

Measuring Spark Plug M12x1,25

Type 6115B...

with Integral 3 mm Cylinder Pressure Sensor and Replaceable Cable

Measuring spark plug Type 6115B... 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

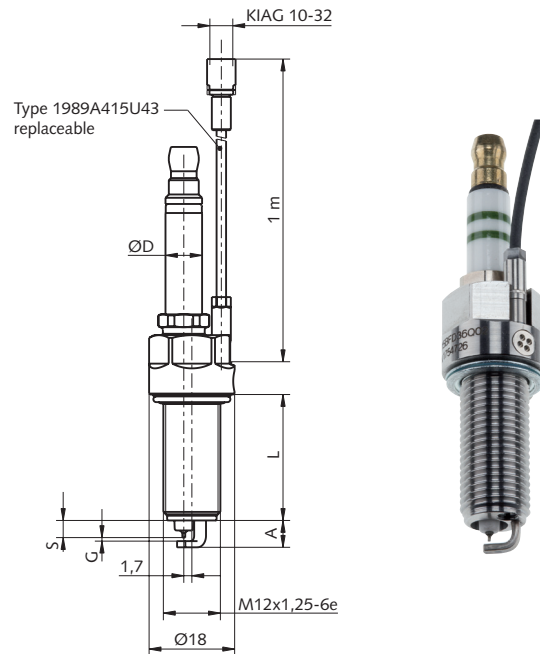
Space to incorporate the sensor has been created by positioning the ceramic insulator slightly (1,7 mm) eccentrically. The sensor can be replaced if repair is necessary.

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 6115B... is also available with PiezoSmart®. PiezoSmart® 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 6995B... 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 6995BFD34 is the repair kit matching spark plug Type 6115BFD34A41.



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 ⁻¹ , 9 bar p _{mi}		
Δp (short-term drift)	bar	<±0,6
Δp _{mi}	%	<±3
Δp _{max}	%	<±1,5
Insulation resistance, sensor		
at 20 °C	Ω	>10 ¹³
at 200 °C	Ω	>10 ¹¹

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This information corresponds to the current state of knowledge. Kistler reserves the right to make technical changes. Liability for consequential damage resulting from the use of Kistler products is excluded.

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Technical Data (cont.)

Insulation resistance of plug at room temperature between central electrode and plug body at 1 000 V	MΩ	>100
Final electronic test of plug spark discharge at		7 bar/20 kV
Dielectric strength	kV	<35
Torque wrench setting for plug	N·m	see table
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 to 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 1300A19.

A bore 20 mm in diameter is necessary.

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

Note: Use grease Type 1067 to make it easier to draw the insulating sheath on and connect the plug connector. This ensures good insulation and makes subsequent 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:

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

Since each manufacturer uses its own numbering system, cross comparison is only possible using a commercial reference book. See Kistler's combustion analysis 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 M12x1,25	15 ... 25	10 ... 15

Table 1: Mounting torque

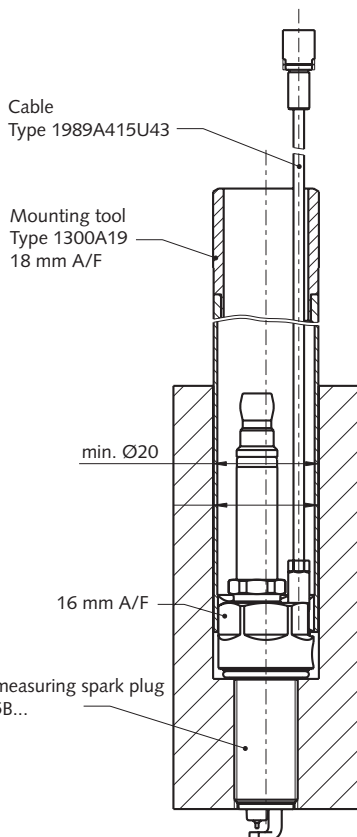


Fig. 1: Mounting measuring spark plug

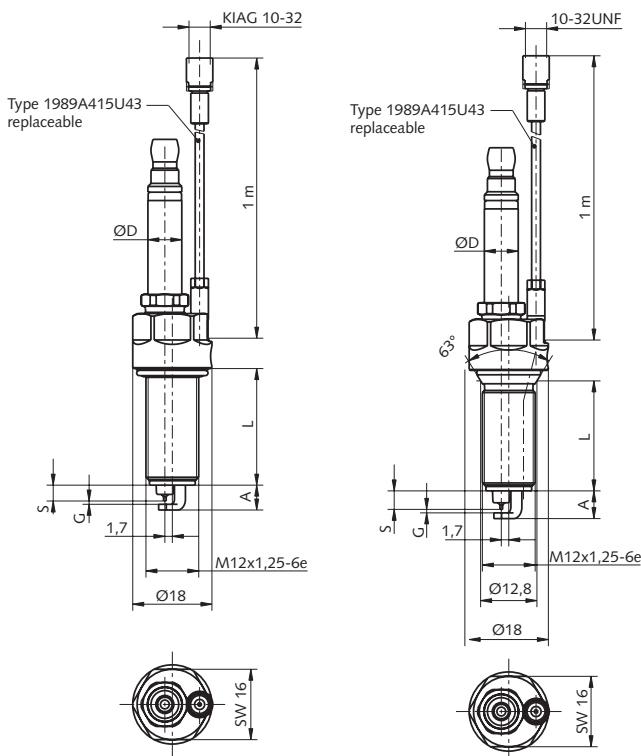
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Available Versions of the M12x1,25 Measuring Spark Plug Type 6115B...

Type	BFD16	BFD34	BFD34Q01	BFD34Q02	BFD34Q04	BFD35Q01	BFD35Q04	BFD35Q05
Thread length L mm	19	26,5	26,5	19	26,5	26,5	26,5	26,5
Seal	flat	flat	flat	flat	flat	flat	flat	flat
Heat value	6	4	4	4	4	5	5	5
Spark position S mm	2,7	3,65	3,65	3,65	3,65	4,75	4,75	5,05
Max. depth A mm	4,8	5,65	5,65	5,65	5,65	7,15	7,15	7,15
Plug gap G mm	0,8	0,7	0,7	0,7	0,5	1,1	1,1	0,8
Dia. of ceramic insulator D mm	10,5 ³⁾	10,5 ²⁾	9,0	10,5 ²⁾	10,5 ²⁾	10,5 ³⁾	9,0	10,5 ³⁾
Wrench size	16	16	16	16	16	16	16	16

Type	BFD36	BFD36Q04	BFD36Q05	BFD36Q06	BFD36Q07	BFD37Q01	BFD65Q01
Thread length L mm	26,5	26,5	26,5	19	26,5	26,5	28 (24,5)*
Seal	flat	flat	flat	flat	flat	flat	flat
Heat value	6	6	6	6	6	7	5
Spark position S mm	3	4,7	2,9	4,7	4,7	4,9	3,55
Max. depth A mm	5,0	6,8	4,8	6,8	6,8	7,3	5,65
Plug gap G mm	0,7	0,8	0,6	0,8	0,8	1,1	0,8
Dia. of ceramic insulator D mm	7,7	9,0	9,0	10,5 ³⁾	10,5 ³⁾	10,5 ¹⁾	10,5 ²⁾
Wrench size	16	16	16	16	16	16	16

* Thread length



Type	BCD25	BCD25Q01
Thread length L mm	25	25
Seal	conical	conical
Heat value	5	5
Spark position S mm	4,2	4,2
Max. depth A mm	6,3	6,3
Plug gap G mm	0,8	0,8
Dia. of ceramic insulator D mm	10,5 ²⁾	9
Wrench size	16	16

- 1) Insulating sheath Ø10,5 l = 16 mm 3.221.522
- 2) Insulating sheath Ø10,5 l = 22 mm 3.221.513
- 3) Insulating sheath Ø10,5 l = 24 mm 3.221.509

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Fig. 2: Available types



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

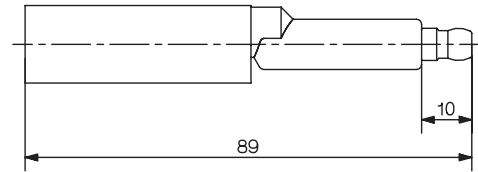


Fig. 4: Spark plug extension connector Type 1700B15

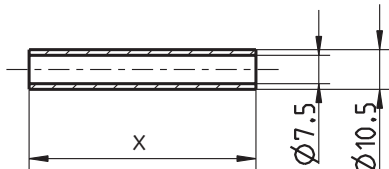


Fig. 5: Insulating sheath, see spare parts for lengths

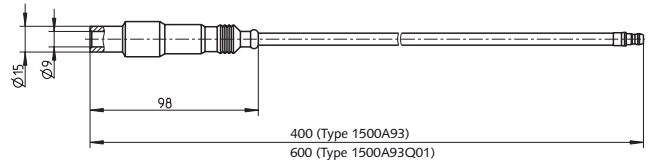


Fig. 6: Spark plug extension cable Types 1500A93 (L = 400 mm) and 1500A93Q01 (L = 600 mm)

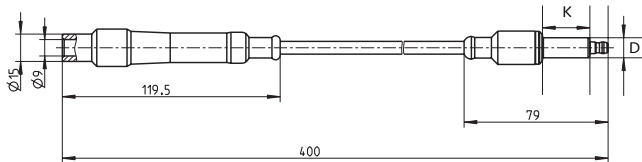


Fig. 7: Spark plug extension cable Type 1500A97 (L = 400 mm)

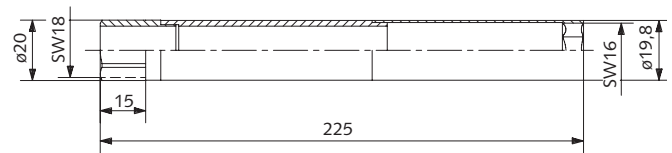


Fig. 8: Wrench for mounting plug Type 1300A19

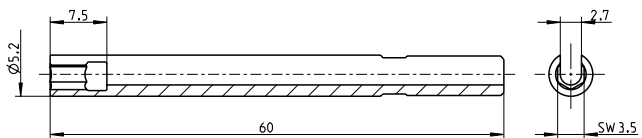


Fig. 9: Wrench for connecting cable Type 1300A125

- Extension cable for measuring spark plug Type 6115B...

L = 400 mm	1500A93
L = 600 mm	1500A93Q01
L = 400 mm	1500A97
- Adapter for pressure generator Typ 6904

Flat seal	6593
Conical seal	6578

Included Accessories	Type/Art. No.
• Coupling, 10-32 neg. – BNC pos. (for non PiezoSmart® version)	1721
• Grease for connecting high-insulation extension connector, 5 ml	1067

Optional Accessories	Type/Art. No.
• Adapter, Triax – BNC pos.	1704A4
• PiezoSmart® extension cable	1987B...
• Wrench for mounting plug (16 mm)	1300A19
• Wrench for connecting cable	1300A125
• Torque wrench for plug	1300A11
• Fork insert, 18 mm, for torque wrench Type 1300A11	1300A15
• Grease for connecting high-insulation extension connector, 5 ml	1067
• High-insulation extension connector	1700B15

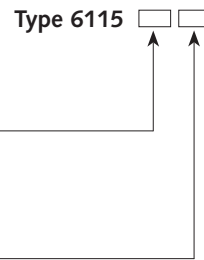
Spare Parts	Type/Art. No.
• Viton® cable M3	1989A415U43
• Spare PiezoSmart® cable with data	1985A8S411U43
• High-insulation extension connector	1700B15
• Coupling, 10-32 neg. – BNC pos.	1721
• Repair kit ⁴⁾	6995B...
• Insulating sheath Ø10,5 l = 14 mm	3.221.512
• Insulating sheath Ø10,5 l = 16 mm	3.221.522
• Insulating sheath Ø10,5 l = 18 mm	3.221.515
• Insulating sheath Ø10,5 l = 20 mm	3.221.518
• Insulating sheath Ø10,5 l = 22 mm	3.221.513
• Insulating sheath Ø10,5 l = 24 mm	3.221.509

⁴⁾ The end of the ordering key for the repair kit is the same as that of the measuring spark plug it matches.

Ordering Key

Type from picture 2,
 available versions, page 3

Without PiezoSmart	A41
With PiezoSmart ⁵⁾	S41



⁵⁾ Detailed information about PiezoSmart® sensor identification may be found in the PiezoSmart brochure, Doc. No. 100-421.

Ordering Example

M12x1,25x26,5 measuring spark plug with heat value of 4, see table for details of spark position **6115BFD34A41**

M12x1,25x26,5 measuring spark plug with heat value of 4 and PiezoSmart® sensor identification, see table for details of spark position **6115BFD34S41**

Repair kit for measuring spark plug Type 6115BFD34A41 **6995BFD34**

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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: M ____ x ____ , ____ mm

Thread length L: ____ , ____ mm

Sealing: flat conical

Heat value: _____ Original _____ BOSCH/BERU

Spark position S: ____ , ____ mm

Max. depth A: ____ , ____ mm

Plug gap G: ____ , ____ mm

Diameter of ceramic insulator D: ____ , ____ mm

Insulator length K: ____ , ____ mm

Miscellaneous: _____

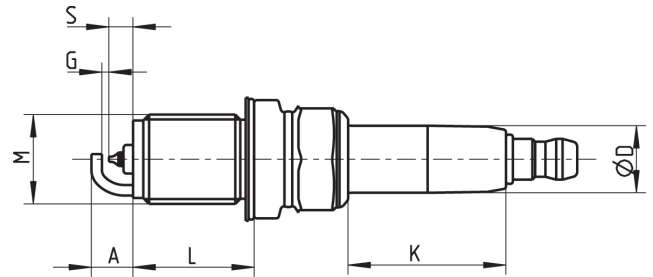


Fig. 10: Dimensions of spark plug Type 6115B...

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