KISTLER
measure. analyze. innovate.

Measuring Spark Plug

Type 6117B...

with Integrated Cylinder Pressure Sensor

The measuring spark plug allows a pressure measurement without a drilled hole. In the spark plug Type 6117B... is integrated the worlds smallest piezoelectric high temperature, cylinder pressure sensor.

- Measuring without measuring bore
- Highest natural frequency (up to 100 kHz) for high rpm
- Sensor mounted flush with the combustion chamber
- High sensitivity
- High accuracy
- Different heat values available

Description

By an eccentric electrode arrangement the space for sensor mounting is provided. The miniature pressure sensor can be dismounted for maintenance purposes. However, in the normal case dismounting of the sensor by the customer is not recommended.

The sensor is mounted from the front of the spark plug and fixed by means of a screw which also serves as flame protection. The cable Type 1927A1 can be dismounted.

This sensor is installed flush with the combustion chamber, allowing for a natural frequency of more than 100 kHz. Therefore the Type 6117B... is also well suited for indicating measurements at high engine speed.

This sensor is also available in a version Type 6617B... with impedance converter integrated in the cable connector (voltage output). See data sheet 12.5147.

Application

Cylinder pressure measurements with the measuring spark plug are recommended in cases when expenditure for the sensor system should be minimal. An example is the adjustment of the engine electronics in racing cars (ignition, injection) near the knocking limit.

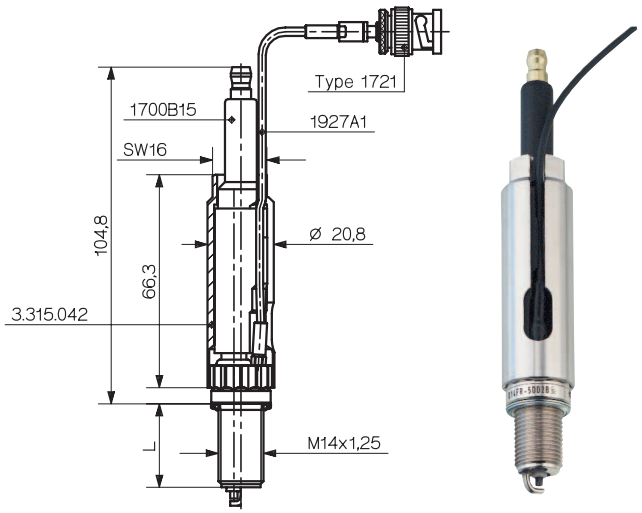


Fig. 1: Complete Measuring Spark Plug

The measuring spark plug Type 6117B... is preferred to the spark plug Type 6517B... when high engine speeds prevail (>5000 rpm), since it has a considerably higher natural frequency.

000-022e-09.02 (DB03.6117Be)

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.

Kistler Instrumente AG, PO Box, Eulachstrasse 22, CH-8408 Winterthur
Tel +41 52 224 11 11, Fax 224 14 14, info@kistler.com, www.kistler.com

KISTLER
measure. analyze. innovate.

Technical Data

Range	bar	0 ... 200
Calibrated partial range	bar	0 ... 50
Overload	bar	250
Sensitivity at 200 °C	pC/bar	≈–15
Natural frequency	kHz	≈130
Spark Plug with integrated sensor		
Linearity	% FSO	≤±0,6
Acceleration sensitivity		
Axial	bar/g	<0,005
Radial	bar/g	<0,005
Operating temperature range	°C	≤350
Sensitivity shift		
200 ±50 °C	%	<±1,5
Thermal shock		
At 1500 min -1,9 bar imep		
Δp (short-time drift)	bar	<±0,8
Δimep	%	<±4
ΔPmax	%	<±2
Insulation resistance of sensor		
At 20°	Ω	$>10^{13}$
At 200°	Ω	$>10^{11}$
Insulation resistance of spark plug		
At ambient temperature		
Between central electrode		
and spark plug body at 1000 V	M Ω	>100
Electrical final test of spark plug		
Spark discharge for	7 bar/20 kV	
Break through resistance	kV	<35
Tightening torque of sensor	Nm	1,2 ... 1,3
Tightening torque of spark plug	Nm	20 ... 25
Capacitance for sensor		
with 1 m cable	pF	110
Weight (with protection cartridge)	g	130

Mounting (Fig. 2)

The measuring spark plug is fitted together with the insulating extension and the protection cartridge into the spark plug bore with the special mounting key Type 1300A19. A spark plug bore of only 21 mm diameter is sufficient. In order to protect the spark plug insulator, the protection cartridge as well as the insulating extension remain mounted on the spark plug.

In order to avoid electrical noise, the cable should be connected without extension directly to the charge amplifier with the coupling 1721.
Use mounting grease 1067 prior to assembling the insulation extension. This secures a high isolation and ease of removal.

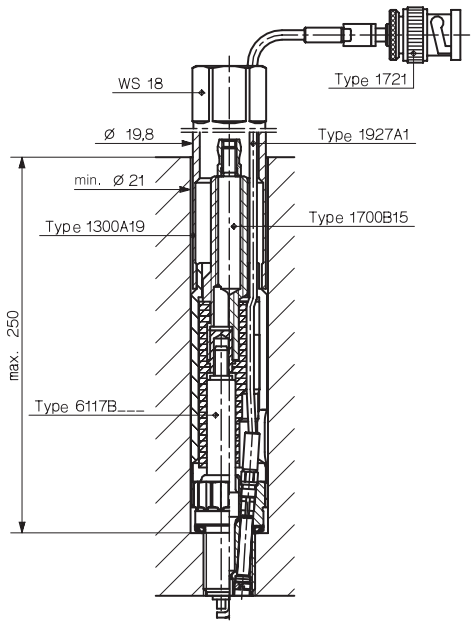


Fig. 2: Mounting of the plug in the spark plug bore

Shape

Bi-Hexagonal	SW 17
Central electrode	Cu/Ni
Electrode gap nominal	refer to technical data
Ground electrode (normal)	Center electrode, if not indicated otherwise

Scope of Delivery with Included Accessories

- Measuring spark plug Type 6117B...
- Protection cartridge Art.no. 3.315.042.
- Incl. insulating extension Type 1700B15
- Coupling 10-32 neg. - BNC pos. 1721



❶ Measuring Spark Plug
❷ Insulating extension
❸ Protection cartridge

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.

Kistler Instrumente AG, PO Box, Eulachstrasse 22, CH-8408 Winterthur
Tel +41 52 224 11 11, Fax 224 14 14, info@kistler.com, www.kistler.com

KISTLER
measure. analyze. innovate.

How to Order

6117B □□□□

Seal		
Flat		**F**
Tapered		**C**

Electrode		
Overhead		**D**
Surface Gap		**G**

Thread length		
Seal Flat	L = 19 mm	**1**
	L = 26 mm	**2**
	L = 22 mm	**4**
Seal Tapered	L = 17,5 mm	**1**
	L = 23,5 mm	**2**
	L = 25,4 mm	**3**

Heat Range	
375	**07**
275	**3**
225	**5**
200	**6**
175	**7**
125	**9**

Heat Range (HR)

The heat range defines the thermal conductivity of the plug. Hot plugs (10, 7) should be used for standard engines, often operated in part load. Cold plugs (09, 07) are used for high performance engines under full load.
The Kistler measuring spark plugs are classified according to the BERU/BOSCH range:

NEW	10	9	8	7	6	5	4	3	09	08	07
OLD	100	125	150	175	200	225	250	275	325	350	375
	Hot		↔		**medium**			↔		**Cold**	

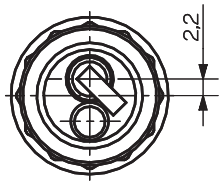
Since every manufacturer uses a different numbering system, a reference hand book has to be used to find the appropriate heat range.

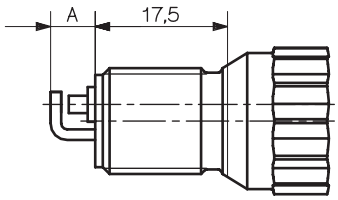
The original heat range should be used if possible.
A spark plug can be replaced by a colder spark plug, but never by a hotter one. A spark plug with a Heat Range of 6 can be replaced by one with a heat value of 5, but not the contrary.

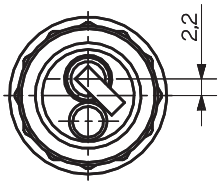
Available Versions of the M14 x 1,25 Measuring Spark Plug

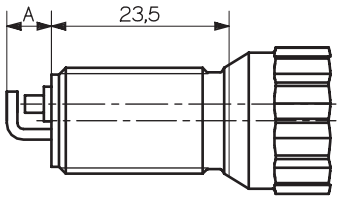
Type	**BCD15**	**BCD17**
Thread Length	17,5 mm	17,5 mm
Seal	Tapered	Tapered
Heat Range	5	7
Spark Position A	$5{,}2^{\pm 0{,}3}$	$5{,}2^{\pm 0{,}3}$
Electrode Gap	$0{,}8^{+0{,}1}$	$0{,}8^{+0{,}1}$

Type	**BCD23**	**BCD25**	**BCD26**	**BCD27**
Thread Length	23,5 mm	23,5 mm	23,5 mm	23,5 mm
Seal	Tapered	Tapered	Tapered	Tapered
Heat Range	3	5	6	7
Spark Position A	$3{,}2^{\pm 0{,}3}$	$5{,}2^{\pm 0{,}3}$	$5{,}2^{\pm 0{,}3}$	$5{,}2^{\pm 0{,}3}$
Electrode Gap	$0{,}8^{+0{,}1}$	$0{,}8^{+0{,}1}$	$0{,}8^{+0{,}1}$	$0{,}8^{+0{,}1}$









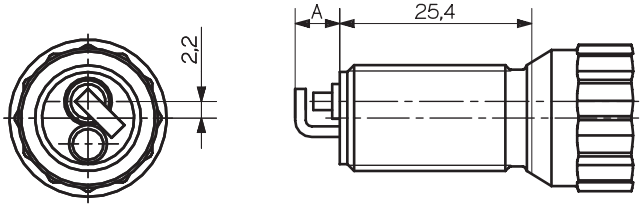
000-022e-09.02 (DB03.6117Be)

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.

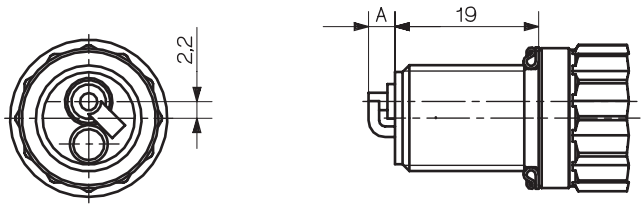
Kistler Instrumente AG, PO Box, Eulachstrasse 22, CH-8408 Winterthur
Tel +41 52 224 11 11, Fax 224 14 14, info@kistler.com, www.kistler.com

KISTLER
measure. analyze. innovate.

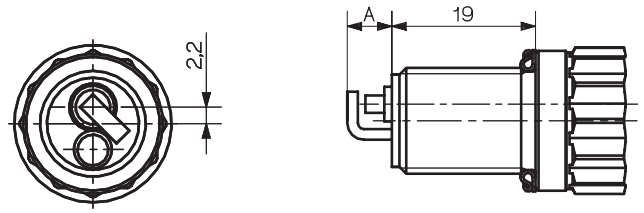
Type	BCD36	BCD39
Thread Length	25,4 mm	25,4 mm
Seal	Tapered	Tapered
Heat Range	6	9
Spark Position A	$7{,}2^{\pm 0{,}3}$	$5{,}2^{\pm 0{,}3}$
Electrode Gap	$1{,}1^{+0{,}1}$	$0{,}8^{+0{,}1}$



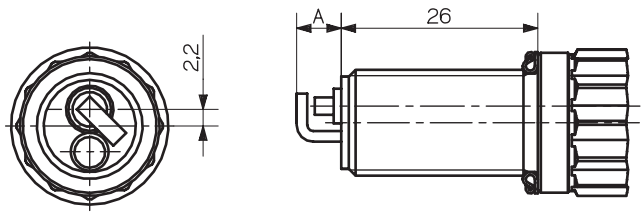
Type	BF107
Thread Length	19 mm
Seal	Flat
Heat Range	07
Spark Position A	$2{,}5^{\pm 0{,}3}$
Electrode Gap	$0{,}5^{+0{,}1}$



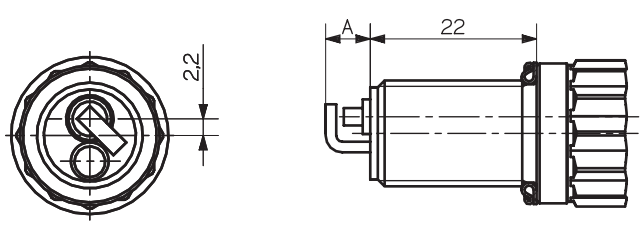
Type	BFD13	BFD15	BFD16	BFD17
Thread Length	19 mm	19mm	19 mm	19 mm
Seal	Flat	Flat	Flat	Flat
Heat Range	3	5	6	7
Spark Position A	$3{,}2^{\pm 0{,}3}$	$5{,}2^{\pm 0{,}3}$	$5{,}2^{\pm 0{,}3}$	$5{,}2^{\pm 0{,}3}$
Electrode Gap	$0{,}8^{+0{,}1}$	$0{,}8^{+0{,}1}$	$0{,}8^{+0{,}1}$	$0{,}8^{+0{,}1}$



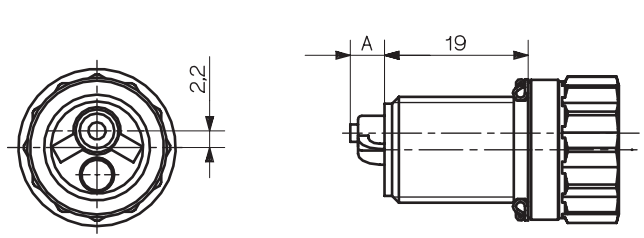
Type	BFD25	BFD27
Thread Length	26 mm	
Seal	Flat	
Heat Range	5	7
Spark Position A	$5{,}2^{\pm 0{,}3}$	$5{,}2^{\pm 0{,}3}$
Electrode Gap	$0{,}8^{+0{,}1}$	$0{,}8^{+0{,}1}$



Type	BFD47
Thread Length	22 mm
Seal	Flat
Heat Range	7
Spark Position A	$6{,}5^{\pm 0{,}3}$
Electrode Gap	$1{,}1^{+0{,}05}$



Type	BFG16
Thread Length	19 mm
Seal	Flat
Heat Range	6
Spark Position A	$3{,}5^{\pm 0{,}3}$
Electrode Gap	$1{,}75^{+0{,}10}$



000-022e-09.02 (DB03.6117Be)

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.

Kistler Instrumente AG, PO Box, Eulachstrasse 22, CH-8408 Winterthur
Tel +41 52 224 11 11, Fax 224 14 14, info@kistler.com, www.kistler.com

KISTLER
measure. analyze. innovate.

Spare parts

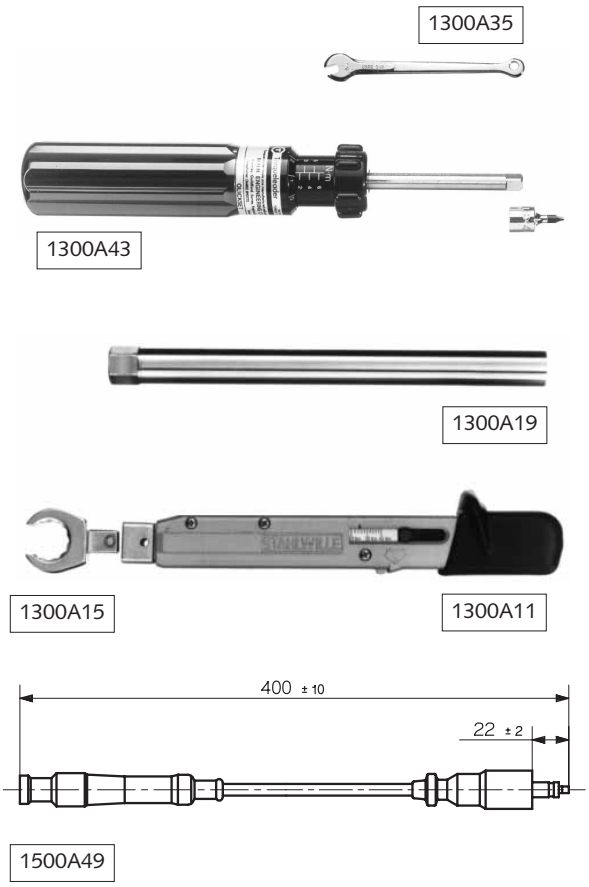
Sensor	7.110.455
Fixing screw	3.315.033
Protection cartridge Art. No.	3.315.042
Insulating extension	1700B15
Coupling 10-32 neg.-BNC pos.	1721

Type	Spark Plug	Cable	Remark
BCD15	3.310.182	1927A1	
BCD17	3.310.181	1927A1	
BCD23	3.310.190	1927A1U17	
BCD25	3.310.185	1927A1U17	
BCD26	3.310.184	1927A1U17	
BCD27	3.310.183	1927A1U17	
BCD36	3.310.191	1927A1U30	
BCD39	3.310.186	1927A1U30	
BF 107	3.310.156	1927A1	Side Electrode
BFD13	3.310.178	1927A1	
BFD15	3.310.177	1927A1	
BFD16	3.310.176	1927A1	
BFD17	3.310.175	1927A1	
BFD25	3.310.196	1927A1U30	
BFD27	3.310.180	1927A1U30	
BFD47	3.310.199	1927A1U34	
BFG16	3.310.203	1927A1	Surface Gap

The pressure sensor and the cable should normally not be disconnected.
Exception: If the plug, the sensor or the cable are defective, they can be replaced as spare parts.

Caution: The sensor sensitivity may slightly change after reinstallation in a new plug due to different clamping conditions. We recommend for precision measurements to make a recalibration of the measuring spark plug. When using a new sensor, a new calibration has to be made anyway. Refer to the Instruction Manual.

Optional Accessories	**Type**
• Mounting key for spark plug	1300A19
• Torque wrench for spark plug	1300A11
• Hex fork for wrench	1300A15
• Fork wrench hex. WS4 for cable	1300A35
• Spare connecting cable 1 m Type 6117B... please refer to table	1927A...
• Torque wrench for sensor with 4 x 0,8 mm	1300A43
• Mounting grease (insulating) 5 ml	1067
• Ignition-cable extension 6117B... length 400 mm	1500A49
• Calibration adapter for 6117BCD...	6588A
• Calibration adapter for 6117BFD...	6587A



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.

Kistler Instrumente AG, PO Box, Eulachstrasse 22, CH-8408 Winterthur
Tel +41 52 224 11 11, Fax 224 14 14, info@kistler.com, www.kistler.com