	10,5 <sup>1)</sup> (7,7)	10,5 <sup>5)</sup> (7,7)	10,5 <sup>5)</sup> (7,7)	10,5 <sup>2)</sup> (7,7)	10,5 <sup>2)</sup> (7,7)	10,5 <sup>4)</sup> (7,7)	10,5 4) (7,7)
Wrench size SW	17	17	17	17	17	17	17	17	17	17	17

1) With insulating sheath	Ø10,5	L = 14 mm	3.221.512
<sup>2)</sup> With insulating sheath	Ø10,5	L = 16 mm	3.221.522
3) With insulating sheath	Ø10,5	L = 20  mm	3.221.518
4) With insulating sheath	Ø10,5	L = 22  mm	3.221.513
<sup>5)</sup> With insulating sheath	Ø10,5	L = 24  mm	3.221.509

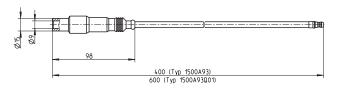


Fig. 4: Spark plug extension cable Types 1500A93 (L = 400 mm) and 1500A93Q01 (L = 600 mm)

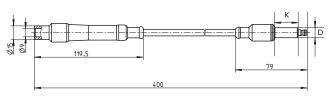


Fig. 5: Spark plug extension cable Type 1500A97 (L = 400 mm)

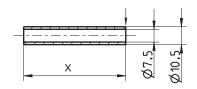


Fig. 6: Insulating sheath, see spare parts for lengths

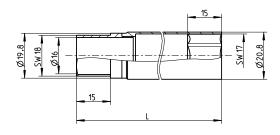


Fig. 7: Mounting wrench Type 1300A4... (see accessories)

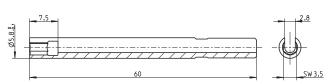
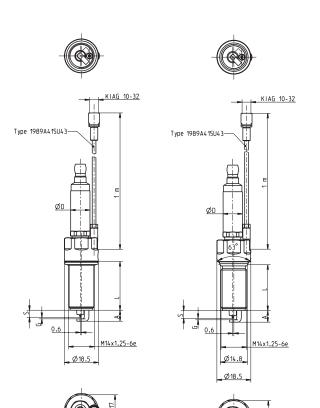


Fig. 8: Wrench for connecting cable Type 1300A125

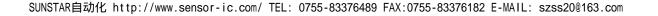
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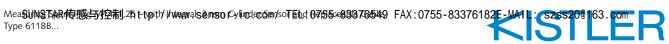


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Torque wrench Type 1300A11 with fork insert Type 1300A15



**Spare Parts** 



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<ul> <li>Included Accessories</li> <li>Coupling, 10-32 neg. – BNC pos. (for non PiezoSmart® version)</li> <li>Grease for connecting high-insulation extension connector, 5 ml</li> </ul>	<b>Type/Art. No.</b> 1721 1067	Ordering Key  Type from picture 2, available versions, page 3	Туре 6118	
Optional Accessories	Type/Art. No. 1704A4			
<ul> <li>Adapter Triax – BNC pos.</li> <li>PiezoSmart® extension cable</li> </ul>	1987B	Without PiezoSmart	A41	
<ul> <li>Wrench for mounting plug (17 mm)</li> </ul>		With PiezoSmart 7)	S41	
L = 300 mm L = 100 mm L = 100 400 mm  • Wrench for connecting cable • Torque wrench for plug	1300A4 1300A4Q01 1300Asp100-400 1300A125 1300A11	<sup>7)</sup> Detailed information about Pie be found in the PiezoSmart bro		
• Fork insert, 18 mm, for		Ordering Example		Туре
<ul> <li>torque wrench Type 1300A11</li> <li>Grease for connecting high-insulation extension connector, 5 ml</li> <li>Extension cable for measuring</li> </ul>	1300A15 1067	M14x1,25x19 measuring spa with heat value of 6, see tabl details of spark position		6118BFD16A41
spark plug Type 6115B $L = 400 \text{ mm}$ L = 600  mm L = 400  mm	1500A93 1500A93Q01 1500A97	M14x1,25x19 measuring spa with heat value of 6 and Piez identification		6118BFD16S41
<ul> <li>Adapter for pressure generator Type 6904 flat seal</li> <li>Adapter for pressure generator Type 6904 conical seal</li> </ul>	6587A 6588A	Repair kit for measuring spa Type 6118BFD16	ark plug	6998BFD16

<ul> <li>Viton<sup>®</sup> cable, M3</li> </ul>	1989A415U43	
• Spare PiezoSmart® + d	ıta cable	1985A8S411U43
High-insulation extension	on connector	1700B15
• Coupling, 10-32 neg	1721	
<ul> <li>Repair kit <sup>6)</sup></li> </ul>		6998B
• Insulating sheath Ø10	,5 l = 14 mm	3.221.512
• Insulating sheath Ø10	,5 l = 16 mm	3.221.522
• Insulating sheath Ø10	,5 l = 18 mm	3.221.515

• Insulating sheath Ø10,5 l = 20 mm

• Insulating sheath Ø10,5 l = 24 mm

Type/Art. No.

3.221.518

3.221.509

• Insulating sheath  $\varnothing 10,5$  l = 22 mm 3.221.513

The end of the ordering key for the repair kit is the same as that of the measuring spark plug it matches.

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Miscellaneous:

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Questions Involved i	n Choosing a Measuring Spark Plug		
Vehicle:		Make and model:	
Type of engine:		Type of measuring spark plug:	
Original Spark Plug			
Manufacturer:		Туре:	
Thread M:	M x , mm		
Thread length L:	, mm	S	
Heat value:	OriginalBOSCH/BERU		
Spark position S:	, mm	Σ	### ##################################
Max. depth A:	,mm	A	
Plug gap G:	,mm		
Diameter of ceramic insulator D:	,mm	Fig. 9: Dimensions of spark plug Type 6118B	
Insulator length K:	,mm		

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