

# Measuring Spark Plug M10x1

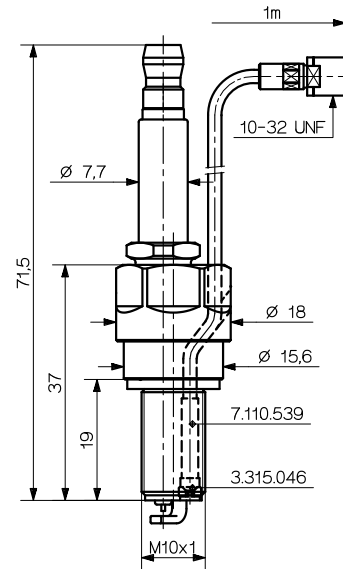
Type 6113A...

## with Integrated Cylinder Pressure Sensor

The measuring spark plug Type 6113A... allows cylinder pressure measurements to be made without the need for a separate measuring bore. The measuring spark plug M10x1 incorporates a miniature piezoelectric pressure sensor.

The sensor is flush-mounted in the combustion chamber; thus, its natural frequency is higher than 100 kHz. The Type 6113A... is therefore also suitable for providing readings at high engine speeds and for knock investigations.

- Exchangeable ignition ceramics
- Measurement without indicator bore in M10 sparkplug hole
- Highest natural frequency for high speeds
- Sensor front flush
- Various heat values and spark positions possible
- Suitable for knock investigations



### Description

The space for incorporation of the sensor has been achieved by an eccentric electrode position of 1,6 mm. As a result of miniaturization, the sensor and cable form a single unit, which can only be dismantled by disconnecting the cable connector. The sensor is inserted from the underside of the plug and secured with a perforated screw, which also provides flame protection.

The ceramic part is screwed in position, allowing it to be easily exchanged in the event of damage.

### Application

Cylinder pressure measurement with a measuring spark plug is used in those cases when a separate measuring bore is to be omitted, in order to keep the expenditure for sensor technology to a minimum. Front-flush sensor mounting achieves high signal quality without disturbing singing oscillations.

A typical application is adjustment of the knock limit for the electronic engine circuitry in production and racing engines.

### Technical Data

Pressure range	bar	0 ... 200
Calibrated partial range at 200 °C	bar	0 ... 50/... 100/ ... 150
Overload	bar	250
Sensitivity at 200 °C	pC/bar	≈-9,5
Natural frequency		
Spark plug with integrated sensor	kHz	>100
Linearity	% FSO	≤0,5
Acceleration sensitivity		
axial and radial	bar/g	<0,005
Operating temperature range, sensor	°C	-20 ... 250
Operating temperature range, cable	°C	-20 ... 200
Sensitivity change 200 ±50 °C	%	<±1
Thermal shock		
at 1 500 min <sup>-1</sup> , 9 bar pmi		
Δp (short time drift)	bar	<±0,8
Δp <sub>mi</sub>	%	<±4
Δp <sub>max</sub>	%	<2
Insulation resistance, sensor		
at 20 °C	Ω	>10 <sup>13</sup>
at 200 °C	Ω	>10 <sup>11</sup>

Insulation resistance, plug at Ambient temperature between center electrode and plug body at 1 000 V	MΩ	>100
Final electronic check of the plug spark discharge at		7 bar/20 kV
Dielectric strength	kV	<30
Tightening torque of the plug	N·m	10
Capacitance of the sensor with 1 m cable	pF	110
Weight	g	50

### Mounting

The measuring spark plug is screwed into the spark plug hole with mounting key Type 1300A19. A spark plug hole of 20 mm diameter is necessary. The spark plug extension connector Type 1700B15 can be fitted onto the spark plug to protect the spark plug insulator. To prevent electrical interference, the cable should wherever possible be connected directly to the charge amplifier using the coupling Type 1721 (i.e. without an extension cable).

**Note:** Use lubricating grease Type 1067 when fitting the insulating extension connector. This will ensure good insulation and facilitate later removal.

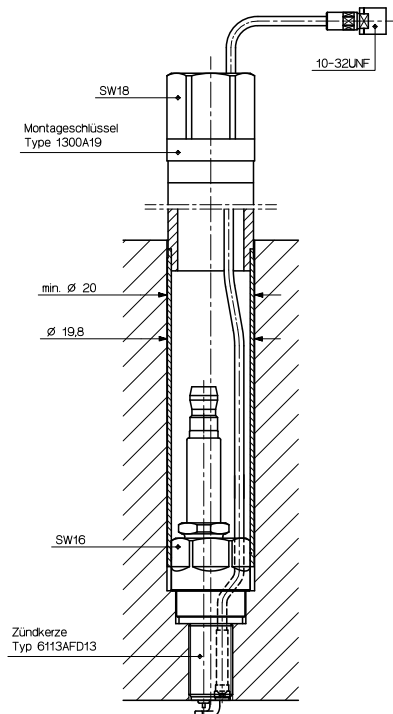


Fig. 1: Mounting of the measuring spark plug

### Heat Value (WW)

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

Kistler measuring spark plugs are classified according to the BERU/BOSCH heat value:

NEW	10	9	8	7	6	5	4	3	09	08	07
	Hot		↔		Medium		↔		Cold		

Since each manufacturer uses his own numbering system, cross-checking is possible only by means of a standard commercial reference book.

Wherever possible, the original heat value should be used.

A plug **can always be exchanged** for a colder plug, but never for a hotter plug. For example, a plug with the heat value 6 can be exchanged for a plug with the heat value 5, but not the other way round.

### Accessories Included

- Coupling KIAG 10–32 neg. - BNC pos. Type 1721
- Insulating extension connector Type 1700B15

### Optional Accessories

- Mounting key for plug (SW16) Type 1300A19
- Torque wrench for plug Type 1300A11
- Fork wrench insert SW 18 for torque wrench Type 1300A11 Type 1300A15
- Lubricating grease for spark plug extension connector (high insulation) 5 ml. Type 1067
- Spark plug extension connector Type 1700B15
- Extension cable for measuring spark plug Type 6115A... length 400 mm Type 1500A93
- Adapter for pressure generator Type 6904 Type 6593
- Repair kit\* for measuring spark plug Type 6113A... Type 6993A...

\* The end of the ordering key for the repair kit is the same as that of the particular measuring spark plug for which it is intended

Type		AF307	AF307Q03
Thread length L	mm	26,5	19
Seal	-	flat	flat
Heat value	-	07	07
Spark position A	mm	2	2
Plug gap G	mm	0,6	0,6

Type		AFD13	AFD13Q02	AFD13Q03
Thread length L	mm	19	12,7	10
Seal	-	flat	flat	flat
Heat value	-	3	3	3
Spark position A	mm	3,6	3,6	3,6
Plug gap G	mm	0,8	0,8	0,8

Type		AFD43
Thread length L	mm	22
Seal	-	flat
Heat value	-	3
Spark position A	mm	3,9
Plug gap G	mm	0,7

Type		AFD14
Thread length L	mm	19
Seal	-	flat
Heat value	-	4
Spark position A	mm	5,0
Plug gap G	mm	0,8

### Ordering Key

Type 6113A		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Seal</b>						
Flat	F	↑	↑	↑	↑	↑
<b>Electrode</b>						
Front	D					
Surface-gap	G					
<b>Thread length</b>						
Seal, flat L = 19 mm	1					
L = 12,7 mm	2					
L = 26,5 mm	3					
<b>Heat value</b>						
Cold	07					
...	3					
...	5					
Medium	6					
...	7					
Hot	9					
Exclusiv PiezoSmart®	-					
Inclusiv PiezoSmart®	S					

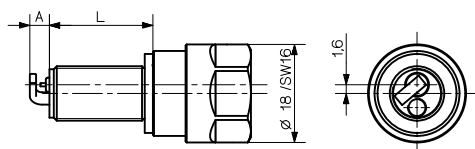


Fig. 7: Spark plug dimensions

Details to PiezoSmart® sensor identification you will find in the PiezoSmart brochure doc.-no. 100-421.

**Spare Parts**

- Insulating extension connector
- Coupling KIAG 10–32 neg. - BNC pos.
- Insulating sleeve

**Type/Art. No.**

1700B15  
1721  
3.221.384

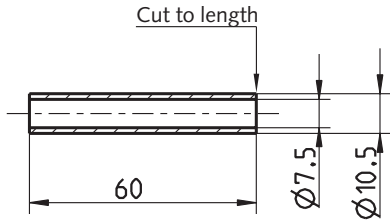


Fig. 2: Insulating sleeve art. no 3.221.384

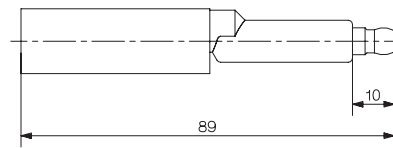


Fig. 5: Insulating extension connector Typ1700B15



Fig. 3: Torque wrench Type 1300A15 with insert Type 1300A11

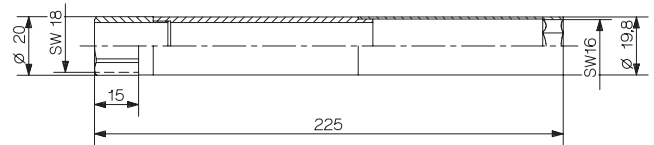


Fig. 6: Mounting key Type 1300A19

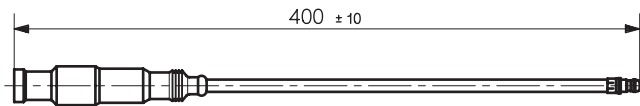


Fig. 4: Extension cable Type 1500A93

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**Questions Involved in Choosing a Measuring Spark Plug**

Vehicle: \_\_\_\_\_

Make and model: \_\_\_\_\_

Type of engine: \_\_\_\_\_

Type of measuring spark plug: \_\_\_\_\_

**Original Spark Plug**

Manufacturer: \_\_\_\_\_

Type: \_\_\_\_\_

Thread: M \_\_\_ x \_\_\_ , \_\_\_ mm

Thread length L: \_\_\_ , \_\_\_ mm

Heat value: \_\_\_\_\_ Original \_\_\_ BOSCH/BERU

Spark position A \_\_\_ , \_\_\_ mm

Plug gap G \_\_\_ , \_\_\_ mm

Miscellaneous: \_\_\_\_\_

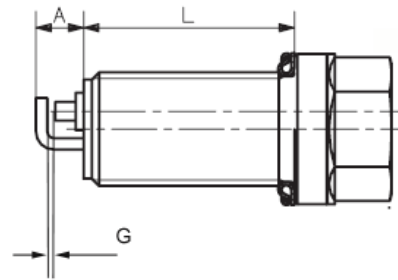


Fig. 8: Required dimensions, Type 6113A...

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